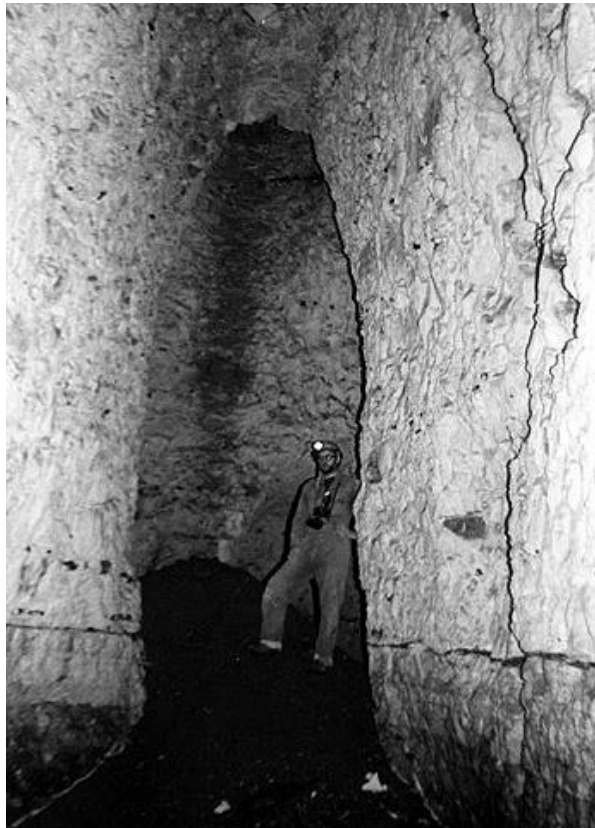


KENT UNDERGROUND RESEARCH GROUP



CHALK MINING

and associated industries of

FRINDSBURY

Adrian Pearce & Dave Long

Research Report 3

CHALK MINING & ASSOCIATED
INDUSTRIES OF FRINDSBURY

Adrian Pearce & Dave Long

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1.0 INTRODUCTION

Frindsbury is a suburb of Strood in Kent (see Figs.1 & 2) with a population of over 12,000. A stranger walking around the area today will see a typical example of urban development with a high density of houses providing a dormitory area for the Medway Towns. There are few surface remains of its previous history and the influx of people from outside the area means that the proportion of locally born inhabitants gets less each year.

As a result, it came as something of a shock to many of them when a tragic accident happened in 1967. Briefly, a Mrs J. Thompson died when the ground subsided beneath her and she fell down a deep shaft. Despite attempts at rescue, her body was never recovered and the hole was completely infilled. Subsequent to this, several previous subsidences in the area were brought to light and the Rochester upon Medway City Council commissioned a survey by W.S. Atkins & Partners, a firm of engineering consultants. Their first report in 1970 suggested that this was a freak accident and a general survey of the area was not warranted. After further subsidences in following years, they produced a second report in 1985 in which they stated that there was a more significant danger to the public and property than had previously been implied.

As mining historians, we became interested in Frindsbury in February 1986 since the incidents indicated previous mining activity and there was already evidence of a Frindsbury Chalk Mine. Our original intention was to attempt to gain access to the underground workings and to research the history of the Frindsbury Mine. We immediately found that three major factors made this area completely different from the usual mining location and, as a result, determined the scope of this study :-

All surface mining features had completely disappeared under a housing estate and any research had to be purely theoretical. Underground access would only be possible if a further subsidence occurred since all previous sites had been completely infilled prior to our interest.

Mining records for the South-East are sparse if not non-existent. The result was a jigsaw study where information had to be obtained in small parts from many different sources and linked together. During the accumulation of this raw material, much useful information was obtained on non-mining matters including other local industries.

Unlike other mining areas, local mines were not worked as a self-contained operation but as part of another activity carried out on site. As a result, we could not look at the mining history in isolation but had to include details of the associated industries, especially brickfields.

The result of these factors was that this study had to incorporate some of the industrial and social history of the area as well as the mining activities. The big problem of course was where to draw the line. The area of the Medway Towns is so rich in industrial history that it would take a lifetime to carry out a worthwhile study. In addition, several of the local industries are so fascinating in themselves that they could be the subject of a completely separate article. As a result, we have decided

to restrict this study to a detailed history of chalk mining and related industries in the small area bounded by the old villages of Frindsbury, Wainscott and Bill Street. For completeness, we have also included brief descriptions of some of the main industries within Frindsbury Parish but outside the immediate area of study. These descriptions are based on a few items of information that came to hand during our research and are not intended to be a definitive study. They are included to demonstrate that intense industrial activity was not confined to the immediate area of study but was a general local trend. It is hoped that they may stimulate others to carry out more detailed research - a particularly worthwhile study would be the extractive industries of the Manor Farm area,

It was also difficult to tie all the threads of information into a logical sequence since so much seems to have happened within even this small area. There were some subjects that were new to us and we had to learn about them from scratch. As a result, we have attempted to cater for a general readership by including background notes on certain features and industries with which the reader may be unfamiliar. Again, these are only general descriptions and, should the reader be interested, they are referred to more detailed publications in the references section at the end. We apologise in advance if this study appears to be rather "bitty" in places but we could think of no other way of setting it out.

This study is primarily a history but it should answer some of the questions about the cause of the subsidences. As mining historians, it was particularly frustrating for us in not being able to actually explore any of the underground features ourselves. The lack of complete records means that there are gaps in our knowledge and we have attempted to fill these by comparison studies or logical conjecture. It does not represent the complete story, because most remains are buried beneath the houses, but it is a start and can be updated as further information comes to light. Some valuable information is believed to be held by the solicitors firm of Winch & Winch in Chatham and we are negotiating for future access to this material. The industrial past of the area has been buried under bricks and concrete (a supreme irony!) but it is a past which will not allow itself to be forgotten - there will doubtless be further subsidences in the future.

Fig.1 The Medway Towns

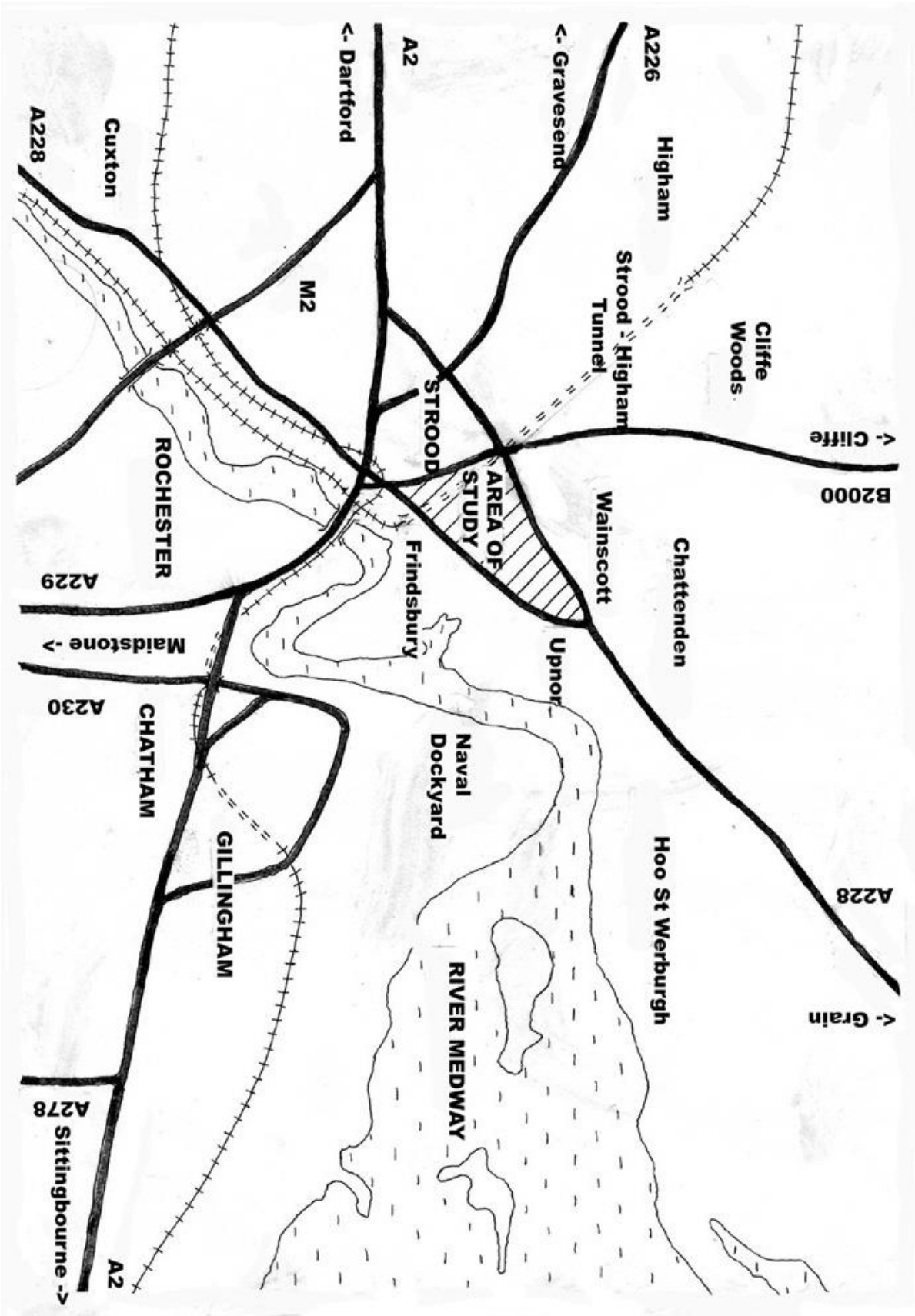
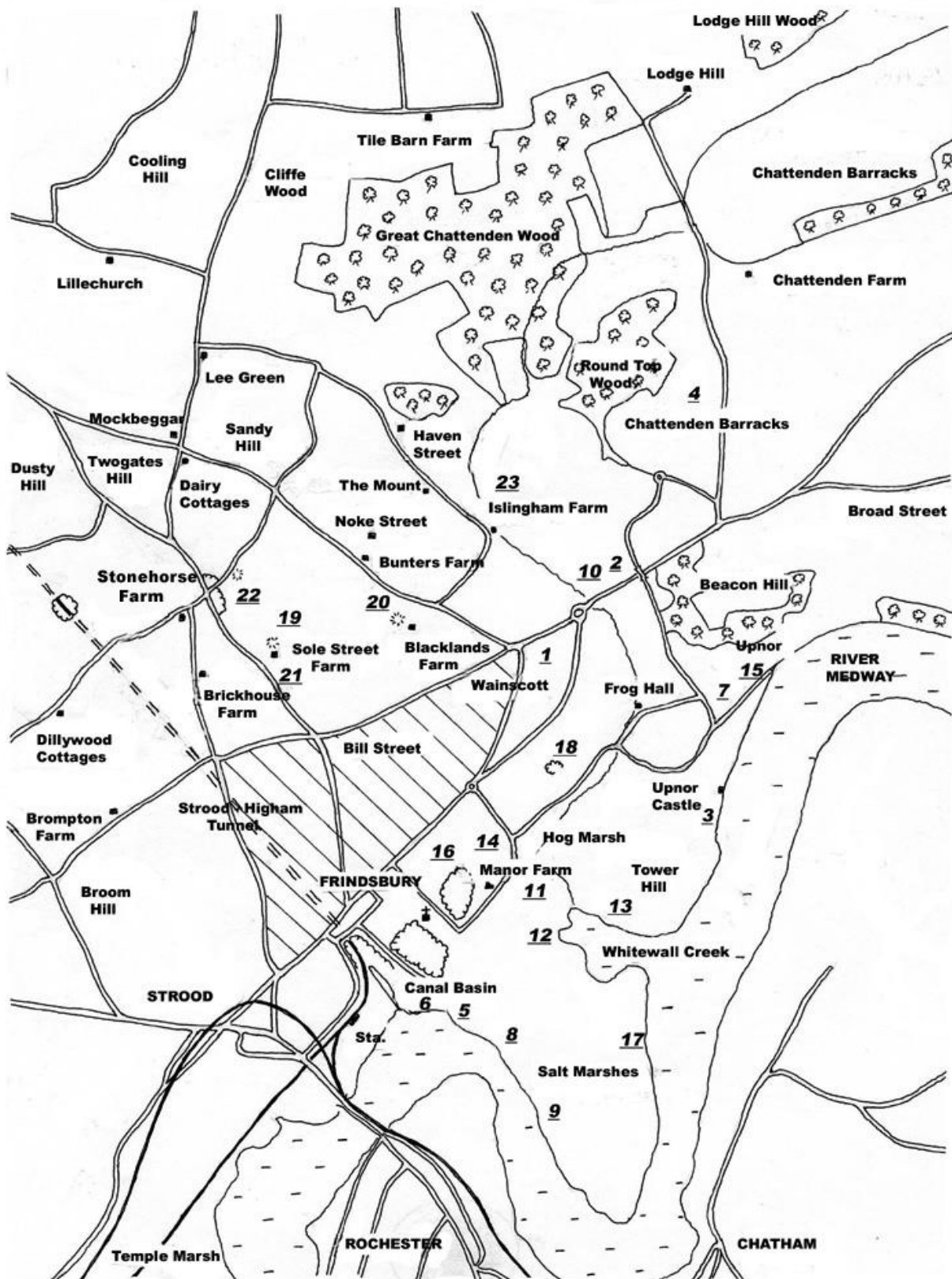


Fig.2 Frindsbury Parish



2.0 THE FRINDSBURY AREA

2.1 GENERAL HISTORY OF FRINDSBURY

Frindsbury has perhaps one of the oldest industrial histories in Britain since there is evidence that it was a centre for flint axe manufacture during the Neolithic period. In AD764, the land was given to the Bishop of Rochester by Offa, King of Mercia, and was known as Aeslingham after the Saxon tribe of Aeslingas who had settled here. The manor of Aeslingham (from which Islingham Farm survives today) ruled over a much greater area than the present Frindsbury Parish and included Strood, which was then only a small hamlet. It is from this time that the name is believed to have arisen – “Freond-Berig” (Freeman's Court). This had been corrupted to Frandesberie by the 11th Century, Ffrensberie by the 14th Century and eventually became known as Frindsbury.

The Domesday Book of 1068 describes the area as the Hundred of Essamele, which has been translated as Shamwell but is more likely to be a corruption of Aeslingham. Within this Hundred were two entries that correspond to areas within the present parish, viz

Frindsbury – held by the Bishop of Rochester.

“Before 1066 it answered for 10 sulungs (unit of 200 acres), now 7. Land for 15 ploughs. In lordship 5 ploughs, 40 villagers and 28 smallholders have 11 ploughs. A church, 9 slaves, a mill at 12s, meadow 40 acres, woodland, 5 pigs, Value £25. Value of what Robert of Tonbridge holds in his territory 10s.”

Haven - held by the Bishop of Bayeux.

“Arnulf of Hesdin holds Haven from the bishop. It answers for 3 yokes (unit of 50 acres). Land for 1 plough. in lordship 6 villagers with 1 smallholder hold 1 plough. Meadow 6 acres, Value 60s. Oswald held it from King Edward. Odo holds 1 yoke from the bishop, also in Haven. Land for half a plough. Value 20s.”

Haven was the hamlet of Haven Street and the lessee Arnulf had larger holdings elsewhere in Kent. He possibly used this area for hunting in the Haven Street Wood, which still exists. Robert of Tonbridge was responsible for the maintenance of Tonbridge Castle and had been allocated many separate parcels of land in Kent for this purpose, one of which was in Frindsbury. The Frindsbury entry presumably refers to the manor that was sited at Islingham Farm and it is apparent that it was already the centre of a growing settlement. The church refers to a chapel that existed here and which was rebuilt between 1137-44. It catered for religious needs in the area until another was built at Strood, resulting in the formation of separate Frindsbury and Strood parishes in 1193.

The old wooden Rochester bridge originated during this era and it is interesting to note that all of the surrounding parishes were made responsible for the maintenance of part of it. Frindsbury (with Borstal, Cuxton and Stoke parishes) was made responsible for the upkeep of the land pier on the Rochester side, together with 3 yards of planking and 3 large support beams. Presumably they originally had to do the repairs themselves but later only provided money.

Without further research, it is impossible to say how the present Manor Farm fits into the picture but it is possible that it became the manor house at a later date with its associated Home Farm. Within Frindsbury parish, a typical feudal land system developed and there arose four small settlements, viz Frindsbury, Wainscott, Bill Street and Home Street. The word "Street" is a common part of local village names, referring to settlements that developed on either side of a single road. By the end of the 18th Century, most of the land away from the River Medway was still predominantly agricultural and in the hands of only a few landowners, the biggest being the Dean & Chapter of Rochester. Down by the river itself, the Naval Dockyard across the water had exerted a considerable influence on the land use. The Board of Ordnance (forerunners of the War Dept) had taken over some land for the fortifications known as Upnor Castle and a powder magazine serving the warships of Chatham Dockyard. In addition there were four private shipyards which sub-contracted to the government to produce warships.

Census returns of 1801 show a population of 1,066 within the parish, which had gradually increased to 1,856 by 1831. It is apparent that the old feudal system was by then beginning to disappear and fewer inhabitants were reliant on agriculture for their livelihood. This is shown by statistics of the occupations of males over 20 years old at this time :-

14	land occupiers
107	agricultural labourers
87	other labourers
151	retail trades & handicrafts.

The Tithe Records dated 1842 were intended to summarise the parish land holdings and usage but they also give us a unique picture of life at that time. The population was still increasing (now 2,150), probably as a result of labour brought into the area to work at the new industries that were developing down by the river. Terraces of cottages were built by the owners of firms to house their workers on site. Many of these were of cheap wooden construction and, due to overcrowding, often rapidly turned in slums. The records give a total of 93 houses and 211 cottages within the parish and this gives an average of 7 inhabitants per household. Even allowing for the large families of that time, some of the cottages must have been used as lodging houses for such a density. There was obviously some speculation at work too since a number of these cottages were owned by absentee landlords who had no connection with the local industries.

The total area of the parish was 3,600 acres and, despite the fact that the Dean & Chapter of Rochester was still the major landowner, the land was beginning to be split up since there were now 113 other landowners of varying amounts of property. Only two thirds of the land was still being used for agriculture by some 31 farmers (both tenants and owner-occupiers) and there were now 6 market gardeners in business on a small scale. A breakdown of the major land use (in acres) was :-

1,680	arable
770	meadows & pasture
140	woodland
56	hops and market gardens

46	private gardens
34	orchards
46	brickfields
34	Board of Ordnance.

The major growth at this time had been within the settlement of Frindsbury itself, which had now become a large village. The other 3 settlements were still little more than hamlets. To serve all of these there were :-

7	shops
5	bakeries
3	millers
2	butchers
7	public houses
2	beer shops
1	basket maker
1	carpenter
1	blacksmith
1	church
3	chapels
1	school
1	workhouse.

The Tithe Records give enough basic information for a separate social history of the parish but there is neither the space nor the scope in this study. This notwithstanding, it is perhaps worth looking briefly at Home Street which represents a typical rural community of 1842 (see Fig.3). The community developed on either side of the road from Strood to the Isle of Grain, in proximity to Home Farm, from which it presumably took its name. The road represented the boundary between the lands to the east, held by the Dean & Chapter of Rochester, and those to the west which had been sold off to the Bingham family and Thomas Wickenden. The Home Farm was occupied by Samuel Stroughill who was a tenant farmer, with land to the north and west. A feature of farmland in this area was that the holdings of the small and medium-sized farmers tended to be separated into a number of isolated fields, presumably the result of competitive bidding for the leases. This must have caused great problems to the farmers and perhaps explains why there are so many lanes in the area in order to provide access to the fields.

The other farmer in Home Street was Thomas Wickenden who was the owner-occupier of Cypress House, sometimes corrupted to Cyprus House. Local rumour has it that it was named after the large tree growing beside it but, if so, it was a mistake since the tree is a Cedar! Wickenden owned a little bit of land but leased most of his fields at Wainscott and to the north. James Browning operated a blacksmith's forge next to Home Farm and was in fact the only one listed in the whole of the parish at that time. It is likely that the forge originated from the time that Home Farm was associated with the Manor House (see Fig.4). Local tradition has it that Grape Vine Cottage was the bailiff's house but this has not been substantiated. It could well have been in earlier times but in 1842 it was no longer part of the Manor Farm estate and the two farms mentioned above were really too small to warrant the

Fig.3 Home Street in 1842

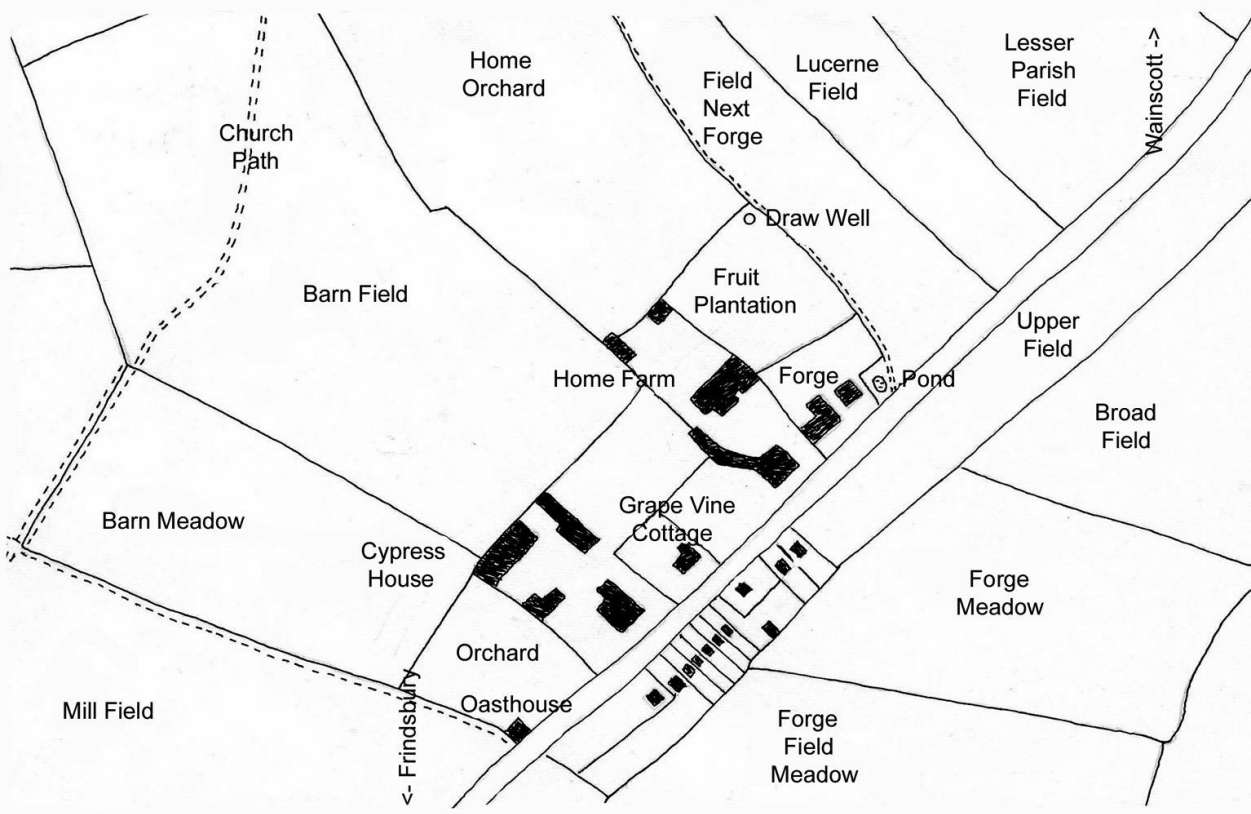
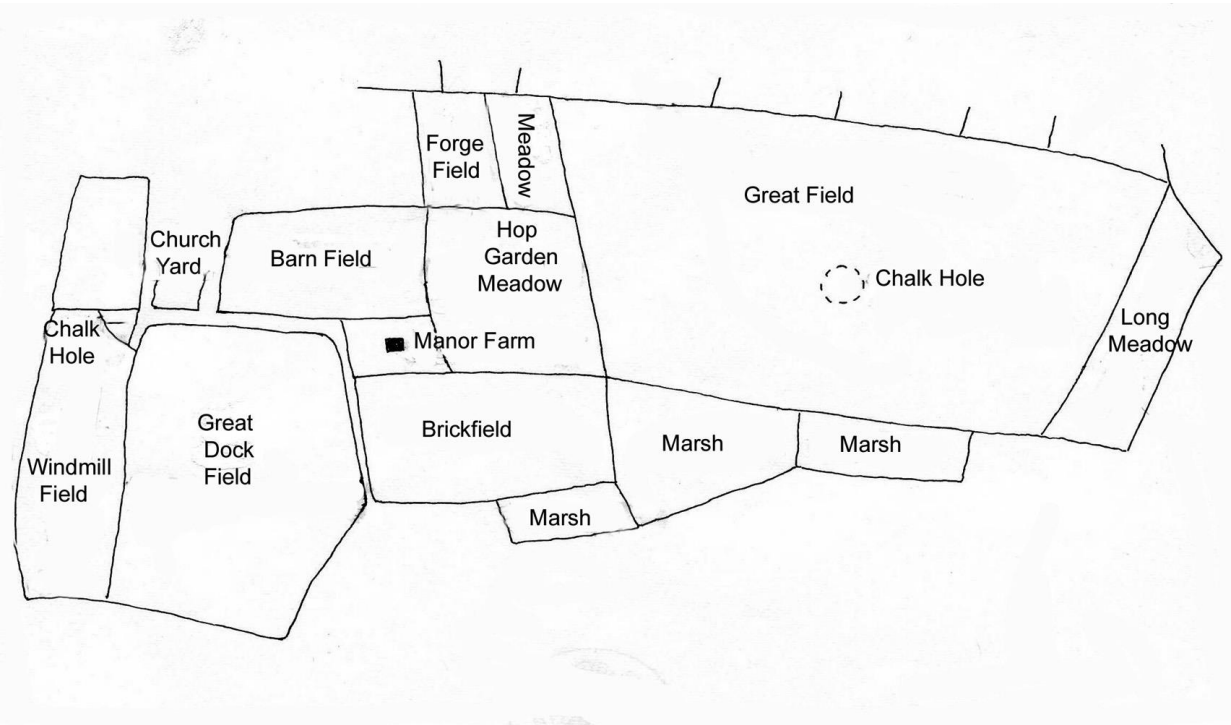


Fig.4 Manor Farm in 1811



employment of the occupier, George Acksedge, as a bailiff. It is more likely that he was the foreman for Samuel Stroughill.

Across the road was a row of 11 houses, two of which were occupied by workers on Manor Farm. The rest were owned by a William Williams who seems to have been somewhat of an enterprising character. In 1841 he was listed as a Wesleyan Minister and yet a year later he was running a beer shop next to Wainscott Pottery, definitely a non-conformist! In later years he moved to Bill Street where he became a brickmaker and lived to be over 70 years old. Of his tenants, 3 were agricultural labourers on the farms, 2 were widows, 1 was a sawyer at Gates' carpentry business in Frindsbury and 1 was a lime burner. He lived in one house himself and one was unoccupied.

During the latter half of the 19th Century, the area of Frindsbury underwent a minor industrial revolution as more and more land was turned over from agriculture to brickfields and chalk quarries, bringing with it the period of greatest prosperity for the area. The War Department bought a large area of land in 1877 to build the Chattenden Barracks, where more ammunition for the warships was stored and a railway built to take it down to the River Medway. By the 1890s, the population had increased to over 5,000 but included in this figure were now the troops based at the barracks. The parish was now split into 2 parts with the agricultural north and the industrial south and Frindsbury village had grown as more houses were built. The total of 304 houses and cottages in 1842 had increased to 608 by 1871 and 976 by 1891.

Unfortunately for the area, it was at this time that the local industries began to decline as brickfields faced competition from other parts of the country. A newspaper report in early 1895 described the extreme poverty of some families living in Bill Street and Wainscott, where the men were unemployed and charitable organisations had distributed food and clothing. By the 1930s, the brickfields in Frindsbury itself had closed and work became scarce. A complete change in character began in the 1950s as Frindsbury became more popular as a residential area and houses were built on the sites of the disused brickfields. Eventually, the houses spread northwards and Home Street, Bill Street and Wainscott lost their separate identity as they were merged into Frindsbury. Down by the river, new industrial estates emerged and, in keeping with the general social trend, people started to live in areas away from their place of work.

2.2 GEOLOGY OF FRINDSBURY

The South East of England consists of rock strata that is more recent than most of Great Britain. The structure was once a huge anticline (see Fig.5), the centre of which has been eroded away to reveal a series of escarpments separated by low lying vales. The rock strata show a symmetrical pattern from the centre of the Weald of Kent and Sussex, with the chalk being the most recent of the Cretaceous rock exposed.

The drainage pattern is superimposed on the landscape and it is noticeable that both the North and South Downs have been cut through by the rivers, with the Medway Valley being the most imposing of these. The area of study is to the north of the

Fig.5 Geological Section of South-East England

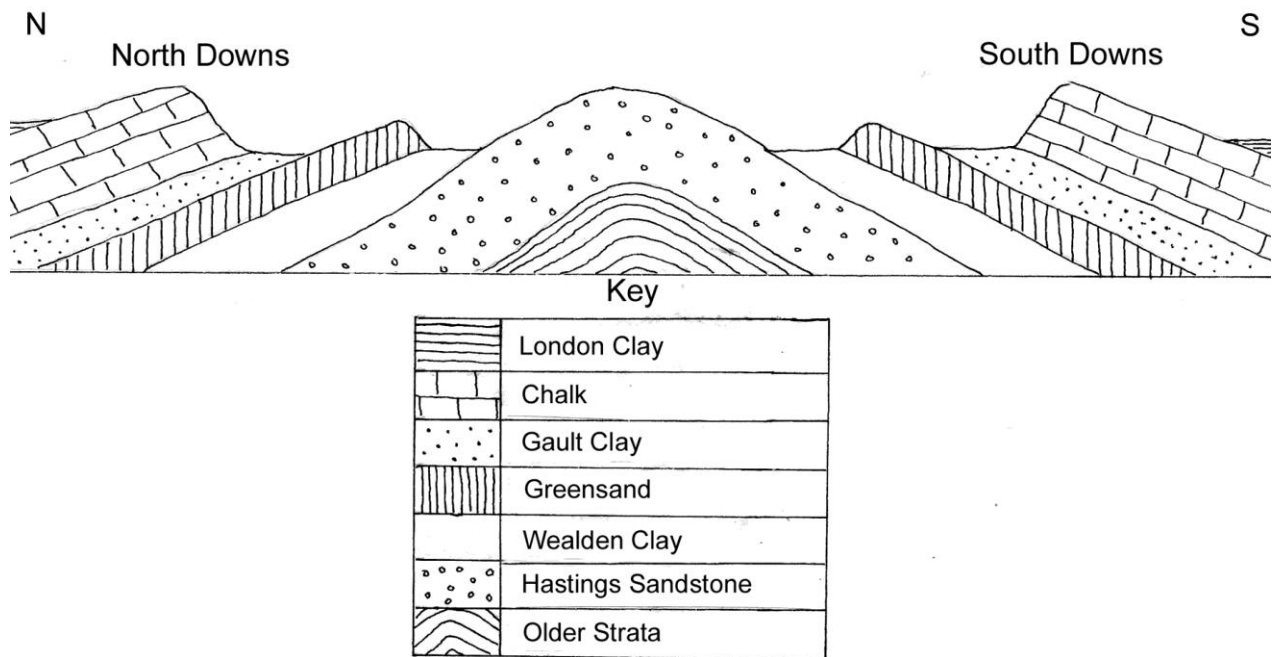
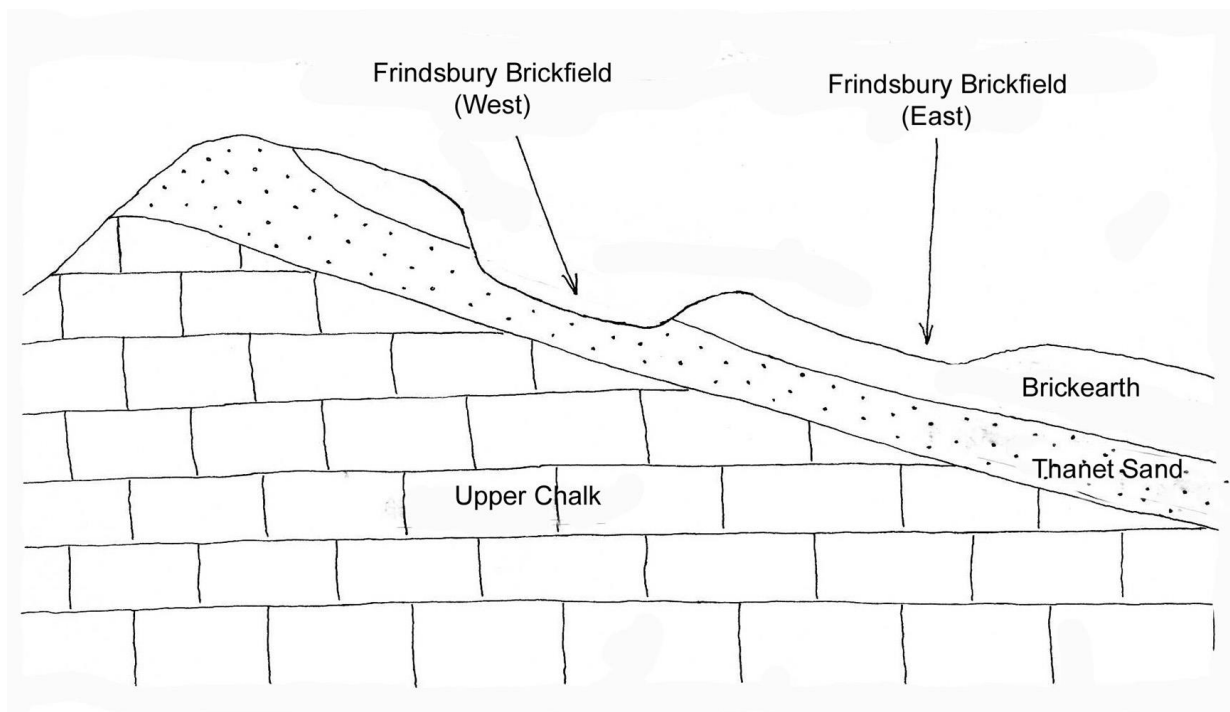


Fig.6 Geological Section of Area of Study



Medway Valley and on the flanks of the North Downs. From this part of the North Downs, stretching onto the Hoo Peninsula, is an escarpment of Eocene rocks. It rises to about 200ft O.D. and is responsible for covering the Upper Chalk with the Thanet Sands. Further to the north, more Eocene deposits can be seen forming the London Basin and consisting of London Clays. Masking much of the solid geology in the area of study are the Head and River deposits dating from Recent times and defined later in the text. The geological sequence for the area of study is shown at Fig.6 and the relative ages of the strata are as follows :-

QUATERNARY	Recent	* Brickearth + River Terrace	1 million years “
CAINOZOIC	Pliocene Miocene Oligocene Eocene	- - - * Thanet Sands + London Clays	15 million years 35 million years 50 million years 75 million years “
MESOZOIC	Cretaceous	* Upper Chalk + Middle Chalk + Lower Chalk + Gault Clay + Greensand + Wealden Beds	120 million years “ “ “ “ “

* Rock strata specific to area of study
+ Associated rock strata

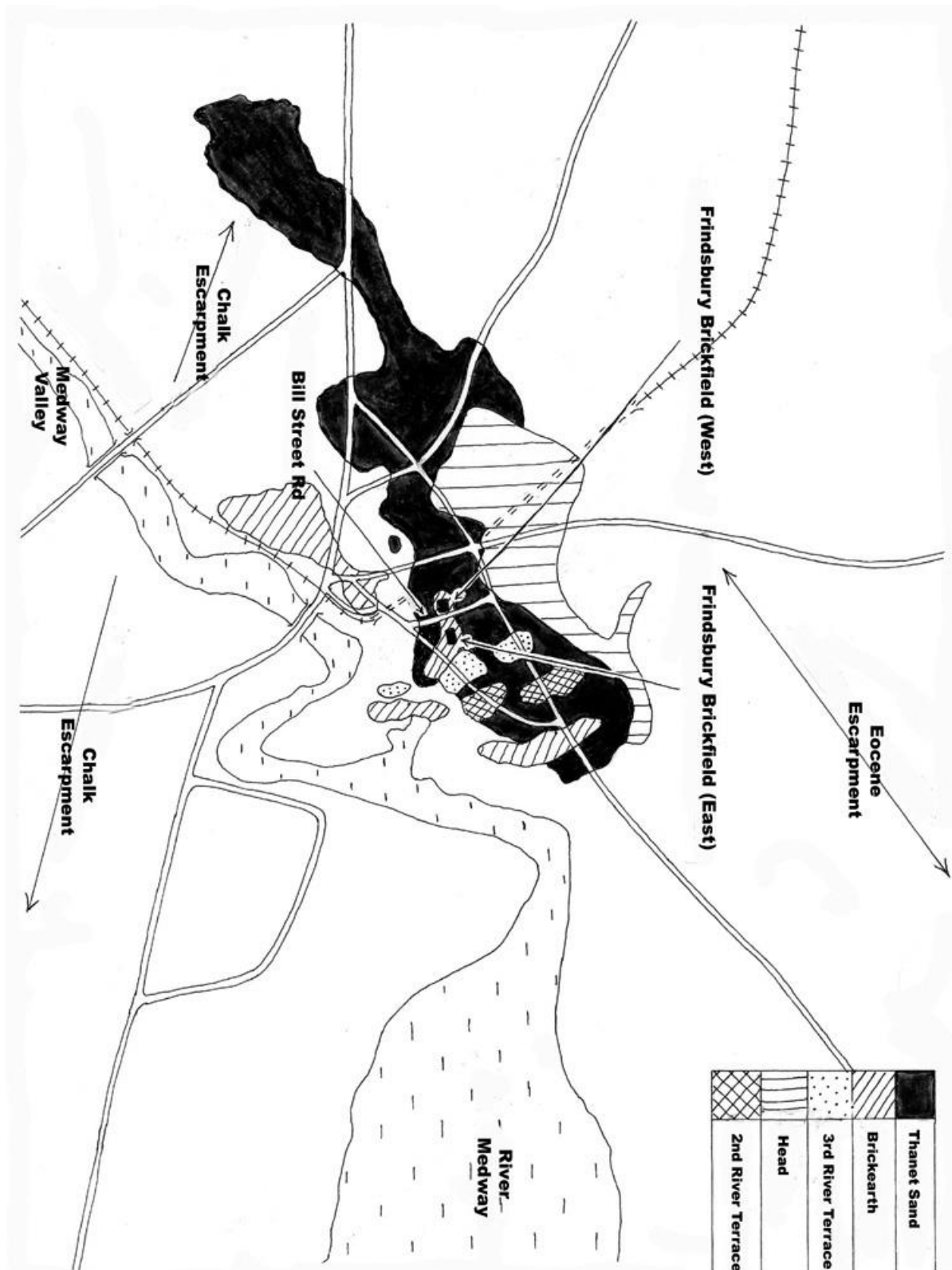
It can be seen that the Brickearth deposits are of Recent origin and this dates them back no more than 1 million years. This table can be used in conjunction with the geological sketch map (see Fig.7). The strata found in the area of study are :-

CHALK – three distinct layers of chalk have been recognised, ie Upper, Middle and Lower, giving a total thickness of rock of about 600ft. The rock is porous and there is no surface drainage, making it necessary to sink wells for a water supply unless settlements have been built on the Chalk /Gault Clay spring line. The chalk in the area of study is Upper Chalk.

THANET SANDS – these consist mainly of sands that rest on the irregular Chalk boundary and fill in the numerous solution hollows. There are five layers recognised within the Thanet Sands, ranging from fine light grey sands to brown clay and loam. The Thanet Sands are often extracted in brickfields for use in the brickmaking process.

BRICKEARTH – this is a Recent deposit and it is a general name given to buff / red / brown structureless loam. It is mostly non-calcareous and needs the addition of chalk for the production of stock bricks. This type of material is also referred to as Head on the geological map of the area and is thought to have been formed by solifluction, probably during the interglacial periods of the Ice Age. Brickearth could also be a water-borne deposit and can be found in the area associated with the four river terraces.

Fig.7 Geological Sketch Map of Frindsbury



The following table shows the proven depth of the strata in this area :-

Head Brickearth		30ft
River Brickearth		30ft
River Gravels	1 st Terrace	35ft
	2 nd Terrace	10ft
	3 rd Terrace	6ft
	4 th Terrace	6ft
Thanet Sands		130ft
Upper Chalk		300ft

The relation of the geology to the area of study can be seen from the section at Fig.6. This shows the Frindsbury Brickfield excavations on both the west and east sides of Bill Street. These excavations can also be identified on the geological sketch map (see Fig.7) as two small "windows" where the Brickearth has been removed exposing the Thanet Sands below.

3.0 GENERAL BACKGROUND INFORMATION

Before we move on to the description of the actual area, it is worthwhile for general readers to learn something about the subject of mining and brickmaking, around which this history revolves. Without a basic understanding of certain techniques and features, most of the later references will be meaningless.

3.1 POSSIBLE UNDERGROUND FEATURES

We must first look at various types of underground feature that could be present in the Frindsbury area and to dispel some of the more bizarre rumours. In order to cater for a general readership, we have described the features in sufficient depth for a basic understanding only. Many of the features are worthy of a complete study in themselves and several have been covered by other authors.

3.1.1 Wells

There are definitely old wells in the area because there were houses here before mains water was supplied about 1890. Their depth will depend firstly on the local water table, which is not known for certain in the area of study but which can be fairly accurately estimated by calculation.

The Southern Water Board estimate that the water table rises in a gradient of 1 in 200 towards high ground away from the River Medway. A measured calculation would thus give a water table of about +15ft O.D. at Frindsbury Hill, which is the approximate centre of the area of study. As a cross check, comparisons can be drawn with the known measurements at nearby wells. The standard measurement is known as the Rest Water Level (RWL), which is the height of water above O.D. when no pumping is taking place, and this can be taken as the localised level of the water table.

There is a well on the premises of the old Lyle's Mineral Water Factory on Frindsbury Road (reputed to have been run by a relative of the sugar family Tate & Lyle). The RWL here is 0ft O.D. Another well at Chattenden Barracks has a RWL of +27ft O.D. In distance measured from the River Medway, the area of Frindsbury Hill is approximately half way between the two wells and thus a rough mean of the RWL would give a figure of +14ft O.D. Thus, the RWL at Frindsbury Hill is likely to be 10-15ft O.D.

The second factor in deciding the well depth is how the wells were actually dug. Wells were sunk by local well-digging gangs at a price per foot so the client would obviously be careful that they were not sunk deeper than necessary. These itinerant well sinkers are worthy of a study in themselves but suffice to say that, despite a reputation for insobriety, they were professionals who dug wells to a standard format. The width of a domestic well was just sufficient for a worker to turn around in and rarely exceeded 3ft.

A wooden pattern was placed on the ground and the well was sunk through the hole therein, a set of sheerlegs and a windlass being used to lower the sinker and raise the spoil. To keep the vertical alignment, a plumb bob was hung through the hole in

the pattern at regular intervals. For safety, the sinker worked in a cage which resembled a barrel with most of the staves removed and these were often abandoned in situ at the bottom of the well. The chalk was an easy substrate to work in and it was hand picked with the spoil being wound to the surface in wicker baskets or leather bags. The strata above the chalk consisted of Brickearth and Thanet Sand in this area and needed support once it had been exposed. To do this, drystone walling (steining) was installed around the shaft supported on a ledge cut out of the chalk. The chalk itself was quite stable and no support was usually needed once it had been reached in sinking. The average well ended at the same diameter as the top, side adits were only driven in the large pumping wells such as those sunk by Water Companies.

The decision as to final depth was quite easy. Once the water table had been reached, water collected in the well bottom and had to be emptied before work could continue. As soon as sufficient water collected overnight that it could not be emptied in one hour, the well was deep enough. This would probably mean that the well bottom would be about 4ft below O.D. Once finished, the well was covered with a slab or a low circular wall in the more refined versions.

Many wells in the Medway area were deepened towards the end of the 19th Century due to a drop in the water table. This was solely due to the increase in pumping from deep wells as populations grew. Now that much of the area's water is extracted from the River Medway, the RWL will have risen again. There have been claims that the driving of the Strood-Higham tunnel lowered the water table in this area by acting as a large drainage level. This is not generally accepted by the Water Board since the tunnel was too small relative to the surrounding area to have anything but a localised effect. It did in fact cause several wells along its line to dry up in 1825 and these had to be deepened at the Canal Company's expense. This wasn't an effective measure, however, since the canal used salt water from the rivers and this seeped into the deepened wells causing pollution. The result was a payment of £979 in compensation to the owners of the wells. The unlucky well owners had to have water transported to them in barrels and in January 1827 a William Watt is recorded as paying 12/- per month to take water from the Strood pump for this purpose.

Taking the above factors into consideration, it is likely that the average well in this area was originally sunk to about 10ft O.D. and, where deepened, extended to 0ft O.D. Thus calculation of depth is merely a matter of subtracting about 10ft from ground level.

The position of wells is more likely to be in back gardens of larger houses with communal ones for the poorer families who could not afford to have their own sunk. Such communal wells would be few in number and likely to be reached from the alleyways behind the older terraced houses in the area. Not all water supplies would be from wells, however, since narrow boreholes were sunk in some cases and connected to a pump. Conversely, the existence of a pump at surface does not necessarily mean the absence of a well since it may have been adapted at a later stage.

Unlike domestic wells, many wells dug for commercial purposes eg Water Works, Cement Factories, etc were usually made wider and deeper because greater volumes of water were pumped out. These averaged 6ft in diameter but in some cases were up to 10ft. Problems were sometimes faced by firms when the water from the chalk was too hard for their purposes or the well was so close to the River Medway that the water was saline through seepage. In these cases, the well was sunk deeper to the Greensand Beds from where a supply of soft water was obtained. The A.P.C.M. Cement Works in Frindsbury sunk their well to 813ft for this purpose. At these depths, the well was continued as a narrow borehole from part way down. Many of these commercial wells were still used in the early part of the 20th Century since it was cheaper to use their own supply than that from the mains.

Since many of the old wells were covered over with slabs when they became redundant, there is a potential danger here where they have become overgrown and forgotten about. Many of the old houses have been demolished and replaced and much depends on whether the builders found the wells and what they did about them. It takes a lot of material and time to fill a 100ft well and it would be a temptation to just cover over the slab or build on it. Even worse, it is easy to put in a blockage a short way down and fill to the surface. All these methods will suffice in the short term but settling and collapse of steining could cause later collapse.

3.1.2 Cesspits

These were a necessary device before the installation of mains sewerage in the area. The latter was done at Bingham Road in 1935 but not until 1949-50 for the Home Street, Cooling Road and Hollywood Lane areas. Dimensions can vary but it appears that the standard cesspit in this area was about 2-3 ft in diameter and 20ft deep, with a brick lining to the sides and bottom. During the building of 7, Garden Row, Bill Street in 1903, it was recorded that it cost £1.9.0d to dig the cesspit and £1.0.0d to hire the scaffolding and sinking gear. This represents 1.5% of the total building cost of £167.

Larger houses would have their own cesspit but the smaller terraced properties would share one, usually one to about 6 houses, connected by earthenware pipes. An overflow pipe led from the cesspit to a soakaway which was usually sunk to the chalk to allow quick drainage. The cesspits were usually situated in the back gardens, as far away from the house as possible for obvious reasons, with a back alley to allow access for emptying. This was a particularly unpleasant job, which had to be done at night and which most people paid special contractors to do.

Even so, there were always some who tried to save money and the Strood Rural District Council's "Nuisance Book" makes good reading for anyone with a macabre interest in this subject. Their inspectors often took action to deal with overflowing or badly ventilated cesspits and even cases where householders spread it on their back gardens! A number of people hit on the idea of knocking the bottom out of the cesspit, which allowed the liquid to drain away and meant that it needed emptying less frequently, thus saving money. This was rather short-sighted in view of the fact that the local water supply came from the same chalk beds. The Southern Water Board confirm that water pumped from the area is still very rich in nitrates - a legacy of the above practice!

Cesspits were normally covered by a slab and it is likely that most were filled in when no longer required. In view of the shallow depth, they will not constitute a particular danger if an unfilled one subsides but it would still be an unpleasant experience to fall down one!

3.1.3 Secret Tunnels

It seems that every area of Britain is rife with secret tunnels if rumour is to be believed! In Kent, every church is said to have an escape tunnel and any subsidence automatically becomes a smugglers tunnel, regardless of the distance from the sea. This area has its quota of such rumours, together with a supposed tunnel linking Frindsbury with the Hoo Brickfield. There is no historical or other evidence supporting such claims and the disparity in ground levels means that any such venture would have had to be a major engineering feat. We think that any such rumours can be ignored!

Another rumour about practice tunnels dug by the Royal Engineers cannot be discounted out of hand but is still doubtful. It is recorded that R.E. sappers practiced their skills in the Medway area during the 1st World War before going over to France. It is also known that experimental tunneling machines were given trials in the local chalk. Unfortunately, records for this period that have so far been discovered are rather sparse and do not go into great detail. One site in Gillingham was found to have been extensively excavated by trial tunnels from this period and probably represents the main training area. Another factor to consider is that the War Department would not tunnel in areas it didn't own and there is no record that they ever owned or leased land in the immediate area of study. They could have tunnelled at the Chattenden Barracks area nearby but between there and Frindsbury the ground level drops to 60ft and any unofficial extension in this direction would be too deep to have any effect. We think that the existence of such tunnels under Frindsbury is so remote that it can be discounted.

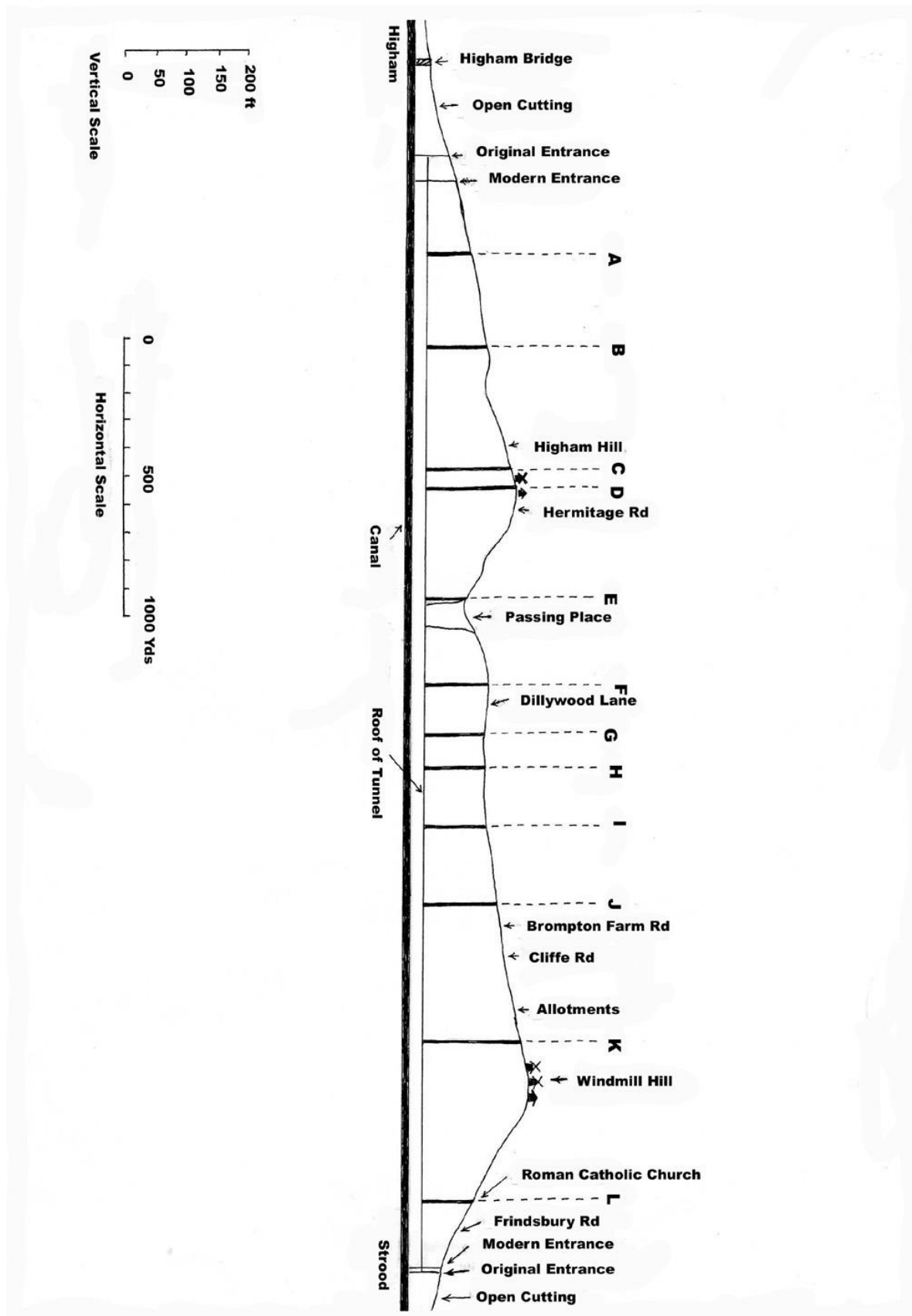
3.1.4 Strood-Higham Tunnel

This tunnel has had an intriguing history and is worthy of a detailed research project. In this study, however, there is no space for other than a brief description and history since it traverses the area of study and there have been rumours that it is a cause of subsidences.

It was first conceived in 1799 by a Ralph Dodd who proposed to save a journey of 47 miles from Strood to Gravesend by a direct canal instead of the sea journey around the Isle of Grain. His reasoning was that sailing barges were restricted by the tidal flow of the Medway and Thames and had to judge their journeys by the times of the ebb and flow tides. At this time, there was a great deal of trade between the Medway Towns and London, mostly carried out by barges, and he foresaw a good financial return. It was decided that a tunnel under the high ground would be more economical than a series of locks.

The Thames & Medway Canal Company was formed and the project started in April 1819. The main tunnelling contractors were Messrs Pritchard & Hoof but the line of

Fig.8 Strood – Higham Tunnel



the tunnel was laid out by William Clark, who was Chief Engineer to the Canal Company. He rapidly found that the undulations of ground and the surface brushwood made it very difficult to survey the route and he eventually hit upon the idea of using a transit instrument (used for astronomical observations). A wooden observatory was built on the summit of Higham Hill, from where a line of sight was possible to Higham Bridge, used as the base marker. A second observatory was built on Windmill Hill (see Fig.27- C) at the point where Everest Lane is now found. This observatory had a line of sight to Higham Hill as well as the Strood portal, which completed the surveying leg. Clark wasted 10 days in attempting to graduate the transit instrument and eventually found that its wooden stand was susceptible to expansion through temperature, explaining the puzzling differences in readings. This was soon solved by the simple expedient of replacing the stand with brick pillars capped with stone. From the two observatories, the locations of 9 working shafts were laid out and these were sunk to the level of the proposed canal base. Once sunk, two wooden frames were installed at either side of the shaft tops on the line of drive and cast iron plumb bobs were hung from these to the shaft bottoms. The instrument was then taken to the shaft bottom of each and the line of drive could be calculated underground by lining it up on the two plumb bobs. The tunnel was driven simultaneously from each portal and from the 9 working shafts, the surveying being accurate enough to ensure continuity when the various sections met up.

These shafts were fitted with horse whims for haulage and would also provide necessary ventilation to the linked sections of tunnel. Although most of the tunnelling was in the soft chalk, they encountered hard sections in several places underlying the high ground and it was necessary to use gunpowder here instead of hand picking. Under the valleys, the chalk was very loose and included veins of Fullers Earth, requiring a great deal of support. During driving, the miners inserted a great many 9" pine timbers to temporarily support the roof but even these were sometimes crushed by the weight. It was necessary to build brick arches at these locations, sometimes these could be started from the tow path level but at other times they stretched from the canal floor itself. In particularly bad places the miners drove side headings in which they built walls to hold up the arching, which was 18" thick at the base narrowing to 14" at the apex.

The Strood portal was very friable with nodules of chalk and flint in loose earth. Attempts to shore this up from the outside failed and it was eventually done from inside utilising the side heading methods already described. Where the shaft bottoms entered the tunnel, it was necessary to install further arching to either side for support. A number of accidents occurred in the driving of the tunnel and it is recorded that there were instances of wilful vandalism, such as cutting through the ropes of the horse whims. These were used to wind up the waste rock and it suggests an element of competition amongst gangs of miners. Several miners were severely injured through this and one was killed.

To recoup some of their outlay, the proprietors sold the extracted chalk as blocks for building, cobbles for lime burning and rubbish for marling. They also sold brown and white flints for the porcelain industry, as well as loam for ship ballast. As an additional income, they quarried away more chalk from the two tunnel entrances but the large excavation at the Strood portal is not all their work since much had been quarried away before they obtained the lease. Despite the above, chalk was being

excavated faster than they could sell it and much was dumped on the marsh land by the river. At one stage, it was heaped so high that ships were allowed to take it away free of charge for ballast.

A seven foot square pilot tunnel was completed in November 1820 and, by 1823, the surface parts of the canal had been finished together with 1,121 yards of full sized tunnel at a cost of £195,000. Problems in the tunnel caused financial difficulties until its final completion on 6th May 1824. When the canal was opened for trade on 14th October 1824, it was 7 miles long and 7 feet deep (6ft in the tunnel). It was the second longest canal tunnel in the country and by far the biggest at 35 feet high and 26ft 6ins wide including a 5ft wide towpath. It could take a 60 ton sailing barge with maximum dimensions of 100ft x 18ft.

The canal bed was 2ft 10ins below low water level at the sea locks and the intention was to fill the canal at spring tides so it held water during neap tides. A problem arose immediately when it was found that the canal lost water at a rate of 4ins every 24 hours and the depth in the tunnel dropped to 4ft before it could be refilled. Since many barges had a draught of 5ft, this effectively stopped their passage through the canal. A steam pump was installed at Gravesend (and later Strood) to top up the canal at ebb tide but this was expensive to run.

Another miscalculation was the decision, for economy reasons, to omit the originally planned arched passing place which was to have been 200ft long by 50ft wide. Whereas the surface section of the canal was wide enough for passing, only one barge at a time could enter the tunnel. The passage therein was therefore so long that a tailback of waiting barges occurred at each end. As a result, an 85 yard section of the tunnel, at the lowest point, was opened to surface in 1830 and widened to form a passing place at a cost of £13,000. This effectively formed two separate tunnels, ie a Higham section at 1,529 yards and a Strood section at 2,332 yards.

It was found that many barge skippers still preferred to sail round Grain rather than pay the cost of the toll and horse towage, eg the toll for a load of hops was 2/6d per ton. They also claimed that there was little difference in time between the two routes. To encourage trade, the proprietors set up a barge business advertising carriage from Maidstone to London in 24 hours but the canal was not a success. In 1843, they bought land near the open section with an intention of extending the tunnel but this was never done. One popular pastime was angling at the bottom of the ventilation shafts since the light encouraged fish to congregate there!

The lack of a good financial return caused some hard thinking and, in 1842, the proprietors formed the Gravesend Rochester Railway & Canal Company. In 1844 they laid a single track railway along the length of the canal. In the tunnel, it ran with one rail on the towpath and the other on wooden pile in the water. It opened to the public on 10th February 1845 and earned £2,971 in the first 4 months, compared to £3,410 from the canal during the whole of 1843. It immediately caught the attention of the private railway companies who were the battling to extend their networks into Kent.

The final adversaries were the South Eastern Railway Company and the London Chatham & North Kent Railway Company. True to the times, each was guilty of much bribery and corruption to obtain parliamentary approval. The S.E.R. finally won and purchased the canal and railway from the proprietors in December 1845 for a sum of £325,000. This is not so great a sum when it is considered that a capital cost of nearly £351,000 had been incurred to that date in building and improvement. The tunnel was drained and a double railway track installed, opening for business again in 1847 and carrying on to the present day. The canal section from Higham to Gravesend was still used up until 1934.

The tunnel is too deep to have any effect on surface subsidences but the ventilation shafts are another matter. A report in 1844 mentioned that the original shafts were then covered over and partly filled in, presumably because a complete fill would be too heavy to be supported by brick arching in the tunnel. If the shafts have been securely capped then there should be no problems but it is interesting to note that there are apparent voids between the caps and the top of the infill. Any slippage of a cap could thus cause a subsidence.

The shafts can be located by comparing the 1842 Tithe Map, a tunnel section dated 1838 and a plan of the tunnel surveyed in 1921. These have all been incorporated into a section which appears at Fig.8. The Tithe Map shows several "chalk pits" owned by the Canal Company, which are all on the line of the tunnel and would be the shaft locations at surface. The 1838 section shows the positions of the 9 "working shafts" and the 1921 plan shows the position and dimension of shafts visible from the tunnel itself, as well as the location of sections which were brick lined. What is immediately apparent is that there are several shafts shown on the 1838 section (and confirmed from the Tithe Map) that do not appear on the 1921 plan and vice versa. This is not due to a surveying error and there is a simple answer. The 1838 section was only concerned with the 9 "working shafts" which were actually drawing shafts utilised in laying out the line drive. These were of 9-10ft diameter and would be operated by horse whims on surface utilising double-acting buckets.

It is common mining practice with shallow depths to sink a separate adjacent climbing shaft which would be about 4ft diameter. This would allow miners to enter the workings without interfering with the winding of rock in the drawing shaft. Since such climbing shafts are comparatively small and had no connection with the surveying, these appear to have been omitted from the 1838 section. The 1921 plan only shows the shafts which were visible at that time, including the climbing shafts, and the locations of the other shafts are obscured by complete brick arching at those points. At some time during the 19th Century, the roof at these locations must have become unstable and the whole section was arched, completely blocking off the shaft bottoms. This might have been done at the same time that the shafts were capped and partially infilled. A key to the shafts at Fig.8 appears below :-

- A) Shown in 1921 but not in 1838. Since the diameter is only 4ft, this is obviously a climbing shaft which probably gave access to the section being driven towards the Higham portal.
- B) 9ft drawing shaft shown in 1838 and 1921.

- C) 3'9" climbing shaft shown in 1921 but not in 1838. Associated with (D).
- D) 10ft drawing shaft shown in 1838 and 1921.
- E) Drawing shaft shown in 1838 but not in 1921. Has been completely cut away in later extensions of the open section.
- F) Drawing shaft shown in 1838 but not in 1921. Is completely obscured by subsequent brickwork and surface location is G.R. TQ/728712.
- G) 8ft shaft shown in 1921 but not in 1838. Something of a puzzle since it is too big for a climbing shaft but not shown as one of the original drawing shafts. As it is about midway in the original tunnel, it may have been a climbing shaft enlarged for ventilation.
- H) 10ft drawing shaft shown in 1838 and 1921.
- I) Drawing shaft shown in 1838 but not in 1921. Is completely obscured by subsequent brickwork and surface location is G.R. TQ/731708.
- J) 9ft drawing shaft shown in 1838 and 1921.
- K) Drawing shaft shown in 1838 but not in 1921. Is completely obscured by subsequent brickwork and surface location is G.R. TQ/736703.
- L) 5ft drawing shaft shown in 1838 and 1921. Associated with section driven towards Strood portal and diameter taken from 1921 plan. It would seem logical to assume that original diameter was 9-10ft like the others, whether this was the case or not is not known.

This cannot be taken as a comprehensive list of all shafts since it may be that there are other climbing shafts associated with the drawing shafts but obscured by brick arching. Only two of the above lie within the area of study. Shaft (K) is located in the allotments between Cliffe Road and Windmill Street and Shaft (L) is located in the grounds of English Martyrs R.C. Church.

There is a local rumour that the well behind Windmill House on Windmill Street (see Fig.27 - D) connects with the tunnel and was used to lower flour down to the canal when Frindsbury Mills were located here. There is no historical evidence to substantiate this but the rumour is very widespread and has been met from a great many sources. The well itself is about 40 yards to one side of the tunnel and, if there is any truth to the rumour, the connection must be via a side tunnel. It must be admitted that there is a section of brick lining at this point which could conceivably obscure a side entry but it is doubtful if such a connection exists. It is more likely that the rumour arose as a result of the close proximity of one of the survey observatories on Everest Lane and that this was one of the wells that ran dry and had to be deepened by the Canal Company.

3.1.5 Natural Caverns

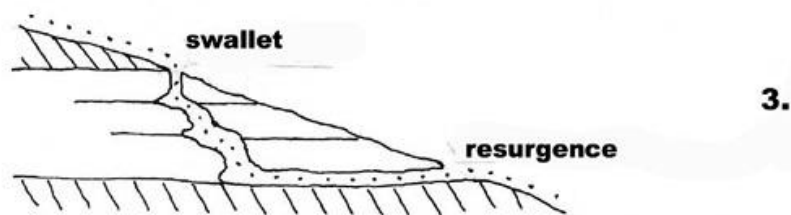
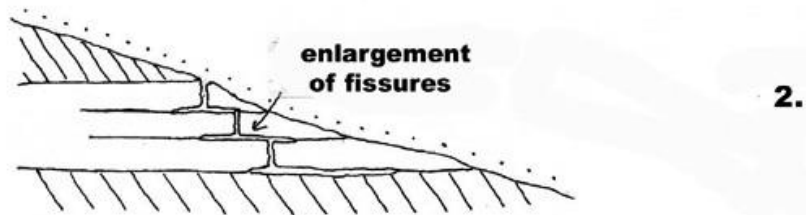
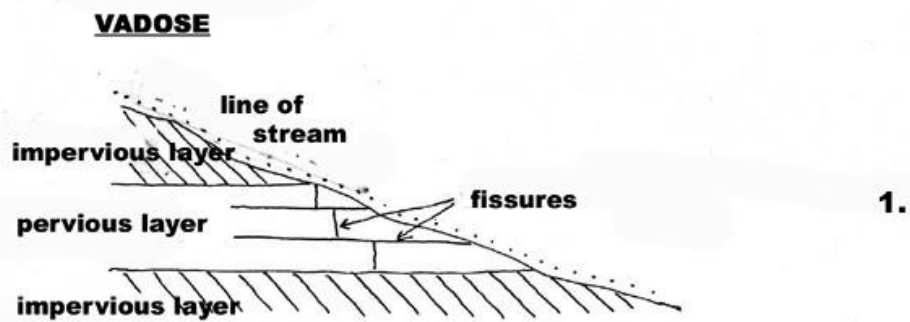
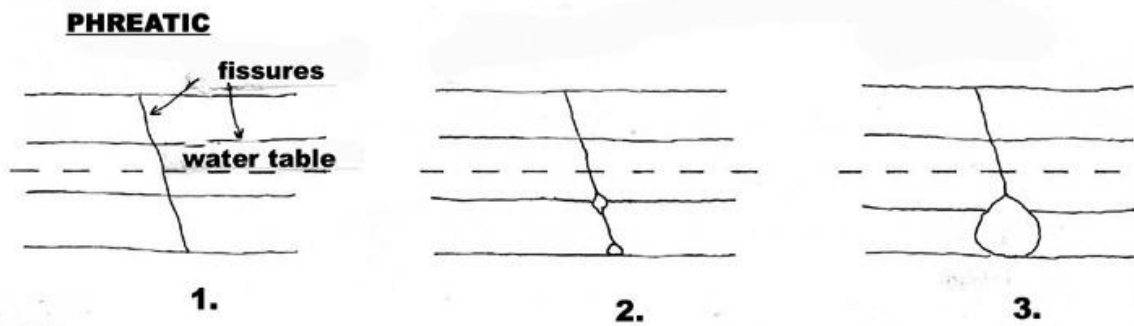
There are local rumours about underground streams in the chalk below Frindsbury, relying for their authenticity on caverns found during well sinking at Strood and rivers elsewhere in Kent that disappear below ground. When water was found at the bottom of the hole that opened in 1967, it was immediately claimed that it was such a stream! Natural cave systems are common in the limestone areas of Britain, especially Yorkshire and Derbyshire. Since chalk has the same chemical composition as limestone (calcium carbonate) it would seem logical to assume that similar caves form in chalk. The facts, however, show that this is not the case and, although substantial natural systems have been found in the Upper Chalk of the Yonne area of France, no cave system of comparable size has yet been found in the chalk in Britain. This could be due to the fact that chalk is more porous than limestone and can absorb up to 2% of its volume before becoming saturated. Thus, where faced with a choice of absorption into the rock or passing along fissures, water is perhaps more likely to be absorbed by chalk than limestone. The subject of cave formation is very complex but it can be simplified into 2 basic methods.

3.1.5a Phreatic Systems - are formed below the water table where the rock is saturated. If there is a small fissure present it will be filled with water which will gradually dissolve away the sides to make a larger hole called a pipe (see Fig.9). Earth movements in our geological past often caused layers of rock to be pushed up above the old water table and the phreatic pipes could be filled with other material. This is why such features are sometimes found in quarries. A large phreatic pipe was found during the sinking of a well at Strood Pumping Station but it was 10ft below the water table. There must be similar systems under Frindsbury and in fact it was recorded that several were broken into during the driving of the Strood-Higham tunnel. Since any phreatic system in this area must be at a depth of about 0ft O.D., they cannot have any surface effect in causing subsidence.

3.1.5b Vadose Systems - are formed above the water table through the enlargement of natural fissures. This is caused through physical erosion by water passing through the fissures, aided by the weak solution of carbonic acid present in rainwater. The entry point of a vadose system from the surface is called a swallet and the exit back to day is called a resurgence. To have any appreciable effect there must be a sufficient flow of water and many swallets occur at junctions of impervious and pervious rock. Thus a stream flowing along an impervious rock will have sufficient volume to start eroding a fissure when it comes to the pervious section. It will follow the line of least resistance (whether it be a vertical or horizontal route) and, if it meets a deeper impervious layer, it will follow this until it perhaps comes out to the surface again (see Fig.9).

Thus a prerequisite for a vadose system is a length of stream (even if only temporary after heavy rain) to allow a sufficient water flow to concentrate. Some rivers such as the Rivers Len and Loose near Maidstone disappear and reappear along their route, only flowing completely on the surface in flood conditions. This is due to a series of swallets and resurgences being formed as the geology of the river bed changes. Since the area of study is on high ground and there is a lack of surface streams, there would be an insufficient flow of water anywhere in this locality for

Fig.9 Cave Formation



anything but a minute vadose system to form. It would be too insignificant to have any surface subsidence effect.

3.1.6 Flint Mines

It is known that flint was mined during the Neolithic Period at Grimes Graves in Norfolk and Cissbury in Sussex. These were shallow shafts with short horizontal tunnels at the bottom, mining a formation of solid tabular flint. This allowed large pieces to be extracted intact, which made it easy to fashion axes. Some people believe that deneholes were sunk to mine flint but this is not the case since the flints found therein are usually so small and scattered that it would not have been worth the trouble. Denehole sites have been found where the flints have been cast aside on the surface and, furthermore, the evidence of metal pick marks proves that these were not Neolithic excavations. Flint mines are very rare and none have been found in this area.

An archaeological excavation in the 19th Century did, however, reveal a Neolithic site south of All Saints Church, Frindsbury, now unfortunately quarried away. A number of shallow circular pits had been excavated in calcareous loam and these were surrounded by heaps of flint chippings and rejected axes of the Acheulian type. Whereas Neolithic Man made many of his own tools from surface flints, some centres specialised in production and catered for a wide area. In view of this, it is unlikely that they would have gone to the trouble of mining flint in Frindsbury when it was so readily available at the surface nearby. Thus flint mines can be discounted for this area.

3.1.7 Deneholes / Chalkwells

Nearly everyone in Kent has heard of deneholes and this name is applied to just about every small hole and hollow that occurs. The theories as to their origin are numerous and the first attempt at a scientific investigation was undertaken at the turn of the century by F.C.J. Spurrell and T.V. Holmes. Further work was undertaken later by J.E.L. Caiger and the latest serious research is being carried out by R. Legear, J. Bradshaw and H. Pearman.

Original theories included usage as grain stores, hiding places, habitations and flint mines but this is not generally accepted nowadays. Despite the fact that many are found in woodland, they are often associated with the remains of abandoned settlements, indicating that the woodland has grown subsequent to abandonment. Many occur along field boundaries or in places where the hedges or copses have been grubbed out. The accepted theory nowadays is the simple and obvious one that they were sunk solely to obtain chalk. Dating is very difficult since surface drainage often caused the shafts to be partially infilled with surrounding soil deposits, including anything that was therein. This was demonstrated quite vividly during an excavation of a denehole by R. Legear when he discovered a fragment of Roman pottery but some 45cms below this was a Victorian chamber pot! Thus, the only valid way of dating these features is by studying their environs and the development of mining techniques demonstrated by the changing shape of the excavations. Recent research indicates that a fundamentally different method of mining was used during

Fig.10 Denehole

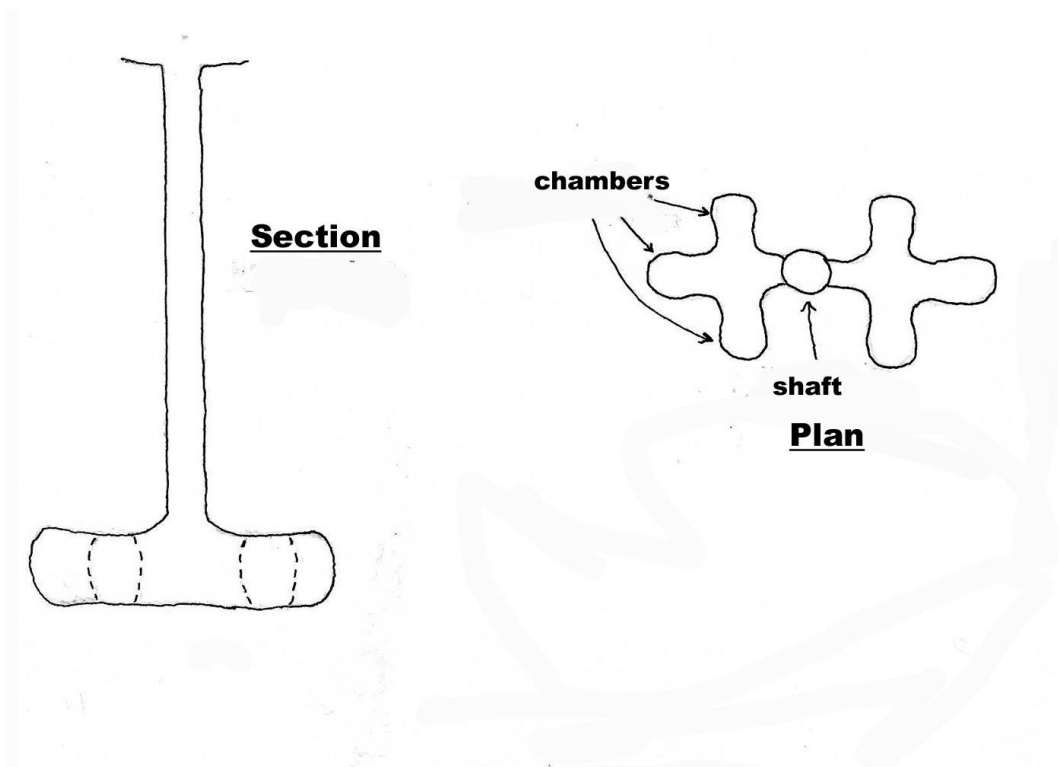
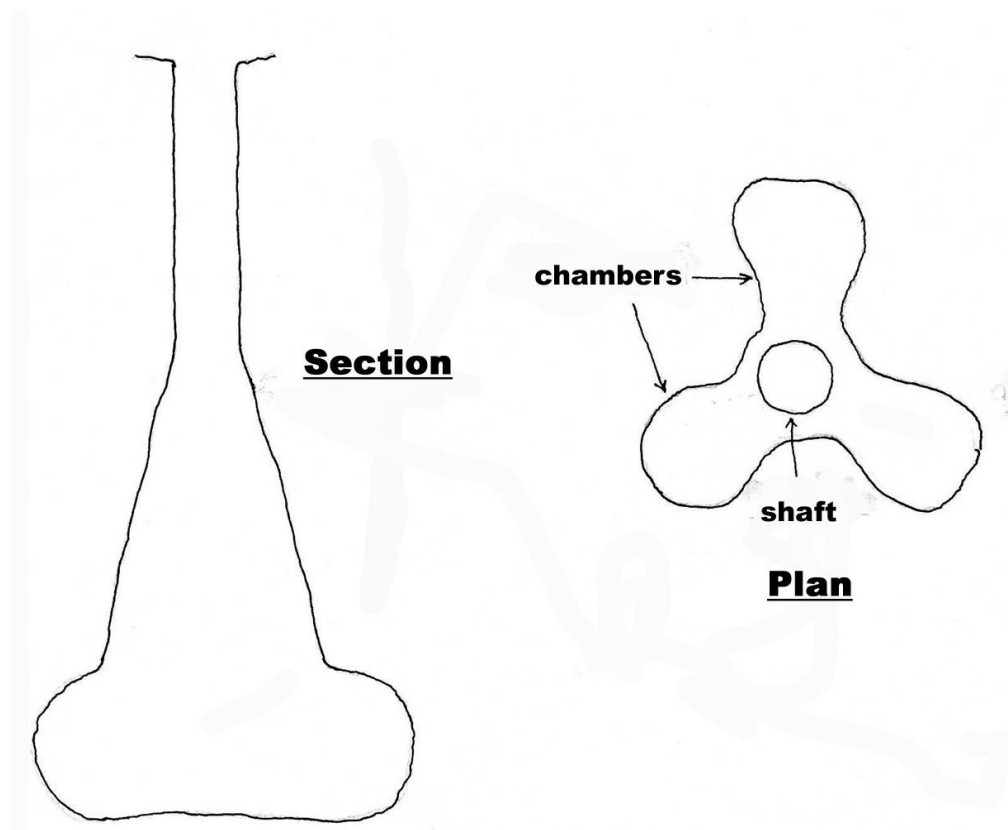


Fig.11 Chalkwell



the last 200-300 years and these later examples are now called chalkwells to distinguish them from the older deneholes.

3.1.7a Deneholes - the word "dena" is found in the Domesday Book and refers to an area of woodland pasture, thus giving rise to speculation that a "denehole" was associated with such clearings. Old writers, however, do not use this word and refer to the features as "pits", indicating that the term is of relatively recent origin. It is likely that the word "denehole" owes its origin to a "dene", a small wooded valley, since some Victorian writers believed that they were found in such locations. Whatever its origin, the word has passed into common usage and it is convenient to describe a particular type of excavation in the chalk.

They are generally of a standard format with a circular parallel-sided shaft with maximum dimensions of 3ft in diameter and up to 80ft deep. They are often sunk through the Thanet Sand for some distance to reach the chalk and have footholds in the side to facilitate descent. At the bottom, two short passages were driven and each was extended to make three small chambers in the shape of a double trefoil (see Fig.10). In some cases, adjacent chambers were linked through the extraction of more chalk, leaving a pillar to support the roof. It may seem inefficient to modern eyes to go to the trouble of sinking a deep shaft for such a relatively small excavation but we must remember that mining technology was in its infancy. Since the working chambers were so near the shaft, daylight could penetrate that far and artificial forms of lighting would not be necessary, thus helping to keep the air reasonably fresh. These were small-scale operations and it is likely that only one man worked underground. Evidence from rope marks in the shaft indicate that the chalk was probably placed in wicker baskets in the working chamber and hauled up the shaft. The initial friction of the rope on the roof of the chamber would thus be a limiting factor on how far they were driven from the shaft.

Such deneholes have been positively dated from associated surface features to the 13th Century and earlier, although it is probable that this design was still in use for a further 100 years or so. They were associated with early settlements at time when deforestation was taking place and field systems were being developed. Once the forest had been cleared, it would be found that the Thanet Sand on the surface made the soil acidic and marling (mixing the more alkaline chalk with the soil) would be necessary to neutralise it for crop growth. Since chalk outcrops at the surface in some areas of the South-East, the obvious question is why wasn't it quarried and brought to site? One answer to this is that the leaching of rainwater made surface chalk brittle and ineffective for marling. Chalk obtained from deeper levels (called fat chalk) is much better and to reach this by quarrying would involve the removal of large quantities of overburden. It is thus easier in most cases to sink a shaft to reach the chalk which is unleached. Another reason is that transport in those days was via difficult muddy tracks and would involve a great deal of work to bring sufficient chalk to site by horse and cart.

It is far easier to sink a shaft next to the field that needs marling and this was the purpose of the deneholes. One denehole would provide enough chalk to supply 6-8 acres, which would be 2 small fields. Henry III in fact passed a Statute in 1225 that every man had a right to sink a marl pit on his own land. As more forest was cleared, further deneholes would be sunk next to the newly formed fields and this is

why deneholes tend to be found in groups. Since a shaft could interfere with ploughing, they tended to be sunk at the side of the fields and occur in lines along field boundaries such as hedges. As later farmers grubbed out hedges to make bigger fields, they often left deneholes within long, narrow copses and these are a feature of land in this area. In a few cases, groups of deneholes have been found concentrated in one area so that as one was abandoned the next was sunk next to it, even though it was rare for them to interlink at the bottom. This might indicate a large community where specialisation was possible and it was decided to concentrate operations in one area with full-time miners.

An abandoned denehole takes a lot of material and time to fill. Where an abandoned one was next to a new one, it would be easy to tip the new spoil down the old shaft as is found in the group at Hangman's Wood in Essex. At this location, many of the shafts have been infilled completely. Where they were separate, it was probably not worth the extra effort to carry the spoil far. In these cases, they were often left with only a few branches jammed across the top with perhaps a shallow layer of soil. This was perfectly acceptable initially since the inhabitants were aware of their location and, being in field boundaries, they were not a nuisance. A great many of them have subsequently collapsed or been infilled so that they are now only identifiable by shallow circular depressions. The dangerous ones are those with a blockage near the shaft top but open underneath, since they can collapse at any time. In prolonged warm weather, a soil plug contracts away from the shaft wall and subsequent heavy rainfall is sufficient to collapse into the shaft. A further common occurrence is caused by the modern tendency for very large fields where a farmer grubs out hedges and copses, not realising that there are deneholes therein. As a result, the weight of a tractor or plough is sufficient to cause the old hole to open up and this can happen even a few years after the original clearance. Since it is rarely known if a denehole has been safely filled, it is politic to keep out of the circular depressions found hereabouts. One denehole has been positively identified in the area of study and it is quite likely that others occur.

Although the commonly used name for such shafts is Denehole (or Danehole), there are a few other names which have been used in Kent for such features and these were listed by F.C Spurrell (a well-known historian) in 1882 :-

CAVE - this is an obvious one referring to just about any hole in the ground and there is a Cavey Wood at Bexley which contains a number of deneholes.

SOUND HOLE - this probably derives from the verb of "sound", i.e. to try the depth.

TOLT - this is probably a corruption of "t'hole".

CLAPPER - this appears to be an old word for hole and Chaucer wrote about "Connis" (rabbits) coming out of their clappers. There is in fact a "Clapper-Field" near Stifford in Essex which contains deneholes.

3.1.7b Chalkwells - this name is given to denehole-type excavations (sometimes also known as draw wells) that were dug from the 17th Century through to the beginning of this Century. They were not excavated with the same skill and care as the deneholes, although their purpose was still to extract chalk. For a start, the

diameter of the shafts tended to be much bigger and varied from 4-6ft across, lacking the trimmed finish of the earlier deneholes. One at Eltham was found to be 140ft deep, where chalk was overlain by a thick layer of Thanet Sand, but most were quite shallow and tend to occur in areas with a clay/clay with flints overburden. The main difference is that the double trefoil chamber shape is no longer found and there are usually only 3 chambers at the bottom, although some examples have been found with 2, 4 or 5 chambers. A later development was widening out of the shaft from part way down to form a beehive-shaped space (see Fig.11). This represented a significant technological advance since more chalk could be obtained from a single excavation and it allowed more daylight to reach the working chambers as well as reducing rope friction when drawing up the baskets of chalk. The wider shafts, however, meant that it was no longer possible to climb down with footholds and the miners must have been lowered by rope.

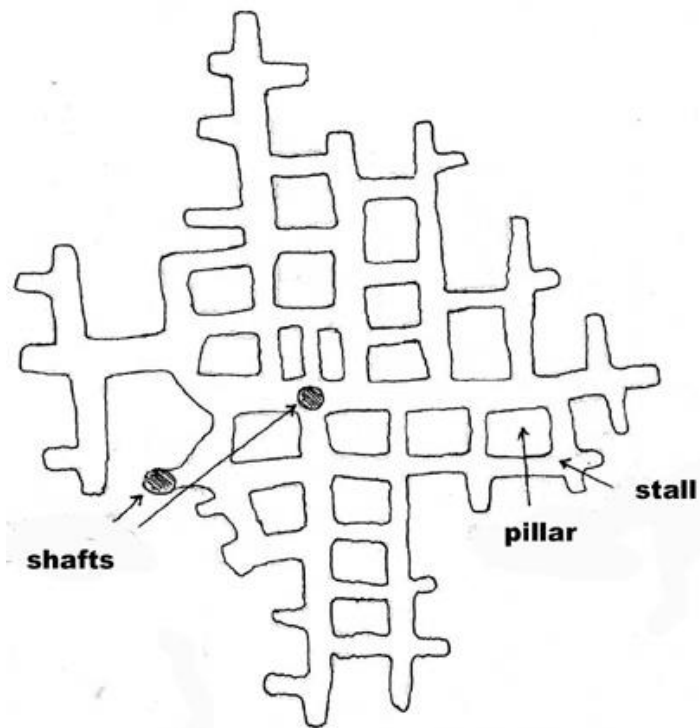
The main usage was still agricultural and the chalk obtained was sufficient to allow regular marling of adjacent fields. A report in 1887 mentioned that chalkwells then in use provided enough to dress 8 acres of field at 800 bushels per acre, the cost to the farmer being about £13. The cost of buying chalk from quarries was appreciably more than this and the use of a chalkwell represented a large saving to the farmer. Teams of professional chalkwell diggers used to travel the area sinking the initial shafts for the farmer. After this had been done, the normal farm workers would actually mine the chalk out of the chambers as and when required. A marled field would last a number of years before it required replenishment thus a chalkwell would probably be in use for a few years, serving fields on a rota basis. Since marling was normally done in Autumn, allowing the chalk to weather into the soil during winter, it would be likely that the mining was not a continuous process. It may have been done at slack times during the year but there was probably a concentrated effort after the haymaking had been done.

Another use for chalk was in limemaking and lime was much in demand in the building industry during the 19th Century as an ingredient of mortar. The larger producers quarried it but there were a number of smaller concerns who sank chalkwells to supply adjacent limekilns. Many brickfields in Kent produced a type of brick that required the addition of chalk to the clay. Some of the bigger brickfields such as at Plumstead and Dartford excavated chalk on site by large-scale mining operations but what about the smaller brickfields? These could not afford such a scale of mining and the cut-throat competition meant that was uneconomical to buy it from elsewhere. Although details are scanty, it would seem logical to use chalkwell-type excavations to obtain the smaller quantities of chalk required. The technology was minimal and the professional chalkwell diggers would be in the area anyway to sink the shaft. F.J. Spurrell, writing in 1882, mentions that chalkwells were used for this purpose in the brickfields at Wickham and Crayford. Again, at least one chalkwell is located in the area of study and there are probably more.

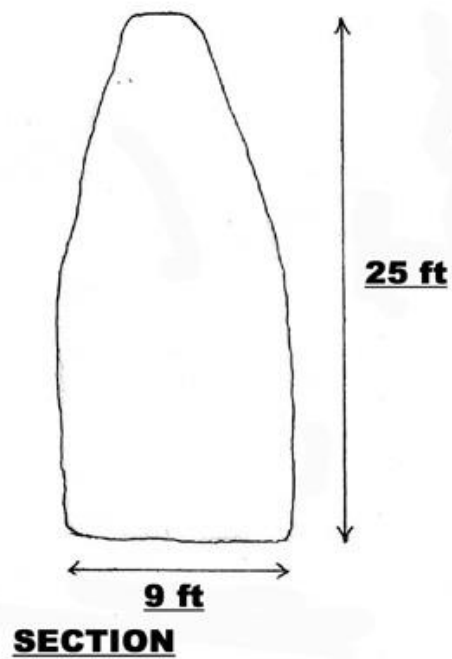
3.1.8 Pillar & Stall Mines

Where a great quantity of chalk was required, it was not economical to sink a number of separate chalkwells and so more traditional mining methods were used. A shaft was sunk into chalk and four passages driven off from the bottom. Further passages were driven off these at right angles and then more driven parallel to the

Fig.12 Pillar & Stall Mines



PLAN (based on Dartford Chalk Mine)



original passages so that a box-like system was formed as the mine got bigger (see Fig.12). Large areas of chalk were left behind (pillars) to support the roof between the passages (stalls). The passages were quite large, being up to 9ft wide at the base narrowing to 3ft in the roof, which could be up to 25ft high. The cross section was in the form of an arch to give extra stability to the passages. Some of the mines were very large and one at the Gregory's brickfield, Plumstead was reported by the Geologists Association in 1906 to contain over two miles of passages. The largest example of a chalk mine in the South East are the Chislehurst "Caves" which extend for about 6 miles (despite larger claims by the proprietors).

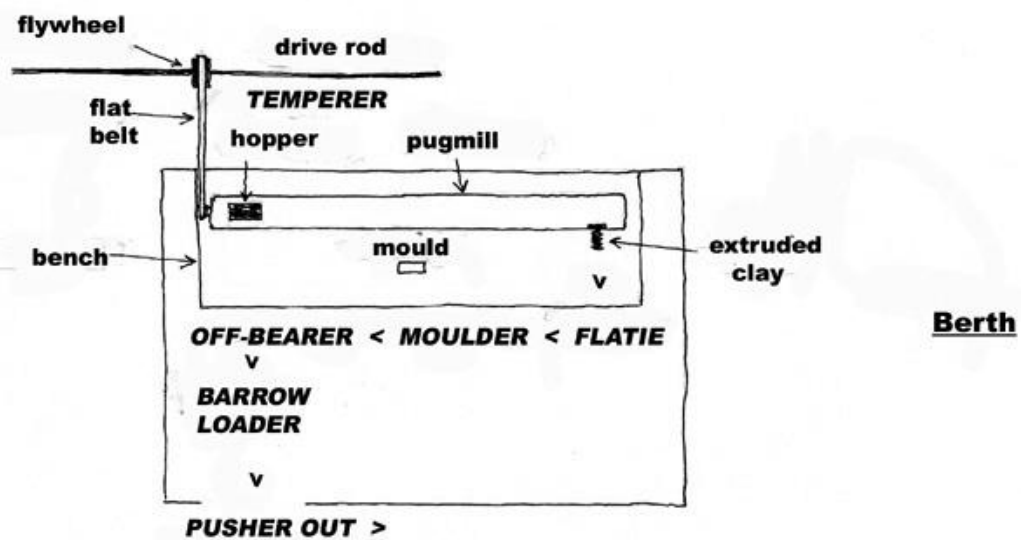
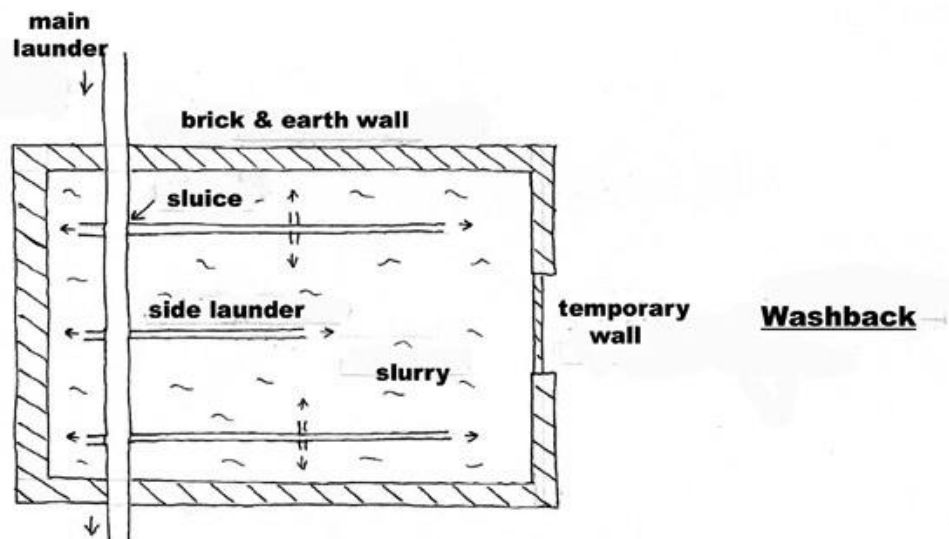
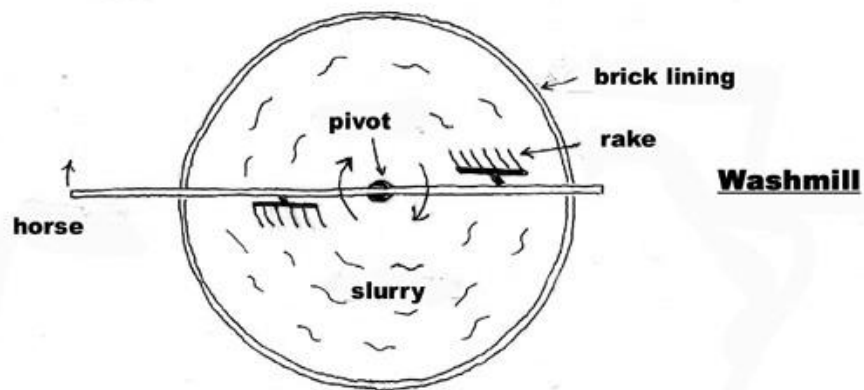
The known workings of this type in Kent were always on one horizontal level above the water table and thus pumping was unnecessary since the mines were dry. Haulage up the shaft was by a simple hand windlass and underground transport of the chalk would be by wheelbarrow or narrow gauge trucks, depending on the size of the workings. Chalk mining was relatively easy since it was soft enough to use handpicking methods rather than gunpowder, thus large amounts could be extracted with a small workforce. These mines were fairly stable, despite their size, since roof support was carefully maintained by the large pillars of solid chalk and roof arching. This notwithstanding, there was a temptation when mines were known to be closing to indulge in pillar robbing. This involved the removal of some of the pillars since they were easily worked from all sides and were an economical method of getting chalk at a time of financial constraints. Another technique to get cheap, easy chalk was to enlarge the roof of the passages leaving them squared off at the top rather than arched. This did not bother unscrupulous mine managers since it saved them money and temporarily prolonged life of the mine. Unfortunately, it weakened the roof of workings and would cause subsequent collapse. This is the most dangerous feature of all since the location of most underground workings of this type are unknown. A collapse of the passage roof will allow overlying strata to fall into the workings, creating a large hole which gradually (or suddenly) works its way to the surface. This could happen at any time or anywhere over the underground workings.

3.2 BRICKMAKING IN THE MEDWAY AREA

Up to the 19th Century, many inhabitants of Kent lived in wooden houses since bricks were an expensive commodity that only the rich could afford. The presence of large areas of forest made wood a cheap alternative and most windmills used to have a saw attachment to produce planks for this purpose. Even today houses are still seen with the traditional clapperboard walls. Over the years, however, the forests of Kent and Sussex shrunk as wood was consumed by the Wealden iron industry and for shipbuilding. In the 19th century, the repealing of a tax on bricks and the growing scarcity of cheap timber began to make brick a more popular building material and one that had become commonplace by the end of the Century.

Before this, builders tended to make their own bricks on site and some large estates had their own small brickworks for private use. There was insufficient demand to produce bricks on a commercial scale. This situation changed dramatically with the expansion of the Naval Dockyard at Chatham and its associated military barracks and defence works. Suddenly, there was a great demand for bricks and the vast surface deposits of brickearth in the area began to be exploited on a commercial

Fig.13 Brickfield Features



scale. Even more important, a massive house re-building programme began in London and the Medway area was ideally placed to serve this capacious market. Not only were the brickfields situated next to the River Medway but there was an existing barge trade down the Medway and up the Thames. Bricks could thus be produced and transported right into the heart of London at very competitive rates.

Numerous brickfields sprang up all over the Medway area and the trade became so lucrative that, in 1880, the massive firm of Eastwoods Co Ltd was formed from the merger of five of larger operations. Although they never operated in the area of study, their influence was great since they operated their own fleet of barges and probably controlled the price of bricks for the whole area. Vast areas of agricultural land disappeared as a result of brickfields but the great advantage of this industry was that there was no lasting effect. Once the brickearth had all been removed and the brickfield abandoned, it left a flat area of land which exposed the underlying Thanet Sand. This could then be reclaimed for cultivation as it was ideal for orchards. Many farmers cashed in on the trend by leasing out fields for brickworks or even working them themselves for a number of years. They could then plant orchards on the site, having made far more money in the intervening period than the original fields could have produced. A feature of the area today is the sight of flat fields which are up to 6ft below road level, this is often the only remaining indication of their previous use for brickmaking. It is an interesting thought that many of London's Victorian houses were originally part of fields from this area!

The most popular type of brick produced in this area was the yellow Kent Stock Brick. This colour was obtained by including 10-17% of chalk in the mixture and by careful firing of the bricks. Some chalk or sand was included in normal mixtures anyway to prevent cracking or shrinkage but the larger proportion of chalk was necessary to obtain the right colour. It was also much in demand because of its unique durability in the polluted environment of Victorian London. The famous London smogs were mainly due to vast quantities of acidic gases such as Sulphur Dioxide being released from factory chimneys. These produced a chemical reaction on the face of the Kent Stock brick that produced a very hard surface glaze which was extremely water-resistant, although it caused the colour to darken. Modern practice to sand blast bricks to recover the original colour is not such a good idea since it reduces these qualities of water-resistance.

At this stage, it is worth looking in some detail at actual working methods of the brickfields. To begin with, about 1ft of top soil had to be removed ("uncallowed") to expose the brickearth beneath. The term brickearth is a general one applied to deposits of varying consistency which were usually all referred to as clay. Clay digging was normally done in winter and the diggers were paid on a piece rate for the amount of clay equivalent to 1,000 bricks. It is estimated that a volume of clay measuring 44ft x 8ft x 6ft deep would make about 33,000 bricks. Dug clay was left exposed in heaps for a time to allow it to weather before being mixed into a slurry with water in a Washmill (see Fig.13). This device was usually a sunken circular brick-lined pit about 4ft deep and up to 15ft wide. In later years, some brickfields used open-topped metal tanks for this. A vertical pivot in the middle supported a horizontal beam that was turned by a horse in the earl days until they were replaced by mechanical means. To each side of the beam was attached a device similar to a large rake which, as it rotated, broke up the clay placed in the washmill and mixed

it into slurry with the water that had also been added. At this stage, the correct proportion of chalk was added if Kent Stocks were being produced and the rakes crushed the chalk which was incorporated into the slurry. At some brickfields, a small amount of river mud was added at this stage to improve the mixture and at the Crayford Brickworks they even added rags! These were brought from London on the barges and picked into threads by women and children. The purpose of this was to provide more combustible material in the bricks during firing. As soon as slurry was the right consistency, a sluice built into the washmill wall was opened and the slurry was allowed to flow into pipes or wooden launders.

The slurry was then laundered to features called Washbacks, which were settling ponds (see Fig.13). These were square enclosures surrounded by brick walls up to 6ft high which were banked with soil on the outside to provide extra strength. There was a small gap left in the front wall which was boarded until the slurry had dried. A brickfield normally had at least 3 washbacks in line and an amount of slurry was placed into each in turn. About 2 days were allowed for the water to drain out before more slurry was added, this process being repeated until the washback was full. The mixture was then allowed to dry until it had reached the right consistency for brickmaking. Since many of the subsequent operations were carried out in the open, brickmaking was dependant on the weather and the season lasted from April to October. Men were laid off during the winter, apart from a few who were involved in clay digging.

The actual making of the bricks was done by gangs of persons who were often family units including women and children as labourers. Each gang operated from a "berth", which was sited in front of the washbacks (see Fig.13), the ratio normally being 2 berths for every 3 washbacks. Inside the berth was a bench, at the back of which was sited a "pugmill", which was a 6ft long narrow cylinder containing an Archimedes screw. Clay was placed in one end and the action of the screw carried it to the other end, in the process cutting it up and making it pliable. The berths were placed in line so that their pugmills could be operated from a flat belt off a mechanically—operated drive shaft. As soon as operations were ready to commence, the access to the washback was unboarded, exposing the clay mixture which was of a stiff consistency.

The first member of the gang was called a "Temperer" and his job was to cut the clay out of the washback. This was a strenuous job and he used a tool called a "Large Cuckle", which was a three-pronged fork with a sharp blade across the bottom. Anyone who has dug in clay will know that it tends to stick to spades so this was an ideal device to cut and carry clay without having a large surface area for clay to stick to. The temperer filled a barrow which he wheeled up a plankway into the back the berth. He emptied the clay into a hopper which fed it into the pugmill already described. Since the team was paid on piece rate, it was important for the temperer to keep the pugmill filled and this job could only be undertaken by strong, fit men.

At the other end of the pugmill, a small aperture extruded the clay and this is where the "Flatie" worked. He used a bow-shaped knife called a "Small Cuckle" to cut off enough of the extruded clay to make one brick. This was rolled in sand to take away some of the stickiness and handed to the "Moulder". The moulder had the most important job and was in overall charge of the gang. He had a rectangular mould,

the inside of which he sprinkled with sand each time to prevent the clay sticking its sides. This fitted snugly over a separate base attached the bench and the clay was thrown into the mould with some force so it would completely fill it. The moulder then used a wooden scraper called a "Stricker" to level the clay and removed the mould from the base. Some bricks had an indentation on one side called a "Frog", which contained the initials of the brickworks, and the impression for this was inbuilt into the mould base. Tapping the mould on the bench, the newly—formed brick (called a green brick) was removed and the moulder prepared for the next one. The green bricks were picked up by the "Off Bearer", who stacked them on the floor next to the bench. Since the moulder's job was quite strenuous, due to the necessity of throwing clay into the mould with some force, the moulder and off bearer changed places at regular intervals to keep the work flow moving.

The "Barrow Loader" stacked the green bricks onto a long, flat wooden barrow. This took 30 bricks, 15 to a side, and weighed 210 lbs when full. Since the green brick still contained a lot of moisture, it weighed a lot more than the completed product. The "Pusher Out" took the loaded barrows and wheeled these to the "Hacks" to dry out, each gang having their own hack to enable the brickworks to calculate the payment. A hack consisted of 1,000 bricks stacked 7 courses high on wooden planks, with wooden end boards and caps to keep the bricks dry.

The state of the industry can be appreciated from the price per 1,000 bricks paid to the brickmaking gangs. During the boom time prior to 1900, it was 4/- but this dropped to 2/10d after competition began to bite. The shares paid to the members of the gang reflected the importance of their job and out of the 2/10d they received the following :-

Moulder - 7d
Off Bearer - 7d
Temperer - 7d
Flatie - 5d
Pusher Out - 4d
Barrow Loader - 3d

This left 1d which was known as "Pence Money" and was kept to be shared out as an end of season bonus. To earn enough to keep them over winter, the gangs would work all the hours of daylight and an average gang could produce 38,000 bricks per week, although some were known to make up to 50,000.

After about 5 weeks, the dried bricks (now known as "white bricks") were up to 2 lbs lighter and were ready for firing. Only the larger concerns had proper kilns and the traditional method of firing was by making a "cowl", sometimes known as a "clamp". Gangs of 4-5 men called "Crowders" would load the white bricks onto crowding barrows, which held 70 at a time, and took them to where the cowl was to be built. A cowl had 750-800 bricks which were laid on edge, 5-6" apart, to form channels, into which the fuel was placed. Ascending rows narrowed towards the top for stability, up to a maximum of height of 32 bricks. The outside was covered with a layer of rejected bricks to retain the heat. The fuel was lit from either end through gaps left at the bottom of the cowl and left to burn for 4-5 weeks.

The fuel used was known as "Rough Stuff" or "London Mixture" and consisted of partly burnt coal and ashes. It was obtained by sifting out (or "scrying") household rubbish, some of which was brought back from London on the empty barges. Large piles of this rubbish was left for about a year to allow the vegetable matter to rot away and brickworks must have been very popular with people living nearby! The sifting to extract ashes was carried out in winter and represented a vital, albeit unpleasant, income to a lucky few of the brickworkers who would otherwise have been laid off. The larger lumps were used in cowls and some of the fine ash was added to the slurry so that it helped to fuse the bricks during firing. This material was still used by a few local brickworks up to the 1960s until the advent of smokeless fuels caused the ashes to contain insufficient combustible material. The current fuel used in the large kilns is now coal dust.

Once the cowl was fired, a man called a "Skintler" removed alternate bricks from the top of the outside layer and replaced these at an angle to allow air to circulate. During the course of firing, all of the outside bricks were eventual criss-crossed to allow sufficient draught to keep the fire burning. At the centre of the cowl, the temperature reached 900° Centigrade but this decreased towards the edges. When the firing was complete, a gang of 4 "Sorters" dismantled the cowl and sorted the bricks into 6 grades, their condition depending on their location in the cowl and how effectively the cowl had been fired :-

First Stocks – yellow, used for facings

Second Stocks - straw coloured, used for facings

Third Stocks - orange, used for interior walls

Roughs - brown and distorted, used for footings

Burrs - black and fused into lumps, used for hardcore

Chuffs - red and half-baked, rejected.

The brickfield obtained a better price for 1st and 2nd Stocks, thus the stacking and firing of the cowl was a skilful and important job in order to get as equal a temperature to the bricks as possible. The larger firms used permanent kilns and there were a number of technical advances in their design in order to attain a better proportion of saleable bricks. The earliest design was the Updraught Kiln (also called a Scotch Kiln) which was rectangular and open-topped with fire holes along the bottom. It was basically a permanent cowl which was filled with bricks and it allowed the hot gases to rise amongst them. The next development was the Downdraught Kiln, which was circular and about 15ft in diameter with a roof. Here the hot gases rose but were deflected back down onto the bricks, this being more efficient in fuel consumption. Closable ports in the roof allowed more fuel to be introduced during firing if necessary.

The Hoffmann Continuous Kiln was the first move towards mass production and was basically a series of downdraught kilns, connected in a circle or in a long rectangle. Each kiln had an access port to the next and, as soon as the first kiln was into its firing process, the heat would begin to fire the next one. The fires would thus burn around in sequence, allowing brickfields time to remove bricks from a completed firing and reload the kiln with green bricks ready for its turn. There was thus always an empty kiln ready to take green bricks so production was not delayed waiting for a firing to be completed. A kiln of this type is still in use at a brickworks in Rainham.

The next development was the Long Continuous Kiln where bricks were stacked on flat wagons which were slowly passed through a chamber where hot gases could circulate around them.

The beginning of the decline of the Medway brick industry started in 1881 when a dark, shaly clay was discovered at Fletton near Peterborough. Some 5% of its weight was tar oil and it was found that bricks made from this material needed very little fuel since they were almost self-firing. By 1908, there was a great deal of competition anyway amongst brickmakers as more concrete was being used in buildings and the Fletton brickmakers combined to drop the price to 8/6d per 1,000 (in 1903 the local price had been 29/—). They could do this because their self-firing bricks could be produced very cheaply in great numbers and they were able to undercut the local product, even with the costs of transport. As a result, the smaller and less efficient local brickworks began to close and a temporary building boom a few years later was tragically cut short by the 1st World War. After the war, trade began to pick up again as result of a Government-aided building programme but, by 1929, a slump had set in to the whole industry. Many brickworks closed at this time, never to reopen.

3.3 HM MINES & QUARRIES INSPECTORATE & STATISTICS

Some explanation is necessary for the above since certain statistics they produced have been very useful in researching the history of mines and quarries in this area.

The first serious attempt to collate statistics on output of mines and quarries (other than coal) in Great Britain was undertaken in 1845 by Robert Hunt. Such returns were voluntary on the part of owners and the details were published under the auspices of the Geological Survey of Great Britain. The Metalliferous Mines Regulation Acts of 1872 and 1875 were primarily intended to improve the working conditions of miners. This was done by dividing the country into 13 Districts, each under the control of a Mines Inspector who was responsible for visiting the mines in his area on a regular basis and to enforce the necessary legislation. Mine owners were also required by law to report all accidents and to make an annual return of mine output, etc, which was collated and published in an annual report by each Inspector.

Quarries were originally included in the Factory Workshops Act of 1878, for which a separate Factory Inspectorate was set up to enforce legislation relating to safety. Unfortunately for posterity, they did not gather statistics in the same detail as the Mines Inspectorate. This was superseded by the Quarries Act of 1894, which brought the responsibility for quarries over 20ft deep under the Mines Inspectorate. Each Inspector now had to check both mines and quarries within his district. From 1895, statistics on quarries over 20ft deep were included in the annual reports of the Mine Inspectors. The situation began to get rather complicated since the Mines Inspectorate only had authority over work carried out within the actual pit, whereas associated activities on site (but outside the pit) remained the responsibility of the Factory Inspectorate. This was overcome by making the Mines Inspector a Factory Inspector too for sites that included an open pit over 20ft deep.

Open pits that were less than 20ft deep (and this included clay pits on most brickfields) remained the responsibility the Factory Inspectorate and any returns of output were purely voluntary. From 1899, the Factory Inspectorate took back the responsibility for works outside the open pit of quarries over 20ft deep. The only exceptions to this were operations involving the processing and washing of the minerals. One of the specific operations that they took over was brickmaking, thus employees engaged in this disappeared from the Mines Inspectors reports from 1899 onwards.

A very complicated setup can be summarised thus. Actual workings underground for any mineral except coal or iron were classified as metalliferous mines from 1872. Kent was within District 9, administered by the Mines Inspector C. le Neve Foster, that also included North Wales, Mid Wales, Isle of Man, Middlesex, Surrey and Sussex. This was a massive area and not only was there a great geographical spread but there were numerous large slate and metal mines in Wales and the Isle of Man that took up most of the Inspector's time. As a result, he could spend very little time in Kent and relied mostly on mine owners voluntarily reporting the existence of mines, something they were loathe to do in view of the extra cost of complying with safety legislation. It is thus not surprising that the first metalliferous mine listed for Kent did not appear until 1896, whereas some must have been working for many years prior this.

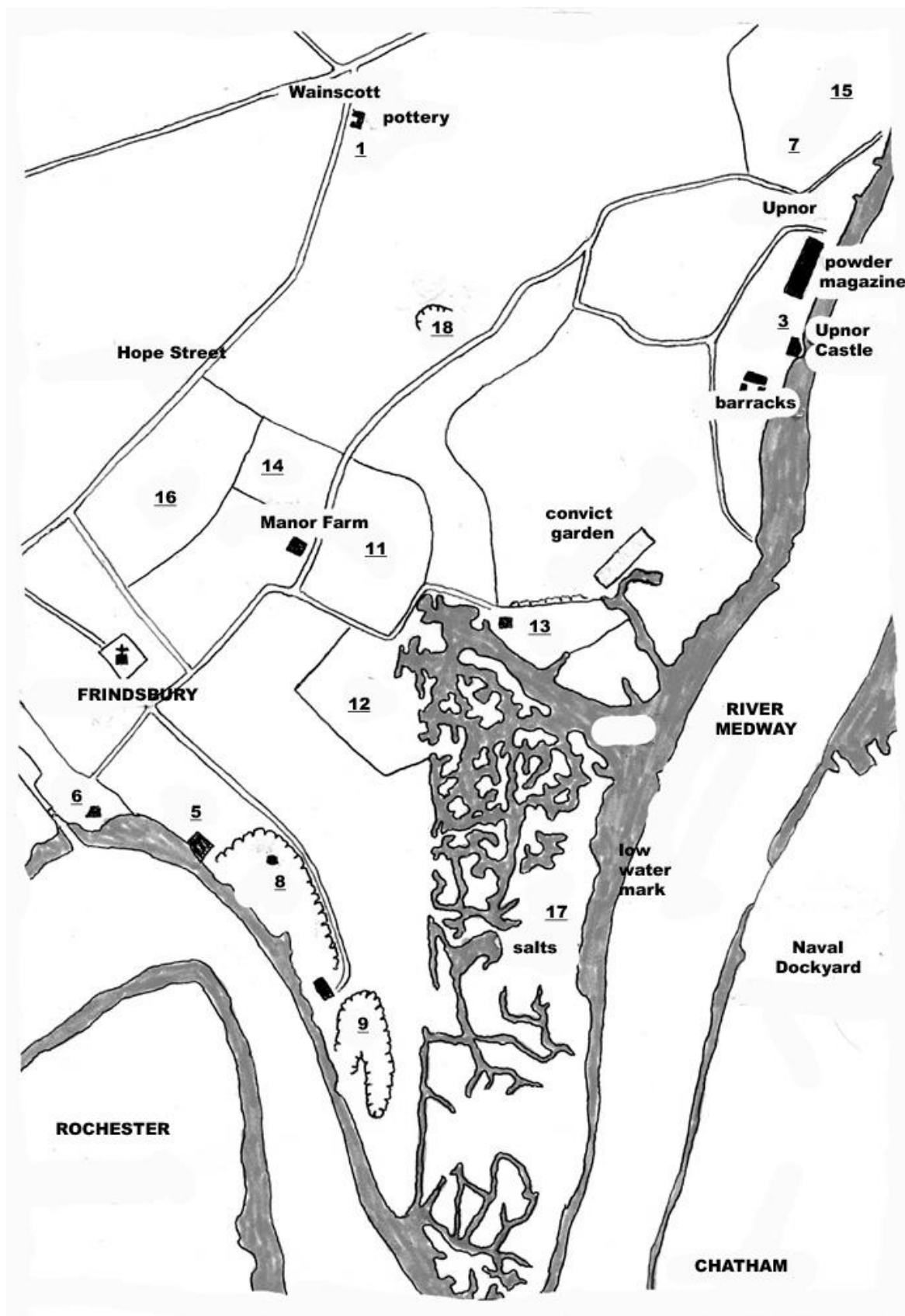
By 1895, he had obtained two assistants but they had also inherited the quarries to inspect as well and so things were little better. In the South-East especially, they had to rely on touring the area to discover quarries that were over 20ft deep and thus within their brief. It is likely that a number of these were reported by Factory Inspectors or jealous competitors as well. Many of the local clay and chalk pits were borderline cases and in some instances they resorted to physically measuring the depth! It was sometimes the case that clay or chalk was worked mostly in an open pit but that there were also underground workings driven from the pit. In these cases, the rule was that the whole site was classified as a mine, even if the underground workings only extended for a few feet underground. One must thus be careful when interpreting statistics to separate true underground workings from surface operations, since they were aggregated in a combined return.

With brickfields, statistics of persons employed on surface included those involved in the actual brickmaking from 1895-98. After this time, those involved in actual brickmaking were excluded, since they became the sole responsibility of the Factory Inspectorate. One must therefore not assume that a brickfield was closing just because the number of surface workers shrank dramatically in 1899. Another result of the inclusion of quarries from 1895 was that the number of listed mines increased. This was due to the fact that the Inspectors now had access to many more sites and could discover where open pits had underground workings as well. We can thus assume three things :-

- a) Where a site was only listed as a quarry then there were no underground workings of any kind otherwise the whole site would be re-classified as a mine.

- b) The first year that a mine was listed cannot be taken as the date of commencement since many were only discovered years later!
- c) The inclusion of a brickfield in the quarry statistics indicates that the open pit must have exceeded 20ft at some point. If a brickfield included a mine on site, the whole of the clay diggings and brickworks were described as a mine and the mine took its name from the brickfield as a whole.

Fig.14 Manor Farm Area – Mid-19th Century



4.0 INDUSTRIES IN SURROUNDING AREA

This is meant to be a brief summary of some of the main industries in Frindsbury Parish. It should demonstrate that the activities within the area of study were not isolated but were part of a general industrial growth in the locality. Numbers in brackets correspond to locations on the maps at Figs.2 & 14.

4.1 *Tilemaking at Wainscott*

A map dated 1711 shows this hamlet as consisting of a house and a few cottages known as Windscott, the name probably referring to a collection of cottages in an exposed or windy place. The house was called 'White Horse' and, since the hamlet was situated on a crossroads on the road to the Isle of Grain, it may well have been an inn. By 1838, the name had been corrupted to Wainscott and a local pottery industry was already in existence by 1842. The main works was the Wainscott Pottery (1) owned by a Henry Hone and next to this was a smaller operation owned by Thomas Fox. The reason for their location is easily explained by investigation of the local land ownership at this time.

Nearby at Four Elms Hill were two clay pits (2) owned by a William Beadle, who was something of an entrepreneur and whose name will crop up again. Beadle also owned the land to the immediate east of the road in Wainscott and it was here that the potteries were set up. Thus, not only did he sell the clay to the potteries but he also got the rent from their premises as well as the adjacent workers' cottages. It must have been quite a monopoly for him as well as being rather lucrative. Both potteries produced tiles for the expanding building industry and some may have found their way to London together with the local brick trade. The tithe records also list an Edward Hone (limeburner at Upnor) and a John Hone (brickmaker at Bill Street). It is not known if they were related to Henry Hone but it is possible that this was an example of a family diversifying into all aspects of supplying the building industry. They were certainly not temperant since Henry later went on to own the Kings Arms pub and John the Old Oak Inn!

By 1858, there had been a change of proprietors and the potteries were now owned by Thomas Baker and Jesse Clark Foster. It is likely that the larger premises belonged to the latter since, in 1877, Foster bought the clay pits from the Executors of Beadle who had then died. With this assumption, Baker must have sold out after a few years to Messrs Charlton & Matthews since, in the book "Industrial Medway" by J.M. Preston, they are mentioned in an advertisement dated 1868. This reference is interesting since it shows the diverse range of products being produced ie oven & paving bricks and tiles; pan, plain & ridge tiles; sanitary & land drainage pipes; chimney, flower & paint pots; garden & edging tiles.

In the meantime, Foster continued to expand his pottery and took his son Theophilus into partnership in 1867. In 1871 they were shown as brick and tile manufacturers but there is no evidence that they had the necessary equipment at their clay pits to make bricks on site. Since it was a competitive business locally, it is more likely that they produced specialised bricks at their premises. In 1882 they sold out to Francis Hazell, who produced bricks, tiles, drainpipes and chimney & garden pots.

The 1862 Ordnance Survey map shows a draw well next to each of the potteries. Whereas these may only be water wells, there is also the possibility that they were chalk wells. The census of 1871 lists a William Eloine of Wainscott who was described as an "excavator". This is a peculiar term since men who dug clay were normally described as merely labourers and it seems to imply extraction at depth. He could of course have been a local well sinker but, again, the latter term is usually used in census job descriptions. One clue is given in an article on deneholes written by F.J. Spurrell in 1882, when he mentions a denehole (properly termed a chalkwell) which was then being used at Plumstead for a tile works. It is known that a small quantity of chalk was added to normal bricks to prevent shrinkage during firing and possibly this was also done in the case of tiles. If products of a yellow colour were required, like the Stock Bricks, a greater proportion of chalk would have to be added to get the colouration. Thus, it is possible that the local tile works had chalkwells on the premises to obtain their own supplies of chalk.

4.2 War Department

This is included for completeness since it represents an appreciable land holding in the area and it probably provided work for a number of locals. The history of Chatham Naval Dockyard is adequately covered elsewhere and Upnor Castle was built as one of the fortifications to protect the dockyard. It existed in 1667 when it failed to stop the raid by the Dutch fleet which sank many ships and caused a subsequent build up of military defences in the area. In addition to this, the Navy required a site to store supplies of gunpowder which could be easily loaded onto the warships but were far enough away from the anchorage in case of accidental explosion.

Upnor was chosen as the site because it was opposite the dockyard and a large powder magazine was built by the riverside (3). A "wheeling way" was constructed to transport the barrels of gunpowder to the nearby wharf where they could be loaded directly onto the ships. In 1842, operations were controlled by the Board of Ordnance and a detachment of supply troops was stationed here in a barracks. Included in the area was a Convicts Garden which was probably connected with the time when convicts were imprisoned in old wooden hulks moored on the river. Possibly a good natured officer allowed some of them to grow vegetables to supplement their diet.

As naval technology developed, more space was needed so in 1877 land was purchased inland at Chattenden. Another magazine was built, together with a barracks and ordnance store (4), a tramway being constructed to transport the shells to the wharf. With the closure of the naval dockyard, Chattenden lost its original function and is now an ordinary barracks for the Royal Engineers. A detachment of Bomb Disposal Experts is based here and they have been called on from time to time to investigate subsidences in Kent, including the one in 1967.

4.3 Shipbuilding

Towards the end of the 18th Century, the Napoleonic War caused a crisis in the Naval Dockyards of Britain. They had previously been responsible for building warships as well as servicing them but the wartime activities of the fleets kept them

too busy to produce new ships. As a result, the government contracted out the job of building warships of all sizes to private shipyards and this encouraged several new ones to be set up. By 1800, there were four shipyards in Frindsbury down by the river and several warships were built here. The most famous one was the H.M.S. Bellerophon, built in 1786 and upon which Napoleon I surrendered after the battle of Waterloo in 1815. This was also an irony since the government contracts stopped upon cessation of hostilities and the local shipyards declined.

By 1842, there were only two shipyards left and these no longer built the large ships. One was owned by John Curel next to the Lime Works (5) and the other by George Chatham at the canal basin (6). Chatham's yard had been replaced by a cement works by 1864 but Curel's appears to have continued for a while longer. Towards the end of the 19th Century, there was a big demand for sailing barges and some were built here. One such yard was that of Cheetham, Gill & Co at the Canal Shipyard, which was still producing barges in 1887.

4.4 *Extractive Industries*

This area of Medway is particularly lucky in that there are successive layers of brickearth, sand and chalk which are all relatively near the surface. Nowhere within the parish have these minerals been so extensively worked as in the area surrounding Manor Farm between the river, Upnor and Wainscott. Most this land belonged to the Dean & Chapter of Rochester and, at this juncture, it is worth making a brief mention of the way that the Cathedral administered its lands.

Up to the mid-19th Century, the issuing of leases and collection of rents, etc, was left in the hands of local clerics who had little experience of temporal matters and were frequently misled. This was a national problem and the Church of England found that it was not obtaining the maximum return from its large land holdings. As a result, a body called the Ecclesiastical Commissioners was set up and all Church land was transferred to them. This body was staffed by professional land agents and they proceeded to manage the income from leases and royalties on a more commercial basis, to the horror of tenants who had been used to much more generous terms. There was also a sister organisation called the Queen Anne's Bounty, which managed Church land originally confiscated by Henry VIII and returned by Queen Anne. The income from this source was used to supplement the tithes of vicars in poor parishes. In the 1940s, both these organisations were merged to form the Church Commissioners.

One of the first things that the Commissioners did on taking over was to carry out a survey of property and this was done for this area in 1867. The report makes specific mention of abuse of lease terms ie "... Chalk, ballast and brickearth are excavated in large quantities from the land demised to George Hankey and shipped from the quays on the river. The excavations appear to have commenced at an early period and, in calculating the fines for renewal of the lease, it would seem that the Dean & Chapter latterly took into consideration the income which the lessee derived from this source and made an addition to the fines in respect thereof. The chalk and brickearth in some portions of the farm (Manor Farm) have been worked, as far as we can ascertain, without any written agreement being made as to the royalties to be paid to the Chapter. We find that a lease for 7 years from 29th

September 1865 was granted to Mr Hankey enabling him to work the brickearth in fields 49 and 50 on payment of a rent of 1/- per 1,000 bricks made and burnt therein. Also a licence for a year from 25th December 1865 enabling the lessee to burn bricks on the farm made from clay taken from the Vicarial Glebe on payment of a royalty of 3d per 1,000 bricks made and burnt. With these exceptions, no other royalty agreement has been made."

Although some brickmaking and lime burning had been carried out here since the 18th century, it is clear from the above that large scale working of the minerals only started early in the 19th Century and without the permission of the landowners. Hankey had obtained the main lease (presumably intended in the main for agricultural use) for a large area of land next to the river. An existing lime works was now his sub-lessee and, possibly encouraged by the potential, Hankey instigated large scale extraction of chalk, brickearth and sand by issuing sub-leases to other operators. He proceeded to rake in a handsome profit from royalties but neglected to obtain the permission of the D.C.R. or to pass on any royalties. How he got away with it for so long seems incredible since it was only when the lease was renewed in 1865 that the D.C.R. attempted to recoup their loss by claiming an element of lost royalties, estimated as £900 per annum.

The juxtaposition of the three main minerals meant that the operators usually specialised in one and also extracted others as a by-product. For example, an operator quarrying chalk would first have to remove the sand overburden anyway so he might just as well sell it to increase profits. As a result, the three main industries cannot be taken in isolation since as more than one mineral was usually extracted from the same site. For the purposes of this study, a few of the main sites will be described for each industry.

4.4.1 Ballast Pits

The large deposits of Thanet Sand in the area gave rise to a small industry down by the river. It was an ideal material for ship's ballast and piers were built to load the sand directly into the ships using the commercial and naval dockyards of the Medway area. It had been excavated from an early date by means of open sand pits and there were three ballast wharves at Upnor in the early part of the 19th Century. One of these had been leased to John Foord & Sons by 1858 and they later leased the other two direct from the D.C.R. to merge them and prevent competition.

A 24 acre site at Lower Upnor (7) had been worked since before 1842 by James Little but in 1867 he had to sub-let it from Foord & Sons at a surface rent of £27, a royalty of 2d per ton and one third of net profits from the trading accounts. This seems a rather steep price to pay but the Foords were obviously in a position to dictate their own terms. By 1908, however, the ballast trade had almost died out and a new market had been found with ironworks for moulding sand. The Little family at last managed to negotiate a direct lease for a larger site of 31 acres at an annual surface rent of £42/10/0d, a minimum royalty of £100 (3,000 tons at 3d) plus 3d per ton over 8,000 tons. The benefit of this was short lived, however, since the dockyard foundries closed in 1922 and the market for sand declined. They negotiated a reduction of surface rent and minimum royalty to £40 and £50 respectively but couldn't make a profit and terminated the lease in 1924.

The lease was taken up by James Thame and Eleanor Martin at a surface rent of £10, minimum royalty of £100 plus 3d per ton for all sand and gravel. It was specified that, if it was used for brickmaking, it would be calculated as 2¾ tons for every 1,000 bricks produced. One month later they transferred the lease to Lower Upnor Quarries Ltd of which Thame was a director together with A.C. Martin. The site subsequently changed hands a number of times and a brief summary of subsequent operations is given below :-

1933	transferred to Karlan Mining Co Ltd
1936	transferred to Medway Brickworks & Quarries Ltd.
1939	transferred to Naybro Stone Ltd
1940	trade slack, minimum royalty reduced to £50
1941	war stopped trade
1946	new lease to C.E. Patman & H.G. Carmody at a surface rent of £10 and minimum royalty of £100
1947	transferred to Medway Brick & Stoneworks Ltd of which Patman & Carmody were directors.

From the above, it would appear that, from the 1920s, the sand was mainly used for brickmaking rather than being sold as a raw material.

4.4.2 Chalk Quarrying & Cement Making

Of all the past industries, the chalk quarries are the most obvious ones today since many tons of chalk have been extracted from the area between Manor Farm and the river. The chalk was originally made into lime but the invention of cement in the 19th Century quickly superseded this. It was found that the alluvial mud from the River Medway was an ideal alternative to clay which is normally mixed with lime to produce the cement. This produced a local breed called "mudders", who had the unpleasant job of obtaining it. A barge was grounded on the mud at low tide and the mudders dug out the clay and threw it into the barge which, hopefully, could be re-floated at high tide. The normal practice was to dig out areas of the bank forming a small inlet, which is why the mud flats today are so intersected with channels. The local cement industry is one that certainly deserves a historical study in its own right but there is no space here other than for a short resume.

Extraction of chalk from small pits was carried out from an early date and the Wardens of Rochester Bridge had rights since before the 17th Century to dig and take away chalk from chalk pits in this area for the maintenance of the bridge piers. It is also recorded that some chalk was being quarried for ship ballast around 1700, this was probably from the area that became the canal basin. This particular area was being quarried by the shipbuilder Brindley between 1810-17 before being acquired by the Canal Company. By 1842, Edward Cole had a lease from the Dean & Chapter of Rochester to work a small quarry further downriver (8) which was known as the Frindsbury Lime Works. As well as producing chalk for his lime kilns, he also sold the Thanet Sand overburden as ballast. William Tingey set up a cement factory and quarry (9) next to Cole's works in 1851 and this became known as the Frindsbury Cement Works.

Before 1864, the above mentioned Hankey had obtained the main lease to these two operations and it would appear that he allowed them to greatly extend their chalk quarries. When negotiating a new lease in 1864, Hankey had to make a payment in respect of lost royalties but presumably he could well afford it. Cole had taken on a partner to form Coles & Young and the Lime Works had increased in size, with over 12 acres of the adjacent Windmill Field having been quarried away. There were 7 working lime kilns, together with an old one which had been converted into a shop! Tingey's Cement Works consisted of a quarry, engine house, drying sheds, kilns, ovens and sheds, now being known as the Quarry Cement Works to avoid confusion. In 1875, Tingey managed to negotiate a direct lease but this was only accepted on the condition that he built a new cement factory at a cost of not less than £5,000. This seems a strange condition but it might reflect the new approach by the Commissioners who wished to ensure that there was a long term future for the local industry. The surface rent was £175 with a minimum royalty of £125 (5,000 tons at 6d per ton) and 6d per ton in excess of this. After 2 years it was to increase to £250 and £200 respectively. For the purpose of calculations, 1 cubic yard was to equal 1¼ tons.

Both businesses continued to expand and it was necessary to acquire a further 14 acres of farmland in 1879 to extend their quarries. By this time, it is likely that chalk from both operations was being made into cement. The official returns for quarries only started in 1897 and there are entries for both operations. A William Ball had taken over from Coles & Young and now traded as the Frindsbury Chalk Works. Within the quarry itself there were 34 men and 25 in associated operations. Tingey had formed the Rochester Chalk Co Ltd and operated his cement works under the name of Rochester Chalk Quarry. His quarry only employed 18 men for extraction. By 1899 there were 7 cement factories in this area employing some 750 persons. In 1900 operations were merged into the Associated Portland Cement Manufacturers and they traded under this title until closure. There were other smaller operations in the area but these can be left to a more detailed study.

4.4.3 Brickmaking

The earliest brickfields were associated with the larger estates and made bricks predominantly for the main house and associated buildings. On a map dated 1711, there was a brickfield associated with Islingham Farm (10) and it was old even then. Manor Farm had a larger brickfield (11) and this was shown as working on maps dated 1768 and 1811. There would have been other temporary brickfields where builders made their own bricks on site but traces of these would rapidly disappear. One possible exception to this, needing further research, is the area of Cooling Marshes which was at one time a detached part of Frindsbury Parish. The 1842 Tithe Map shows a Brick Kiln Marsh (G.R. TQ/773770) and a Brick Land Marsh (G.R. TQ/777772) both of which were owned by John Baker. This area is extremely desolate and a long way from any other brickfield to make the transport of brickearth elsewhere a feasible proposition. Whereas settlements are scarce in this area, there are one or two isolated houses and one of these is actually called Brick House, as if the use of brick was remarkable enough for comment. It is possible that brick houses were necessary to withstand the elements in this area and the two sites mentioned may have been a convenient place to make the bricks necessary for the few houses that were actually built. If so, they may be from an early date since they

had reverted to marshland in 1842. Another possibility is a link with the Roman Pottery Kilns that were found nearby (G.R. TQ/764766).

Early in the 19th Century, the trend towards more brick houses made commercial brickfields a possibility and the Manor Farm brickfield (11) was taken over as a going concern. Henry Everest acquired it in 1830 but soon used what little clay was left and, by 1842, he had extended his operations to include a further brickfield (12). He leased a field called Chalk Hole Bank (13), on which site he quarried chalk for the stock brick process, and also an area of the salt marshes by the river (17). It is known that some brickmakers added mud to the clay slurry to stop shrinkage during firing and this may be where Everest got his supply. Everest was also a farmer at Temple Farm, Strood and in 1855 he moved his brickmaking activities back there to form the large Temple Brickfield. By 1862, either Everest or his successor had extended the brickfield even more to include clay diggings on the other side of the road (14). There was a tramway linking the two sides and a small chalk quarry was worked in the new diggings. The latter may have become necessary since the Chalk Hole Bank was now in different hands. There is also a well which is said to be dry but whether this was a chalkwell or not is unknown.

The Chalk Hole Bank site (13) was probably taken over by the Formby family when Everest left since it was definitely in the hands of Charles Formby in 1879. A Frederick Formby was operating as a brickmaker in 1855-58 and James Formby in 1859. It is quite likely that Everest started a brickfield on the site as well as the quarrying operations but it was certainly well established by 1862. It is interesting to note that in this year there was also a small cement works here, probably cashing in on the demand. Whether it was also in the Formby's hands is not known but Reverend Charles Formby obtained a 7 year lease in 1877 to dig mud from part of the old saltings (17) nearby. It was to be used to make cement and lay between bands of peat to a depth of 5ft, the plan being to remove an area of over 2 acres and to dump the spoil in the creek. He was charged a rent of £10 per annum with a one-off payment of £400 for the mud. If the mud wasn't for his own cement works then he was certainly going into competition with the traditional mudders.

The Upnor Brickfield (15) probably started as a sideline of James Little who has already been mentioned in connection with the ballast industry. He was producing bricks between 1830-34, after which he probably concentrated on ballast again. The brickfield side was taken over by George Baker in 1837 and by 1842 he was operating on two adjacent sites with an area of 19 acres. It became a large operation and he carried on until 1850 when it was probably taken over by Messrs Foord & Sons who were producing bricks by 1858.

William Hankey was producing bricks in 1828-29 and you will recall him being mentioned in the Commissioners' report of 1867. Without more research, it is difficult to locate the sites referred to but the main area of operations was probably in the Upnor Brickfield (15). The 1 year lease for the Vicarial Glebe is interesting, however, since the 1842 Tithe Records show that this description can only apply to one or two fields near to the Church. The most likely is (16) and it was probably never more than a small operation.

Whilst on the subject of brickfields, it is worth a brief mention of Joseph Butcher who used to live in Frindsbury. He started work as a labourer for his father who was a market gardener owning land in the Frindsbury / Strood area. By 1867 he owned large brickfields in Rainham and Otterham and in 1878 he joined forces with four other brickmakers to form the firm of Eastwoods Co Ltd, which became the largest operator of brickfields in the Medway area. The agreement shows that the individual brickmakers acted as semi-independent subsidiaries of Eastwoods and demonstrates the volume of production that was taking place at this time. Butcher undertook to make 22 million bricks per year and Eastwoods to buy them all except for those needed for local use up to an annual maximum of 50,000. Eastwoods were to buy at least 4 million bricks per quarter and the balance of the quota by 25th March of the following year. Butcher died in 1886 and his operations were taken over by Eastwoods.

4.5 *Lime Burning*

The Frindsbury Lime Works have already been described and represent the largest local example of this industry. There were, however, a number of smaller-scale operations within the parish and some farms had their own chalk pits where the chalk was sufficiently near the surface. The chalk may have been applied to the fields in its natural state or more than likely converted into lime which is assimilated more quickly.

The oldest known operation was at Dale Hole (18) which was shown on a 1768 map as a "hole with trees", thus indicating that it was disused at this time. Another map dated 1811 merely calls it a "chalk hole" and it may have been reworked since a Thomas Gransden was burning lime in 1838 at some limekilns at Wainscott. Since there is no trace of any limekilns in Wainscott itself, it is possible that Dale Hole was the site mentioned. It is located on land belonging to Manor Farm which indicates that it may have, at least originally, provided chalk for the fields.

There is a small chalk pit at the back of Sole Street Farm which was being worked by Robert Hayes in 1842 as the Sole Street Chalk Hole (19). Since Hayes was only a small farmer, it was probably only for his own use. The space available is restricted and four short chambers were excavated into the chalk face. There is no evidence of a limekiln so it is not known if Hayes used the natural chalk for marling or not. Nearby is another of Hayes's⁵ fields known as Well Field (21) but there is no indication of a water well. This may indicate the presence of a chalkwell in the field at one time, possibly predating the chalk pit.

There is a small chalk pit (20) at Blacklands Farm which was being worked by William Dawes in 1842. Associated with this was a limekiln which was still in operation by 1862. In close proximity to Stonehorse Farm are two small chalk quarries and a chalk pit (22) which were being operated by the farmer James Rich in 1842. Lack of space has resulted in small excavations being made into the face of the larger quarry and the 1862 map shows a well in the floor of the quarry. Whether this was for water or to extract more chalk is unknown. A similar well is shown in the other quarry on the 1897 map. There is no evidence of lime kilns but the scale of extraction seems too big for one farmer's use. It is always possible that the chalk was sold to surrounding farms who had no pit of their own.

In the northerly part of the parish is a field near to Eastborough Farm known as Sand Hole Field (G.R. TQ/76976O). It was owned by John Baker in 1842 and there is no evidence of any chalk pits on the farm. The word "Sand", however, is most likely a corruption of "Sound" and indicates the presence of a disused soundhole or denehole. Next to this field was the Leap Well Field which has been corrupted nowadays to Lipwell. This is more likely to be a water well and one is in fact shown on modern maps next to a spring.

4.6 Farming

This of course was the major industry of the area and it is intended to take Islingham Farm (23) as a true example since the area around Manor Farm has already been mentioned. It was one of the few large farms in the area and must have an interesting history if time was spent on research, since it takes its name from the original Saxon settlement and even possessed its own chapel next to the farmhouse. It lies on the southern slopes of the high ground rising to Chattenden Woods and the farmhouse is sheltered within a small valley formed by a stream flowing to the Medway (see Fig.15). The stream actually disappears for a short distance into swallow holes near the farm buildings but there is no evidence of a large cave system. Unlike other farms in the area where the Thanet Sand is exposed, the soil should not be so acidic and the necessity for marling would be less. This may be the reason why there is no chalk pit on the farm, unlike other smallholdings nearby.

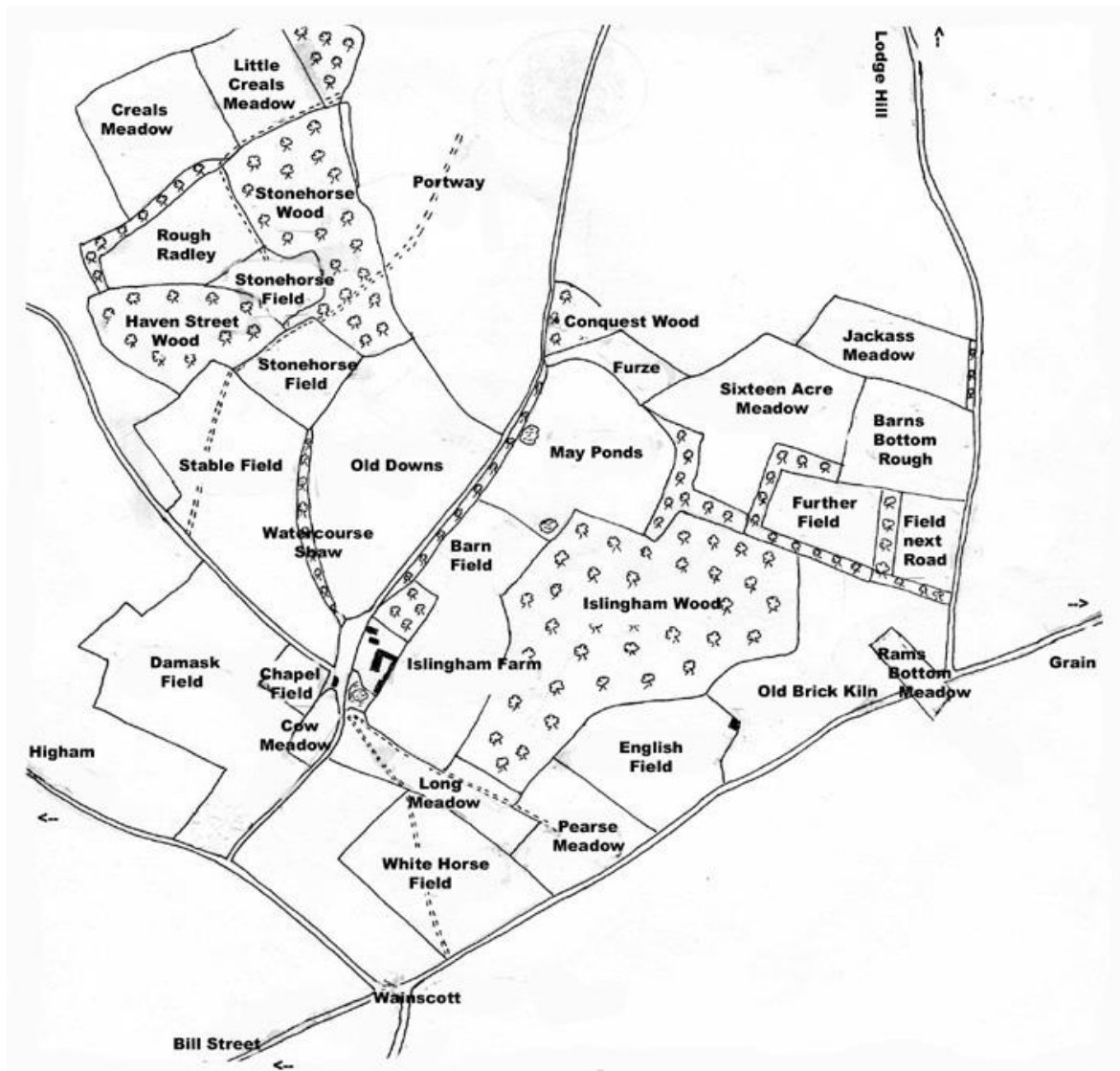
One famous owner was Thomas Lord Cromwell who was executed for treason by Henry VIII. By 1711 it was occupied by a George Russell who held a total of 346 acres and probably drew his workforce from the settlement at Windscott (later renamed as Wainscott). By 1835 a William Eley was leasing the farm from James Best and still had the same acreage in 1842. This was divided as :-

Arable	221 acres
Pasture	52 acres
Meadow	15 acres
Woodland	47 acres
Orchards	4 acres
Hops	3 acres
House, etc	4 acres.

For this holding, Eley paid a rent of £13.14.0d and a Tithe of £9.13.9d per annum. It indicates a mixed type of farming with cattle or sheep as well as crops. The production of hops on the farm can only have been relatively small and was possibly only for the consumption of the household only. The field called "Old Downs" was the only one free of a Tithe which possibly indicates that it was common land. Another mystery which has not been followed up is the name "Stone Horse" which appears in several fields and woods. It is also the name of a nearby farmhouse and it would be interesting to learn of its origin.

The 1711 map shows a disused brick kiln on the farm that may have originated from when the farm buildings were constructed. Although the 1842 Tithe Records show no of brickmaking on the property, it is interesting to note that Eley was described as

Fig.15 Islingham Farm – Early 19th Century



As at 1842



both a farmer and brickmaker in 1847. One clue is that by 1842 he had grubbed out Islingham Wood and combined this and four adjacent fields (including the brick kiln) into one large field. This low-lying area had clay at the surface and was adjacent to the clay pits of Wainscott Pottery. Since there is no subsequent mention of Eley as a brickmaker, he probably took the opportunity in the 1840s to obtain a large arable field and to make money in the process by using the clay for bricks.

His son, also named William, took over from him until at least 1892 and extended the family holdings, since he was shown as farming 520 acres in the 1871 Census. When the Chattenden Barracks was built in the 1870s, the boundary of the military property did not follow the old field lines and Eley both lost and gained land in the adjustment. By 1909, it was occupied by Henry Evans but it is not known when he took over.

Running through the property was a footpath which is said to run from All Saints Church in Frindsbury to Eastborough Farm and was known locally as the Church Path. The latter farm was located in the Cooling Marshes and was within a detached portion of Frindsbury Parish until the area was included in Cooling Parish in 1887. Local legend says that the path was made so that the occupants of Eastborough Farm could walk to church on Sunday but it seems unlikely that a farmer would be without some other form of transport. The 1862 map calls it the Portway which is a clue since this name was used to refer to ancient trackways that ran along ridgelines. Remains of Roman habitation have been found on Cooling Marsh so it is more likely that this was part of an ancient route from there to Rochester.

4.7 House Building

This is included here because it was the ultimate customer for much of the local industrial output. Most builders in the 19th Century were small family firms who turned their hand to just about any job, including making their own bricks on site. With the increase in house building, however, many of these builders found it was more economical to operate their own small brickfield to supply their continuing needs rather than rely on the materials found on site. A natural progression from this was to expand the brick production to supply other builders at a profit and this caused several builders to become full-time brick manufacturers.

Between October 1903 and March 1904, a Charles White had a house built for himself at 7, Garden Row, Bill Street (see Fig.16). The house was demolished in 1969 but his descendants have retained all the bills, etc and these form a valuable record of building practice at the turn of the century. The builder was a Mr H.J. Williams of Bill Street and he contracted out all the work to local tradesmen, the final net cost being £167.9.2d. This amount included :-

£1.15.0d	preparing plans
£26.8.8d	supply of 20,450 bricks
£17.14.2d	bricklaying (labour)
£12.8.1d	supply of slates, etc
£0.18.10d	slating (labour)
£66.15.4d	supply of wood, plumbing supplies, etc
£24.8.7d	carpentry, plumbing, glazing (labour) 651 hrs @ 9d

£6.14.0d	plastering, cementing (labour)
£1.9.0d	digging cesspool
£7.14.3d	cartage
£1.0.0d	mains water connection fee
£0.3.3d	house insurance

Transport of materials was arranged by the carter W. Booker who spent over 50 hours for this job varying from 1 hour to a full day of 10 hours at a time. His rates for carting bricks and sand were based on the actual time spent at a basic hourly rate of 11d per hour with either a small premium or discount depending on the length of time continuously employed, ie

1 hour :	1/- (+1d)
half day :	4/6d (-1d)
1 day :	9/- (-2d)

For other items he charged a rate per load, irrespective of distance, possibly reflecting the harder work involved in loading and unloading the heavier bricks and sand, ie

Brick rubbish	1/- per load
Ashes	2/- per load
Lime	12/- per yard

Up to the 1930s, houses tended to be built in terraces, often next to the occupiers' workplace, and were called "Rows" when they were spread out along a main road. Garden Row and Nursery Row at Bill Street took their name from nearby market gardening sites. When built in separate streets, the street was usually called "Road" and a local dignitary was often incorporated into the name, eg Bingham Road and Powlett Road in Frindsbury are named after George Powlett Bingham who was a local landowner. After this date, the streets were often called "Avenue" eg Ravenswood Avenue in Frindsbury and in recent years builders seem to compete to think up the most bizarre names. It is thus possible to roughly date the age of houses from the name of the street they are on.

Fig.16 7, Garden Row, Bill Street

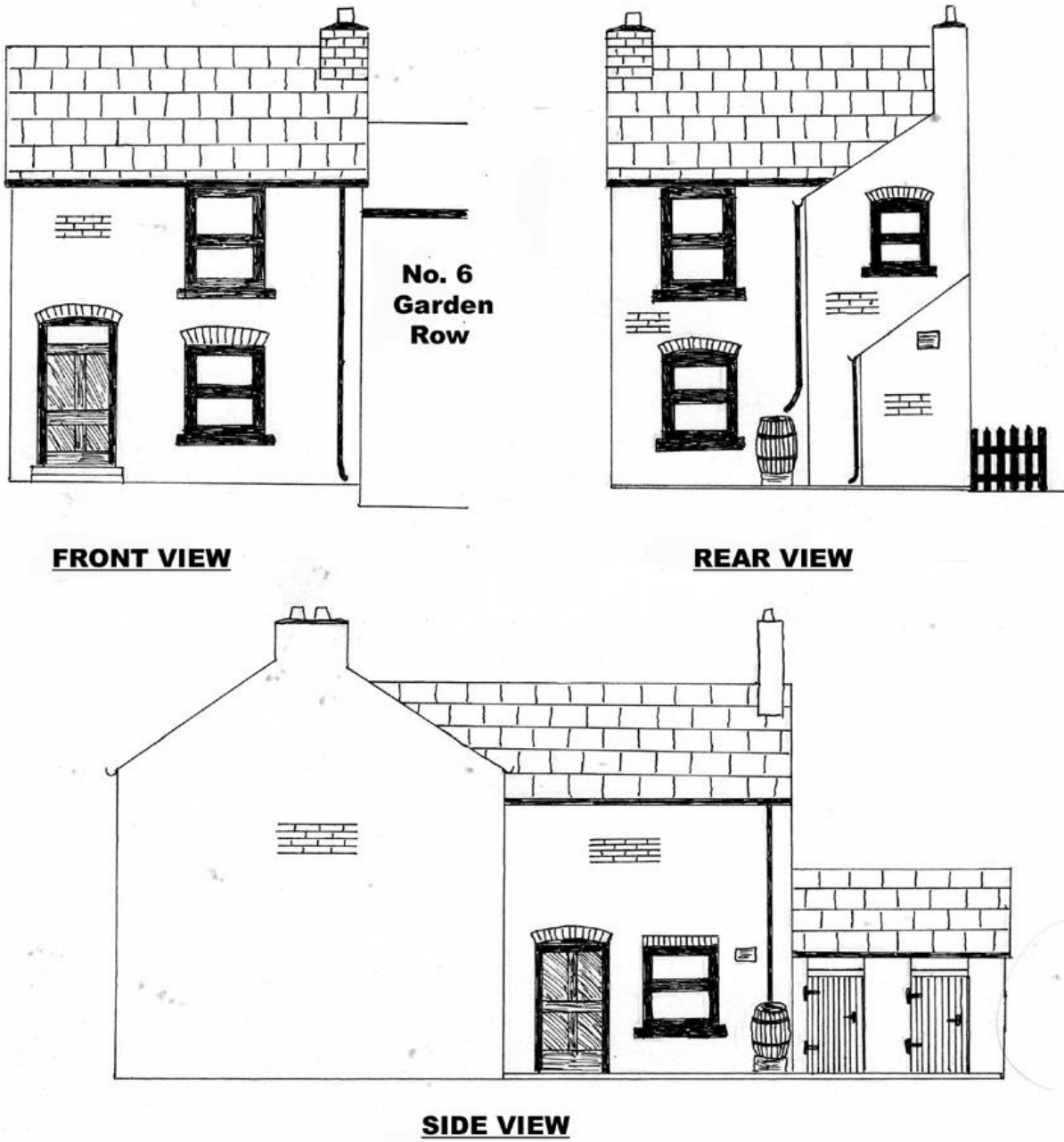
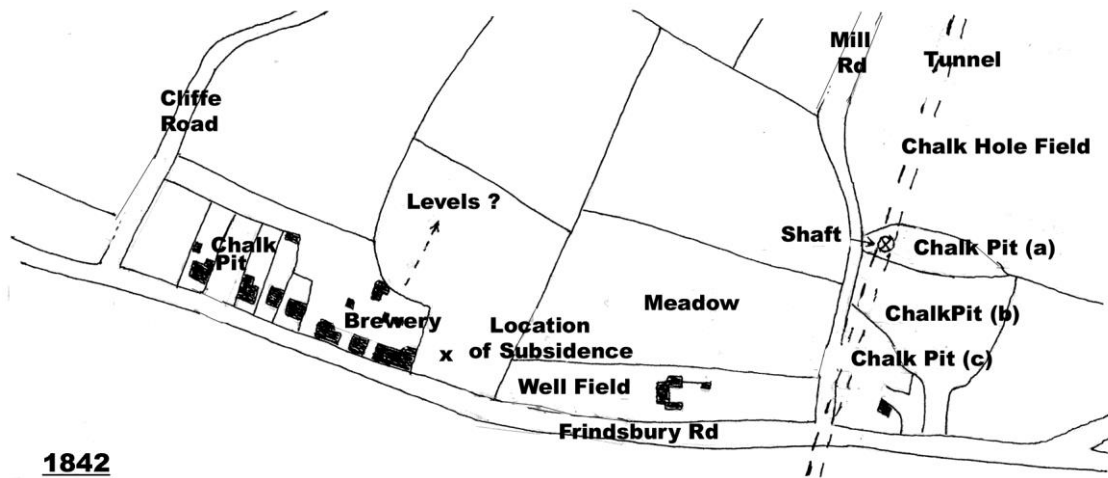
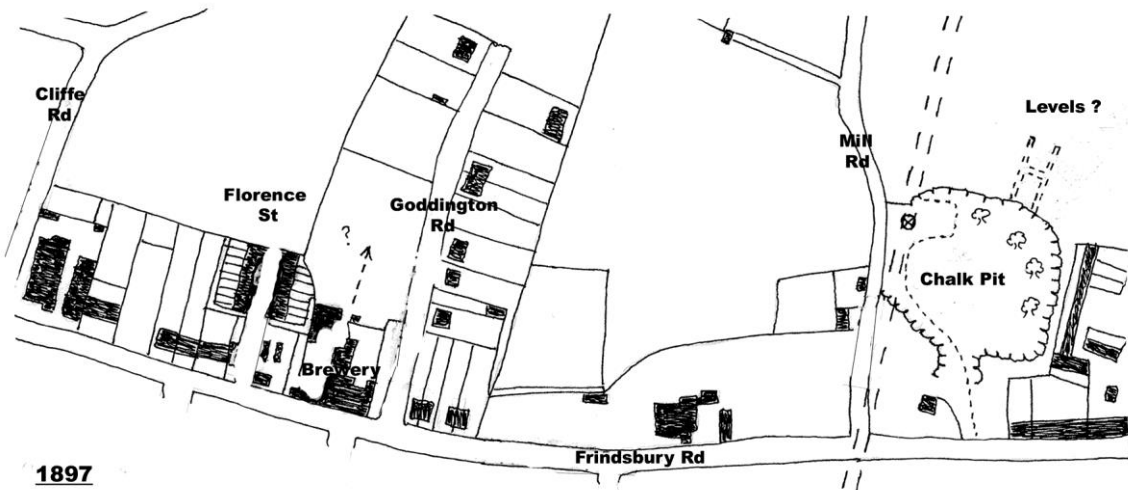


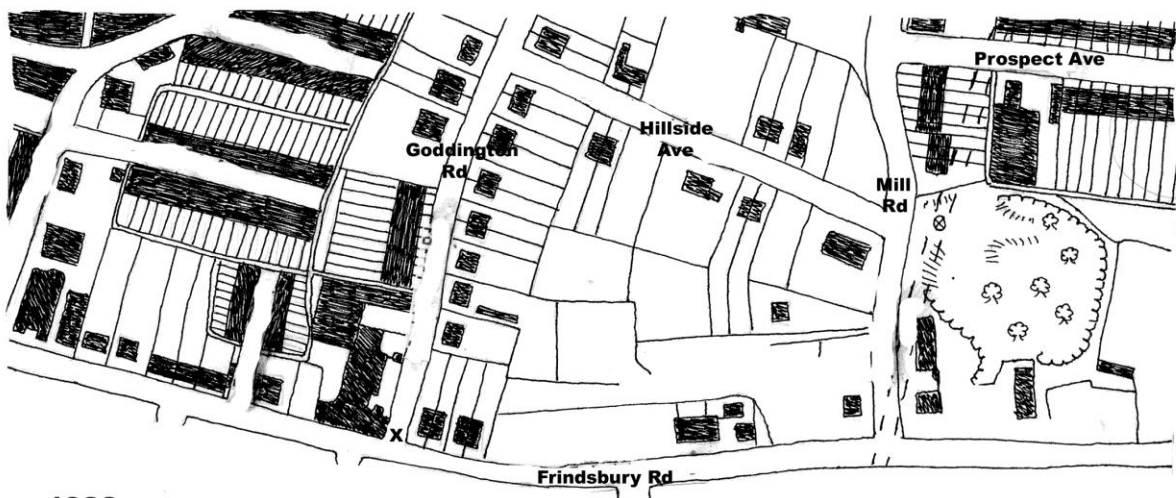
Fig.17 Brewery Levels & Mill Road Chalkpit



1842



1897



1938

5.0 CHALK MINING WITHIN THE AREA OF STUDY

Research has revealed the existence of several locations where chalk was mined from underground at various times. Some of these are already known, some have been forgotten about and lost and others are based on conclusions from historical evidence.

5.1 *Brewery Levels*

At the junction of Frindsbury Road and Goddington Road are some buildings that in the 19th Century were the site of the Frindsbury Brewery (see Fig.17). This was apparently operated by a William Wood from at least 1841. By 1891, it had been taken over by H.L. Dampier, who was advertised as an ale and porter brewer, and there is an interesting entry in a trade journal of that time :-

".... Adjoining the brewery there are some very extensive caves in the chalk cliff which are utilised for the storage of ales and stout; the beers kept in these cool stores are thus got into very excellent condition."

The premises were subsequently taken over by Lyle's mineral water factory and, when they ceased operations, part was acquired by E.W. Coombs Ltd who operate the present day seed factory on the site. The latter company state that the rear part of the premises has changed hands several times and the latest scheme is to build some houses on the site. The site has been extensively altered over the last hundred years and any traces of the caves have been covered over.

So, what was the purpose and extent of the caves? It is unlikely that the brewery would have excavated them and it is probable that the site was originally a chalk pit with passages mined into the cliff side to obtain more chalk. The brewery utilised them as a convenient store and the use of the word "extensive" indicates that they were more than just rooms cut into the cliff. The area behind the site slopes to the south—west and is now built upon by houses. One of the houses on Goddington Road which backs onto Hayward Avenue had a rear fence subsided in recent years and there is a drop here which is partly bricked up. Did the levels enter at this point or behind the Brewery itself? There was a slight subsidence in Goddington Road itself in 1986 near to its junction with Frindsbury Road. It would be tempting to connect this with the Brewery levels but there is no evidence for this. It is more likely to have been settling of infill in an old chalkwell which existed in a field here before the road was built during the 19th Century. It is interesting to note that in 1842 the field next to it was called Well Field.

5.2 *Mill Road Chalkpit*

It has already been mentioned that a ventilation shaft down to the Higham-Strood tunnel was driven from the chalkpit at the junction of Hill Road and Frindsbury Road (see Fig.17). Unlike the other shafts, it is likely that the chalk pit here was already in existence when the tunnel was driven and the shaft was sunk from the floor of the pit. In 1842 the pit was divided into three parts of which (a) and (b) were leased by a farmer called John Sedgwick. The section marked (a) was where the shaft was sunk

and it is likely that it was covered over when abandoned so as not to interfere with the chalk quarrying operations.

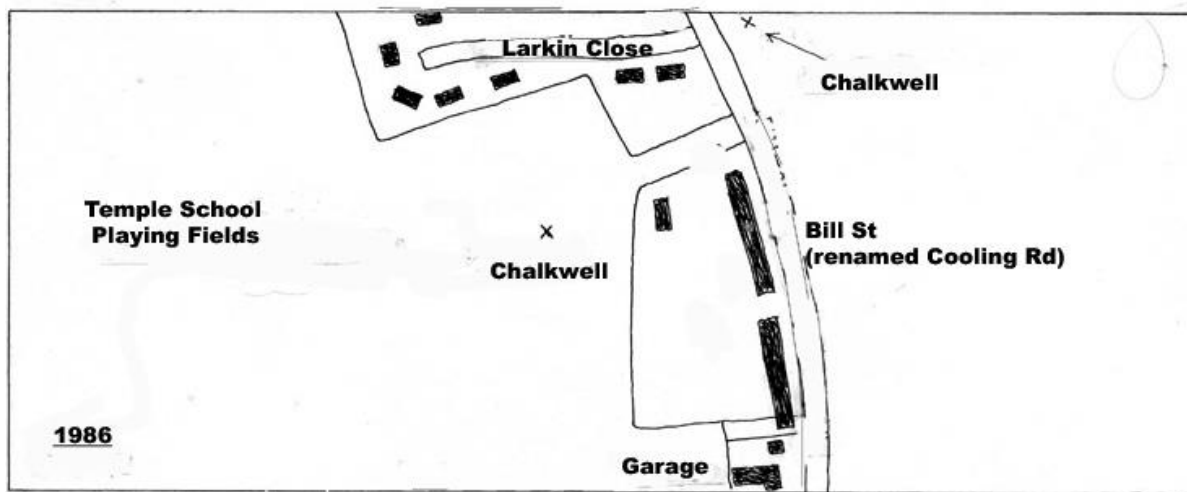
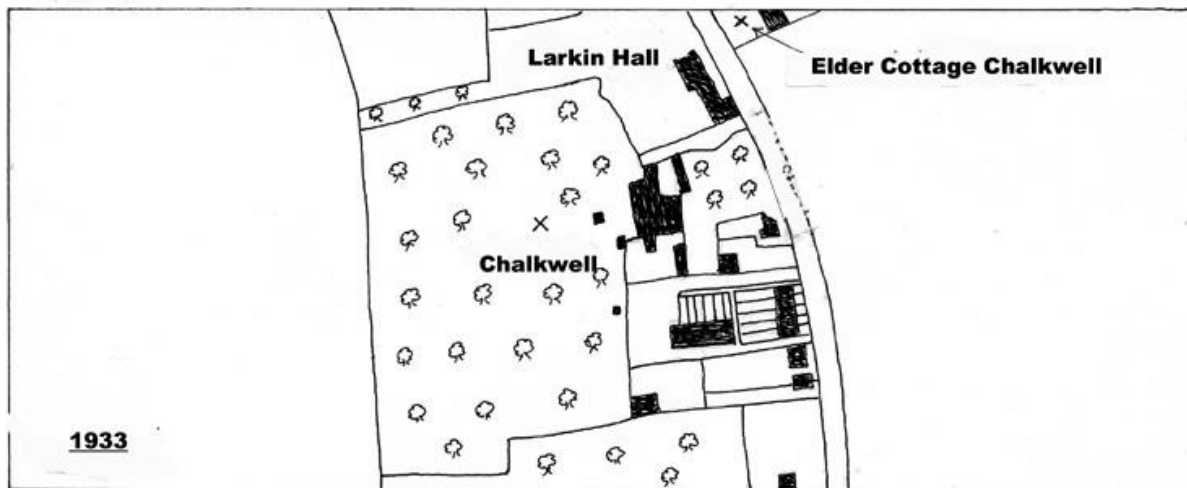
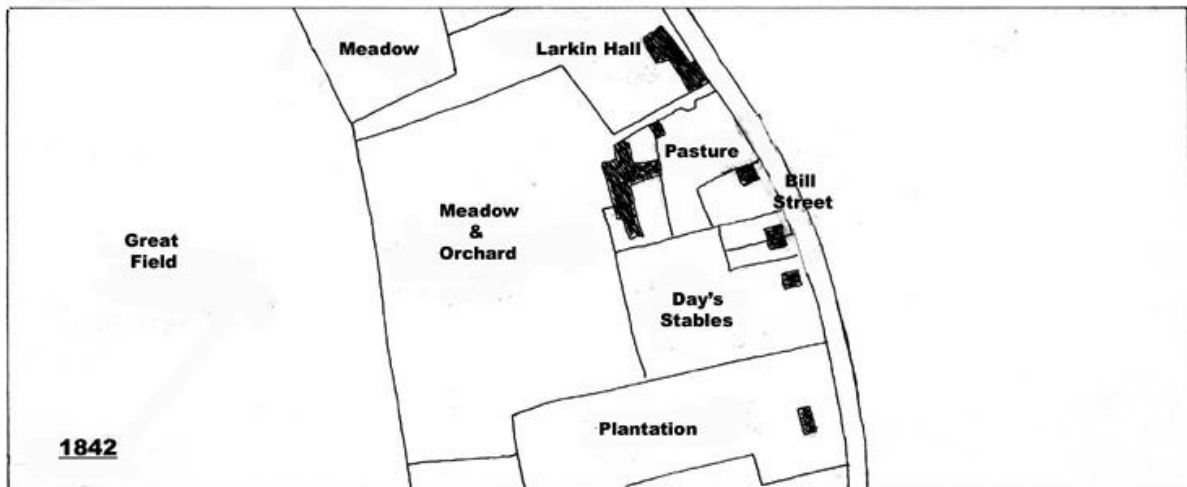
One puzzling factor is that this was the only shaft onto the tunnel where the surface area was not owned by the Canal Company. Since Sedgwick was a farmer, he would need chalk to marl his fields but the area of the excavations seems too big for his own needs. What is more likely is that the pit had already been worked for a number of years for chalk and Sedgwick leased it as a going concern for the occasions when he needed chalk for his fields. Whereas other tunnel shafts had been sunk in fresh ground, the Canal Company at this location would only need a wayleave and probably left the excavated chalk for Sedgwick to use.

The other part of the pit (c) was leased by a William Costen, but it was described as being for arable use, indicating that chalk excavations had ceased in this section. By 1897 the whole of the pit was disused and presumably had been topsoiled since mature trees were shown as growing therein. By 1933 the English Martyrs Roman Catholic Church had been built on part of the site and a hollow in the cliff side had been converted into a shrine. A new Church has recently been built and much of the area has been landscaped to accommodate this and the school next to it.

One ex-resident, John Chinery, can remember that there was an air raid shelter here during the First World War. Opposite Hillside Avenue was a ramp leading down into the chalk pit and there was a mine passage leading into the cliff side which faced Hill Road. From memory, there were two parallel passages about 200 ft long with a 30 ft cross-cut linking them into a H-shape. The passages were about 10 ft wide and 12 ft high in the shape of an arch. The left hand passage was a full-sized entrance but the right hand passage merely ended at a small "window" in the cliff side (presumably for ventilation). The shrine was positioned about midway between the two openings. It was used by locals on a number of occasions during Zeppelin raids and candles were placed on ledges in the passage sides. A soldier with a fixed bayonet was placed on duty outside the entrance. Anti-aircraft guns were placed at Broom Hill and Lodge Hill and he remembers one Zeppelin being shot down at Cuffley. The shrapnel from the guns used to be so bad that his father used to walk about during raids with a galvanised hip bath over his head! The entrances were later bricked up and today there is no trace of them whatsoever. The landscaping operations have only left a small section of exposed cliff face and the entrances have been buried beneath the present surface level.

The purpose of the levels was obviously to extract further chalk when the surface pit had reached the limits of its boundary. They can perhaps be dated between 1862-97 since the ramp leading down to them from Hill Road only appears on the O.S. map of the latter date. Mr Chinery only remembers them as a child so the measurements are only approximate and it could be that they ended at a collapse rather than a working face. We can only speculate on their direction but the position of the ramp and the cliff face on old maps indicates a likelihood of them trending north towards Prospect Road and Ravenswood Avenue. Coincidentally, there have been instances of subsidences on Ravenswood Avenue on the projected line of the passages.

Fig.18 Larkin Hall Chalkwell



5.3 *Larkin Hall Chalkwell*

In 1841, a farmer called John Oakley lived at Larkin Hall and leased several adjacent fields including one described as an orchard and meadow (see Fig.18). By 1858 both the Hall and land had been taken over by William Woodhams, who appeared to be a farmer too, until it was inherited by his son Frank Woodhams in 1867. For a 10 year period, Frank's main occupation was that of a lime burner until he concentrated on farming in 1878. From this time on his business expanded and he leased more land in the Bill Street and Four Elms Hill area until he formed a partnership with a Mr Levy which lasted until at least 1909. This partnership obtained premises at Victoria Wharf, Canal Road, Strood and traded as corn, coal, salt and soda merchants, having a barge built for themselves in 1887 to presumably ply trade to London.

The orchard referred to was remembered earlier this century by a resident Peggy Day and one feature she remembers quite clearly. This was a circular hole, about 6 ft in diameter, in the middle of the orchard that was surrounded by trees and a fence. It was still open in 1954 but it is not known what happened when the orchard was cut down and landscaped to become part of the playing fields of the Temple School. The area today is quite flat apart from 6 ft banks to the north-east and south-east which were presumably the result of grading operations. During September 1986, a dowsing exercise was carried out over the fields to try and pick up any underground features. The line of a water pipe was identified without prior knowledge and subsequently confirmed in the position stated. In addition, a circular feature was identified of about 20 ft diameter and positioned on one of the football pitches. It corresponded with the approximate position of the hole stated to have existed in the orchard.

It is probable that the hole was a chalkwell and the diameter of 20 ft would correspond with the outer extent of the chambers at the shaft bottom. Depth is unknown but in this area is unlikely to have exceeded 30 ft. Whereas it could be quite old, it is interesting to note that Frank Woodhams was a lime burner for some 10 years whilst leasing this area. From the above, it can be seen that Woodhams was an astute businessman and he would not be slow to follow up an opportunity. The mid-19th Century was a period of expansion in the building industry and there would be a sudden demand for lime which perhaps could not be met solely from the larger lime works. It can thus be conjectured that Woodhams used the resources on his land to produce lime for a period until the larger lime works took over the market. If this is so, then the possibility exists that he sunk the chalkwell between 1867-77. It is not known whether the hole was infilled or capped during landscaping operations.

5.4 *Elder Cottage Chalkwell*

Elder Cottage was opposite Larkin Hall on Bill Street and the Day family used to live there earlier this century. Peggy Day can remember an incident in 1930 when a hole opened up in the middle of their garden (see Fig.18). Her father was manuring the potatoes at the time and was particularly annoyed that his manure heap disappeared down the hole! They tied three hop poles together to try to gauge the depth but couldn't reach the bottom, making it over 30 ft deep. The hole was filled in and no further subsidence occurred.

Again, this is probably a chalkwell but it was presumably sunk to obtain marl for the field before the cottage was built. Since the cottage appears on the 1842 Tithe Map, the chalkwell must date from before this time.

5.5 *Home Street Chalkwell*

A field next to Home Farm is described as a fruit plantation in the 1842 Tithe records. The 1862 O.S. map shows a draw well in the northern corner (see Fig.3) which is too isolated to be a water well.

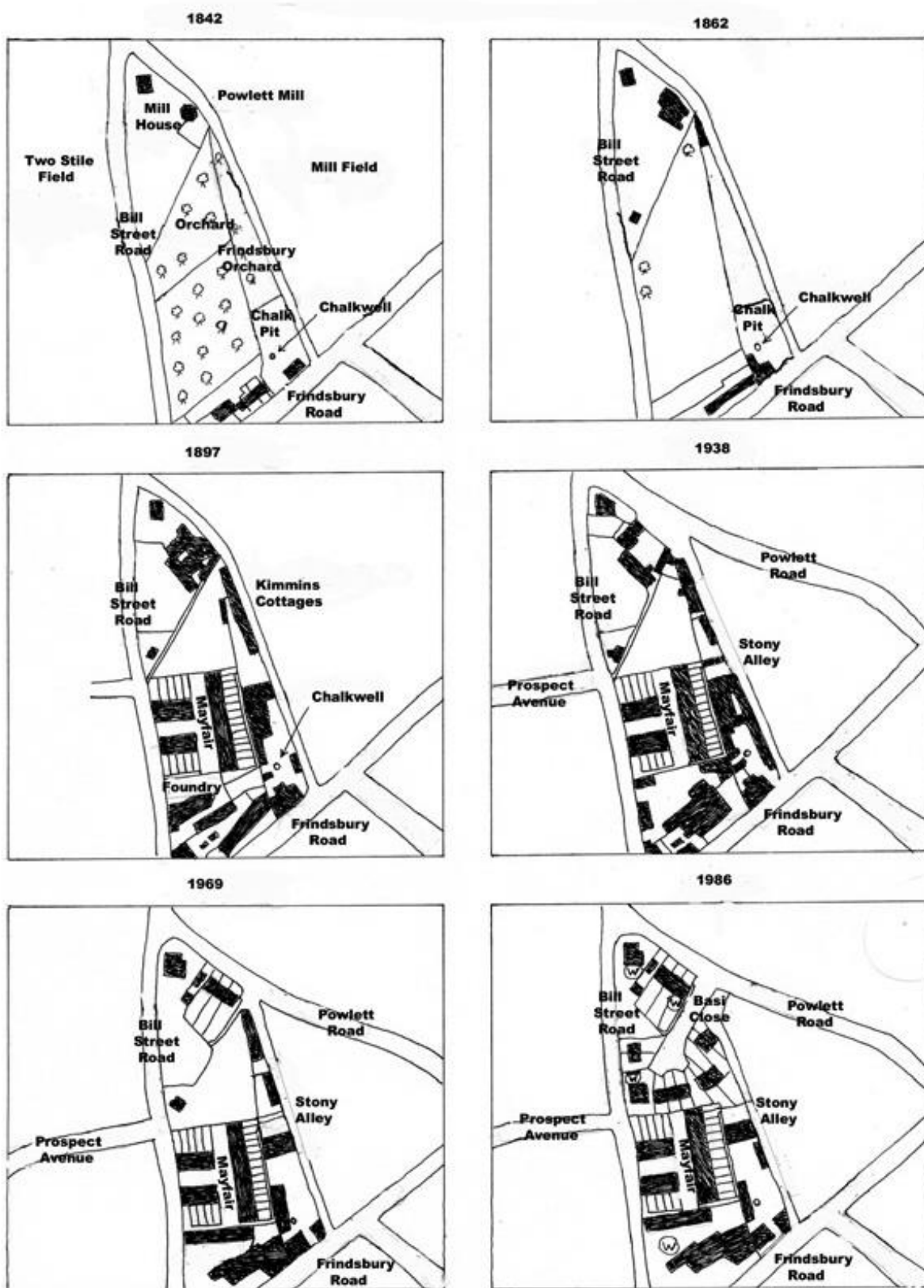
The lessee of the field in 1842 was a James Summers who is described in the 1841 census as a gardener, together with his sons James junior and Thomas. The son James junior was subsequently described as a lime burner between 1855-65 (Thomas was also a lime burner but only in 1858) before changing back to being a market gardener in 1867. Like Frank Woodhams, it is possible that James junior sunk a chalkwell in the field to cash in on a short period when lime burning was more profitable than market gardening. There was also a John Hills who lived across the road and who was a lime burner and market gardener in 1845. It is thus possible that the lime burning side of the business was already in operation on-a part-time basis and Hills worked for the Summers family. Again, there is no information as to what action was taken about the shaft when the area was built on and it is located in Jarrett Avenue.

5.6 *Frindsbury Road Chalkpit*

Between Bill Street Road and Powlett Road, a narrow alley (known locally as Stoney Alley) leads north-west from Frindsbury Road (see Fig.19). On the left of the alleyway there is a sunken yard, which is now used by M&J Engineering Ltd, that is about 20ft deep with brick lined walls. In 1842 this was a small chalk pit owned by a William Hart who also owned a small adjoining orchard to the north. Hart was listed in the 1841 census as living at Strood Hill together with his two sons Henry (15) and William (10), all of whom were brickmakers. Between at least 1855-58, Henry Hart was described as a brick, tile and drain manufacturer based at the chalk pit premises. As well as this, the Mines & Quarries Statistics for 1858 also list him as a brickmaker at Wainscott Pottery, manufacturing some one million bricks per year. The latter reference is puzzling since the Wainscott Pottery was being worked by a Henry Hone in 1842 and by 1858 it was in the hands of Jesse Clark Foster (see Tilemaking at Wainscott). There are 3 possible explanations for this :-

- a) Being similar, the two names were mixed up by Robert Hunt who collated the statistics
- b) Henry Hart acquired the Pottery from Hone before 1858 when it was taken over by Foster
- c) The clay digging area at Four Elms Hill was called Wainscott Pottery through its association with that premises and Hart leased part of it to obtain his raw material.

Fig.19 Frindsbury Road Chalkpit



Without further information, it is impossible to be sure but it is known that the Hart family was using the Frindsbury Road premises from at least 1842 up to 1867.

In 1867, the premises were acquired by Messrs John and George Gates who were builders and undertakers. This apparently strange mix was due to the fact that John Gates (the father) had owned a carpentry business nearby since at least 1826 and it was common for village carpenters to make coffins when required. His son George had joined him by 1859 and was presumably responsible for developing the building side of the business. The move was obviously to obtain larger premises and by 1871 John had retired leaving his son to operate both sides. The business was successful and George had acquired further premises at Canal Road by 1895. He was then advertising as a steam saw mills, joinery works, undertaker and house decorator. The family business carried on until just after the Second World War and the premises were acquired by M&J Engineering Ltd in the 1950s.

A Harold Smith was working for Gates in 1947 and has described how a hole suddenly opened up in the yard. It was approximately 6 ft in diameter at the top, widening a short way down, and at a depth of 80 ft three short tunnels radiated from the shaft bottom. Two firemen went down in a bucket and windlass, finding the shaft completely dry, and the hole was subsequently filled with rubble. Ernie Weeks has worked for the present firm since they came here and says that the hole kept subsiding over the years until 1985, when it dropped again to a depth of 1ft. It was covered over with reinforced concrete and this will hopefully solve the problem. He remembers seeing a 4 inch lead pipe going down the side of the shaft but this could have been for drainage from the yard into the shaft.

Another puzzle about the yard is the presence of 10ft arches in the brickwork covering the sides (see Fig.20). Two of these are exposed but at least another two have been bricked up. Of the open ones, the right hand arch is about 1ft deep and behind it is a solid chalk face. The left hand arch is of similar dimensions but there is no sign of chalk, merely a crumbling face of Thanet Sand. The whole of the left hand wall shows signs of frequent repair suggesting that the weight of the houses on **Mayfair** above are exerting a lateral pressure on the Thanet Sand faces under the brickwork.

At the rear of the yard, a lower brick wall about 10ft high holds back an overgrown area containing much brick rubble. To the right, there is a recess about 2ft wide and 6ft deep which looks very much like a flywheel pit for an engine. Ernie Weeks says that there was an open arched tunnel in the middle of the wall when the firm took over in the 1950s. It was about 8ft high and big enough to store 3 coffins side by side. The back of the tunnel was either bricked or boarded up and he never found out if it went beyond. The entrance was bricked up when the new workshop was built in front of it. When the houses on Basi Close were built, the builders carried out test drilling and found nothing but he doesn't know if they drilled on the exact line of the tunnel. It is said that some of the new houses have developed cracks but this could be normal settling.

So, there are a number of interesting features in this yard and several rumours but what was the origin and purpose? One rumour is that tunnels exist behind the bricked up arches and that small subsidences have occurred on Stoney Alley and in

back gardens of Powlett Road. There was indeed a 2ft square subsidence on Stoney Alley in December 1980 but this was put down at the time to settling of the walls behind the brickwork. This is feasible but the exposed arch on that side reveals that there is solid chalk on this side. Another rumour says that a hole opened up in the road in Mayfair and that men were lowered down in a bucket. This is too similar to the incident in the yard to be a separate incident and must be based on that. Having said all this, it is not uncommon for short adits to be driven from the sides of chalkpits to obtain further chalk when the surface had been worked to the limits of its boundary. In this location, it would have been dangerously unstable to deepen the chalkpit itself and adits cannot be ruled out. If present, however, they would be on the right hand side since this is where the chalk face is. The evidence of the exposed arches points to these having no connection with any possible adits and they must be purely structural. Since a newly abandoned chalk pit would have unstable sides, anyone wishing to use it as a yard would have to support the sides with brickwork and this is what has happened here. Possibly the arches were an attempt at economy since a great many bricks would be required to completely seal off the old pit faces. It is interesting to note that the position of the buildings on the 1936 map (see Fig.19) mean that all of the arches would be hidden by or incorporated into the buildings. Whether this has a significance is not known. To recap, if adits are present they are only likely to be on the right hand side and hidden by brickwork, the presence of a bricked up arch having no particular significance here.

The description of the shaft in the yard makes it undoubtedly a chalkwell, since it is of standard dimensions and was dry when explored. In addition, ground level here is about 120ft O.D. which makes the shaft bottom 40ft O.D. - too high above the water table to be a water well. The shaft itself first appears on maps in 1897 when it was erroneously shown as a water well, a common mistake. It is thus impossible to say whether it was sunk by Gates, Hart or even earlier so we must rely on deduction.

The 1842 tithe records describe this area as a chalk pit and yet the geological evidence from the exposed arches poses a problem. At the back of the yard at least, the right hand wall is composed of chalk and yet the left hand wall is Thanet Sand. This suggests that either the top of the chalk dips steeply to the left at an angle of about 45 degrees or there is a fault line running up the yard which has displaced the chalk downwards on the left hand side. Since the chalkwell had to be sunk to a depth of 80ft to reach chalk and is on the left hand side, this suggests that a localised fault may be the logical reason for the disparity at either side. Either way, this would have been an inefficient chalk pit to operate since at least a third of the removed material was Thanet Sand which would have to be disposed of. The map dated 1862 (see Fig.19) shows the area of the chalkpit to be the same as in 1842 and yet it had doubled in size by 1897. Since surveying would take place some time before the map was published, we can date the extension to between about 1860-1895. Again, since Gates only used this area as a yard, this can be narrowed down to between 1860-67.

This dates the extension to the period when Henry Hart was apparently using the premises to make bricks, tiles and drainpipes. Some Thanet Sand deposits have been used elsewhere to make bricks and it is tempting to suggest a small scale operation here using materials from site. This doesn't tie in, however, with the

Fig.20 Frindsbury Road Chalkpit

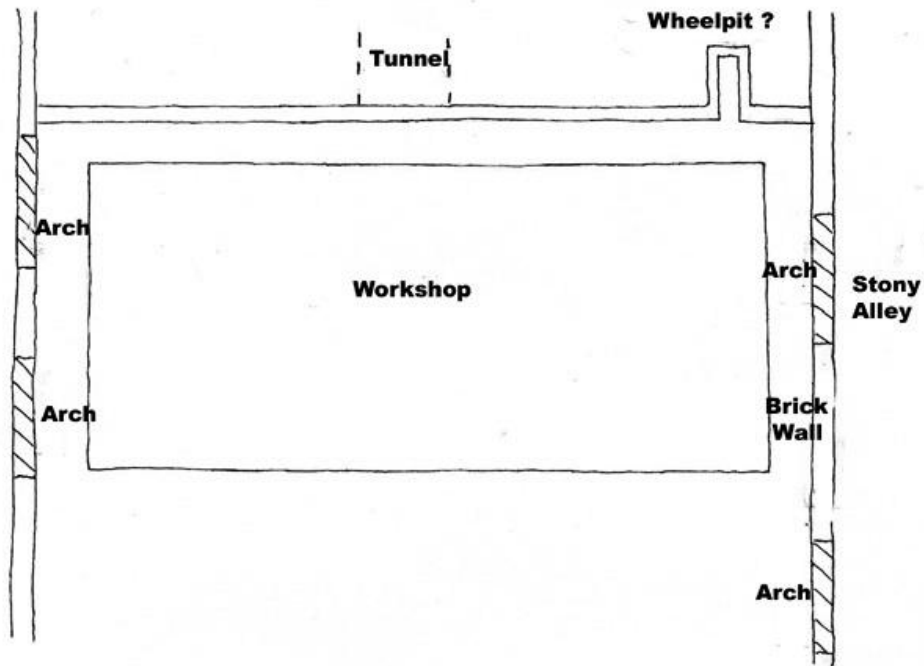
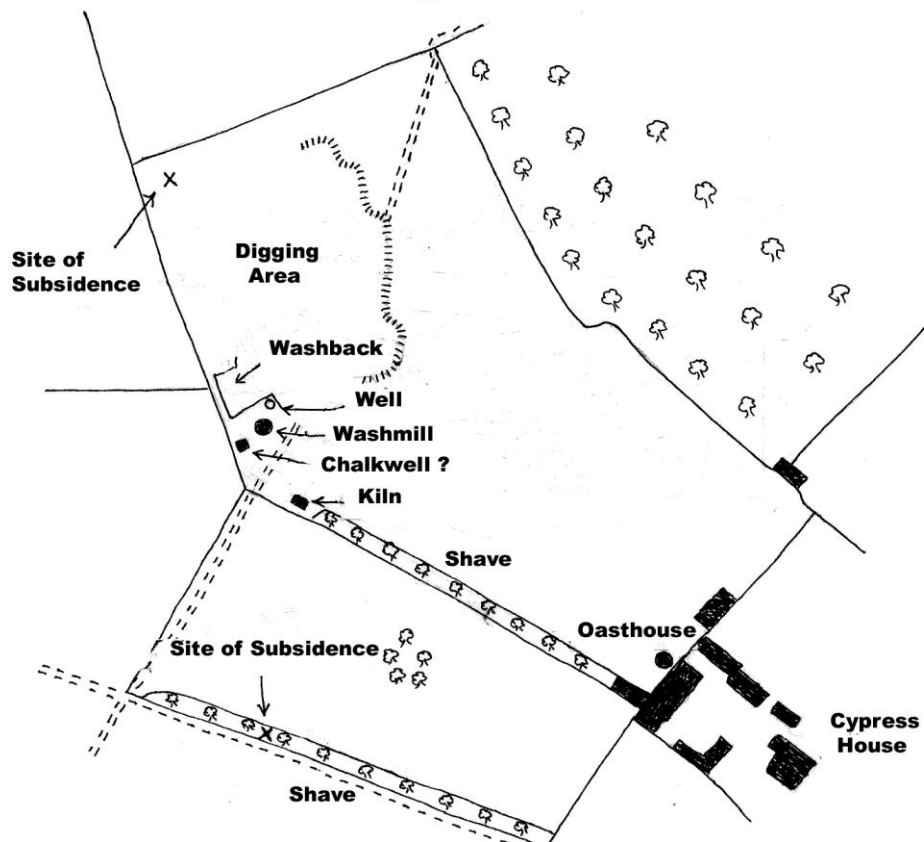


Fig.21 Wickenden's Brickfield
1862



statistics of 1 million bricks as there would have been insufficient material on site. In addition, there is a probability that Hart was digging clay from Four Elms Hill and it would be too much trouble to bring it here just to make bricks on site. The most logical conclusion is that Hart was operating on two separate sites. At Four Elms Hill he could dig clay and use clamps to make stock bricks, obtaining the necessary chalk from this chalk pit. In the disused part of the chalk pit he could operate a small kiln to manufacture tiles and drainpipes from the Thanet Sand deposits obtained on site. Once the surface chalk deposits had been removed, the only option for further supplies would have been to drive short adits from the chalk face and to sink the chalkwell. The Gates family used the site for the various sides of their business and there are local rumours that coffins were stored in holes in the chalk face. This would tie in with the adit behind the present workshop since it would be cooler in summer and could act as a temporary morgue! Albert Walter remembers that, earlier this century, the firm used to cut their own trees and bring them to the yard on a wheeled trestle pulled by three horses, who were stabled in the yard. Local children stripped off the bark and the trunks were placed in the river at Strood Pier to season for a few years. By the 1930s there was a large complex of buildings at the yard which presumably acted as the joinery works. A long building along the right hand side could have been for sawing wood and it is in line with the recess in the rear wall. This may have been for the flywheel of an engine sited on the raised bank which could have operated the machinery via flatbelts.

5.7 Well Sinking

This is included since there is some evidence to point to a well sinking business that originated within the area of study and which may have been responsible for sinking many of the wells in the area. It probably owed its success to having a permanent base (unlike most sinkers who were itinerants) and could thus build up a reputation.

John Batchelor was listed as a bricklayer in Frindsbury between 1855—59 which was the term used at that time for a small builder. There was also a John Batchelor who was a lime burner at Chatham Hill in 1847 but it is not known if they were the same person. By 1861, he had changed his job description in the official census to that of a well sinker. By 1867 he was aged 55 and it is possible that he had handed over to his son because Batchelor was listed as a bricklayer and builder between 1867-1905. Both appear to have lived at 27, Frindsbury Road which is a coincidence because it was opposite the Brewery previously mentioned.

The Geological Survey's list of wells for the area was based on information gathered in 1940 and a well sinking firm called R.D. Batchelor & Co was then in existence. They were responsible for sinking at least 48 wells in the Medway and Sheerness areas between 1863-1937 and were then based in London. The wells listed in the publication are mainly industrial ones so it is very likely that many more domestic wells were sunk. Among the wells sunk by them were those at Chattenden Barracks, Frindsbury Brewery and Frindsbury Cement Works. All of these were sunk before 1901 (precise dates are unknown) and it is too much of a coincidence that the local Batchelors were not connected with the firm. It is known that some builders sunk wells at properties they built so it would be easy to turn their hand to this when work was scarce. Circumstantial evidence thus points to the Batchelors

carrying out well sinking as a sideline to their building business and then specialising as they obtained a reputation.

5.8 Wickenden's Brickfield

In 1842, a Thomas Wickenden farmed several fields in the area and lived at Cypress House at Home Street. Part of his holding was the "Barn Field" (see Fig.3) of over 6 acres which was then in arable use. Although he remained predominantly a farmer, by 1847 he had turned the field over to making bricks (see Fig.21) which presumably brought in more income than its former use. He may well have been stimulated by the success of the Nursery Brickfield which was adjacent to his property. By 1861 he had been joined by his son Thomas Junior and he retired soon after. His son carried on the brickmaking business as a sideline to farming up to at least 1878. By that time the brickearth deposits must have been exhausted and had left a flat area which by 1897 had been planted as an orchard (see Fig.22).

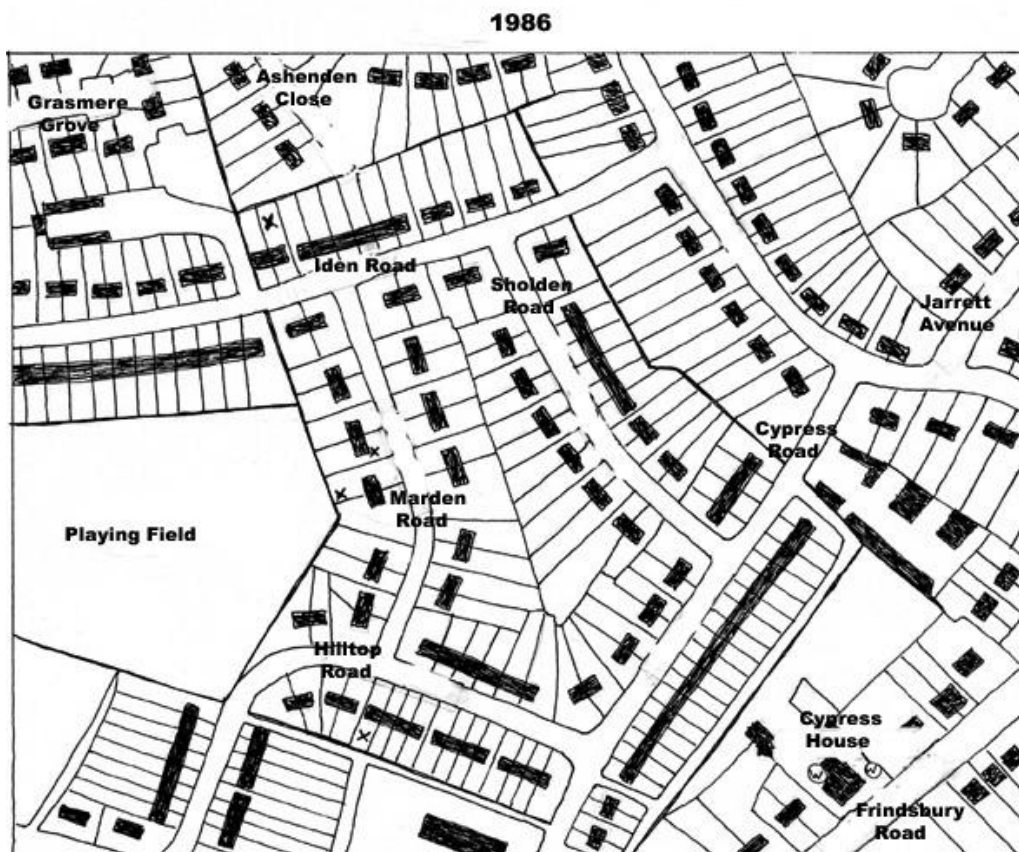
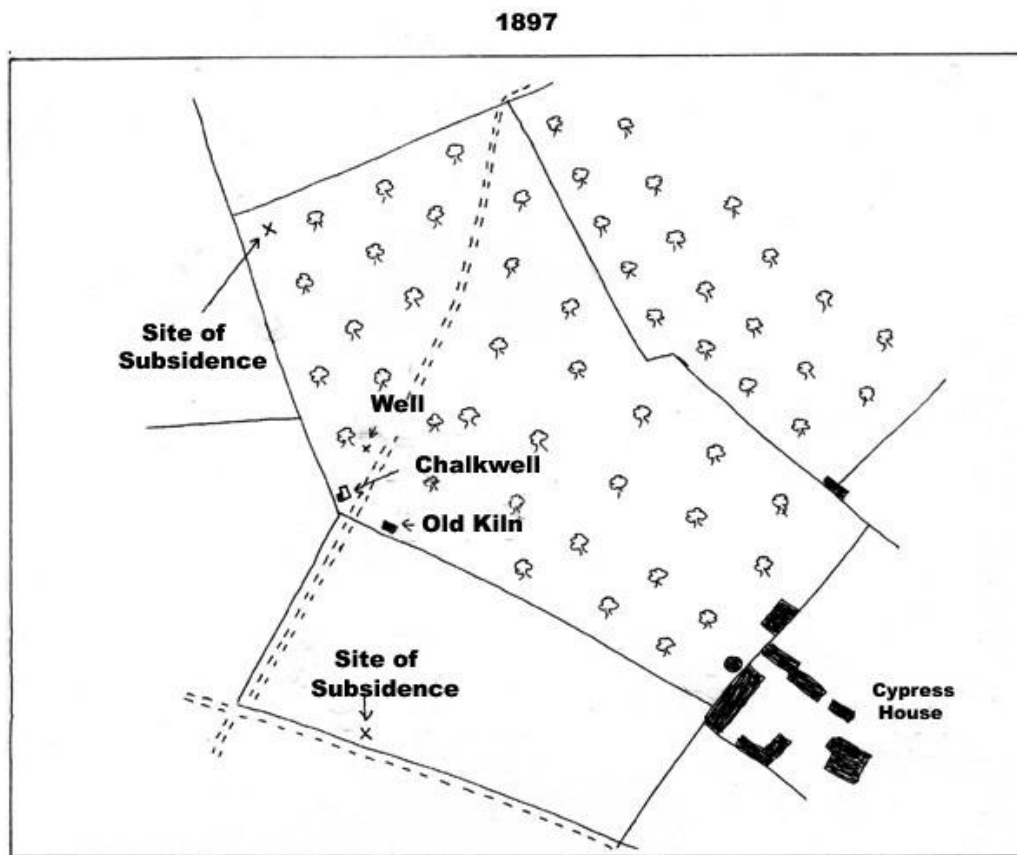
By 1902, Cypress House and the land had been taken over by Alfred Wyles, who came from a farming family based at Stonehorse Farm. He had a reputation for bad temper and was nicknamed "Donkey Wyles" by local children whom he chased out of the orchard. In 1960, the land was sold by his descendant Paul Wyles to Presnail (Builders) Ltd who built a number of bungalows and houses on the site.

The map of 1862 (see Fig.21) shows the brickfield as it was in full operation and a number of features can be identified. The brickearth was dug from the north western area of the field and the old Church Path (see Farming) had to be diverted as it passed through the workings. The large circular feature nearby would have been a washmill, which would have been horse-operated at that time. It has been suggested that a similar feature in the southern corner of the field was a shaft but this is very unlikely in view of its distance from the area of operations. It is too big to be a shaft anyway and another washmill was unnecessary. Its proximity to the farm buildings points to its being merely an oasthouse. There only appears to be one washback which points to the small scale of the operations. A shaft was situated next to the washmill and this indicates that it was a well to provide water for the slurring process. The immediate explanation of the small square structure nearby is that it was a berth but this is not positive.

The existence of a small kiln gives a few clues to the type of brick produced here. In small brickfields of this area, it was traditional for the yellow stock bricks to be produced in clamps and kilns were only used to make the red bricks without any chalk addition. Since immense quantities of stock bricks were being produced in the brickfields around Manor Farm, it would not be economical to compete against them on such a small scale. It might, however, make sense to specialise in producing red bricks which were used as house facings, etc. If this is the case, then there would be no need to sink a chalkwell on site to obtain the quantities of chalk necessary to produce stock bricks and the square structure would be a berth.

Since we cannot be certain that only red bricks were produced, we must look at any other available evidence, Fred Denness can remember a structure that existed in the orchard in the 1930s and Albert Walter can vaguely remember this also. It was in the shape of a beehive with the bottom part of bricks and the top made of

Fig.22 Wickenden's Brickfield



concrete, surrounded by a barbed wire fence. It was located next to the hedge to the left of the stile and corresponds to the square structure already mentioned. Fred was actually told that this was a capped shaft and the barbed wire fence points to the feature being regarded as dangerous. Similar brick beehives exist elsewhere in Kent as caps to disused chalkwells and there is a possibility that this was also a chalkwell. The shaft would have been round but it is always possible that a wooden hut was erected over it which would explain the shape on the map.

If we accept the existence of a chalkwell, it could have predated the brickfield for marling purposes but the strength of the cap points to it being made when the brickfield closed, which suggests a use in the brickmaking process. Possibly the explanation was that both stock and red bricks were made on site and chalk was obtained from here.

This feature is presently located in the back garden of 7, Marden Road belonging to Mr R. Davis (see Fig.22). There is no sign at surface but Mr Davis says that the builders landscaped the area and it is probably buried under topsoil. Fred Denness has probed the area with a rod and claims to have hit something solid at the position he can remember from the 1930s. If a shaft is present, it seems that the cap is still intact. The site of the well is not apparent but it must lie underneath number 9. There is a strange gap between numbers 3 and 5 which is rough ground and which was initially suspect. The explanation for this was that part of the garden of number 3 was sold in 1983 as part of a plan to build another bungalow on the site. Planning permission was refused since it would not fit in with the line of the other bungalows and the land has remained undeveloped.

The 1862 map also shows two lines of enclosed trees (known locally as "shaves") which had been left along the edges of the adjacent field as well as a clump left in the middle. Both features were commonly left to isolate disused deneholes and it is possible that some old ones existed here. It is interesting to note that a 30ft hole opened up in 1940 on the line of the southern shave which had by then been grubbed out. It is not known if chambers were seen at the bottom since it was quickly filled in. In 1965, a small 3 ft deep subsidence occurred in the rear garden of 26, Iden Road which is located on the site of the old brickearth diggings. The cause of this is unknown but it could have been a mere settling of the disturbed ground beneath,

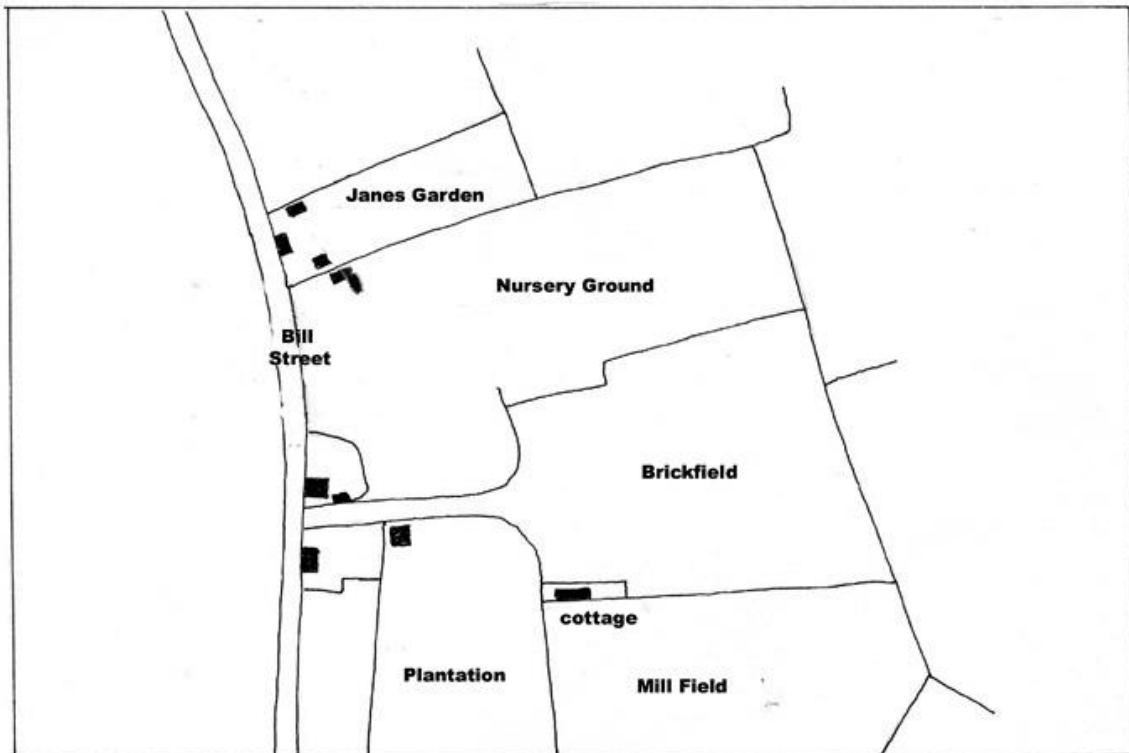
5.9 *Nursery Brickfield*

This brickfield has been known by several names over the years including Bill Street, Jordan's and Medway Brickfields. Since the earliest known name is Nursery Brickfield, this will be used as the overall title for what was the earliest brickfield in the area of study.

It is not known for certain when it first started but there was a brickmaker called James Janes listed for Frindsbury in 1826, although the precise location of his brickworks was not given. It is interesting to note that a nearby plantation was called "Jane's Garden" in 1842 (see Fig.23) and the name Janes was not particularly common. It can thus be speculated that Janes worked this brickfield and lived nearby, his garden being subsequently planted with trees. If this was the case, he

Fig.23 Nursery Brickfield

1842



1861

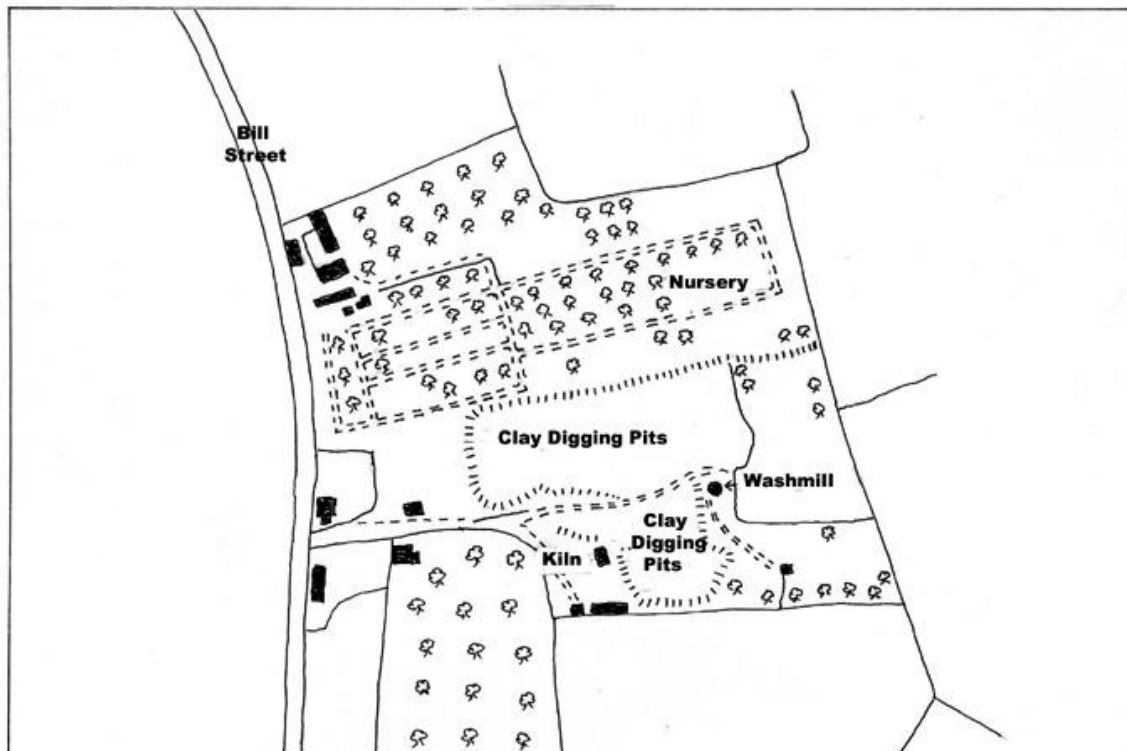
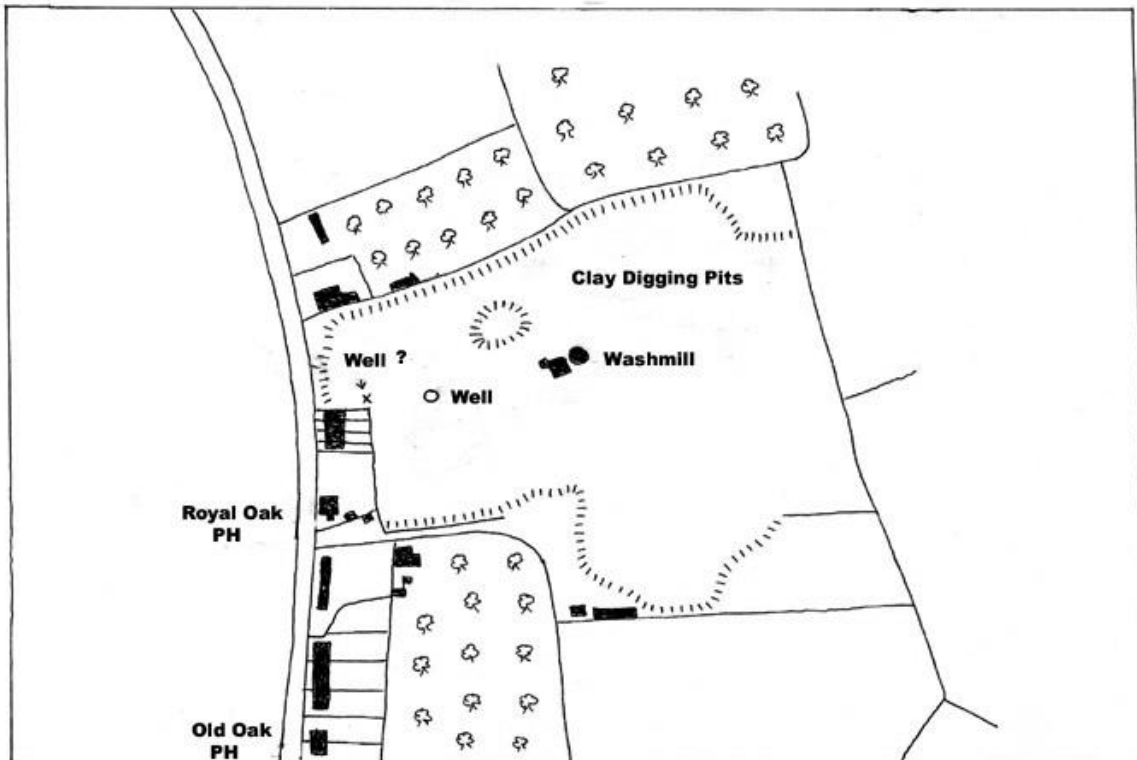


Fig.24 Nursery Brickfield

1895



1907

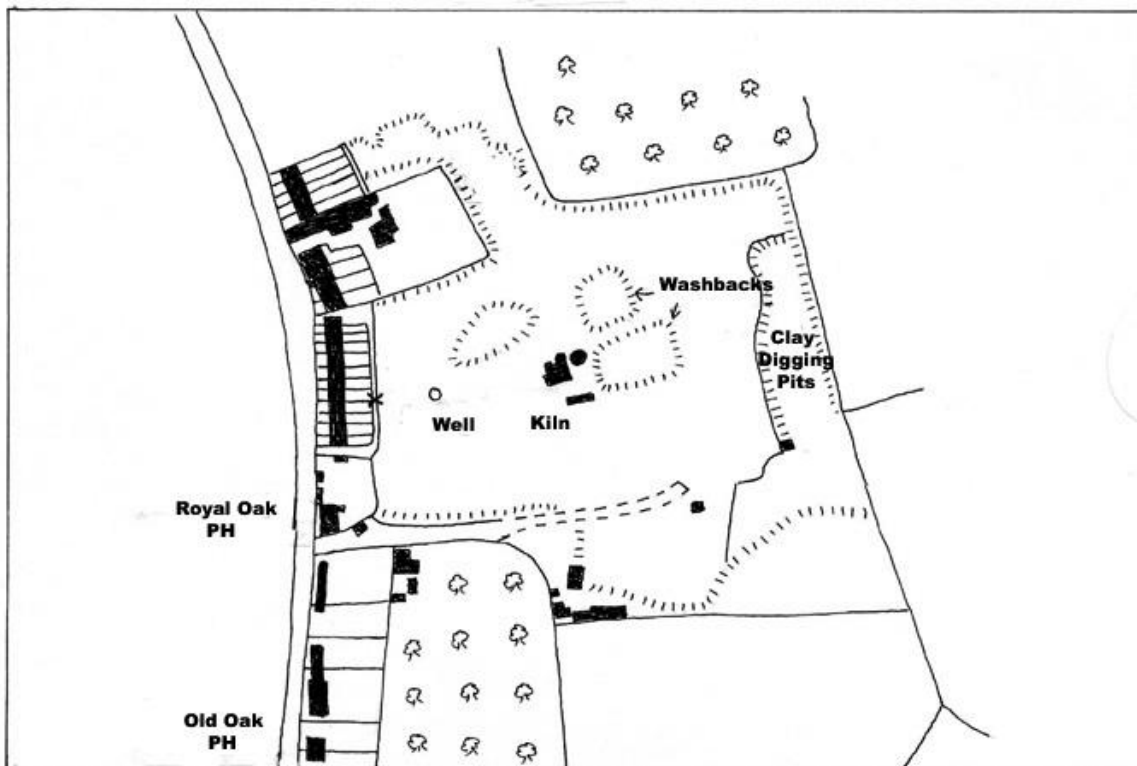
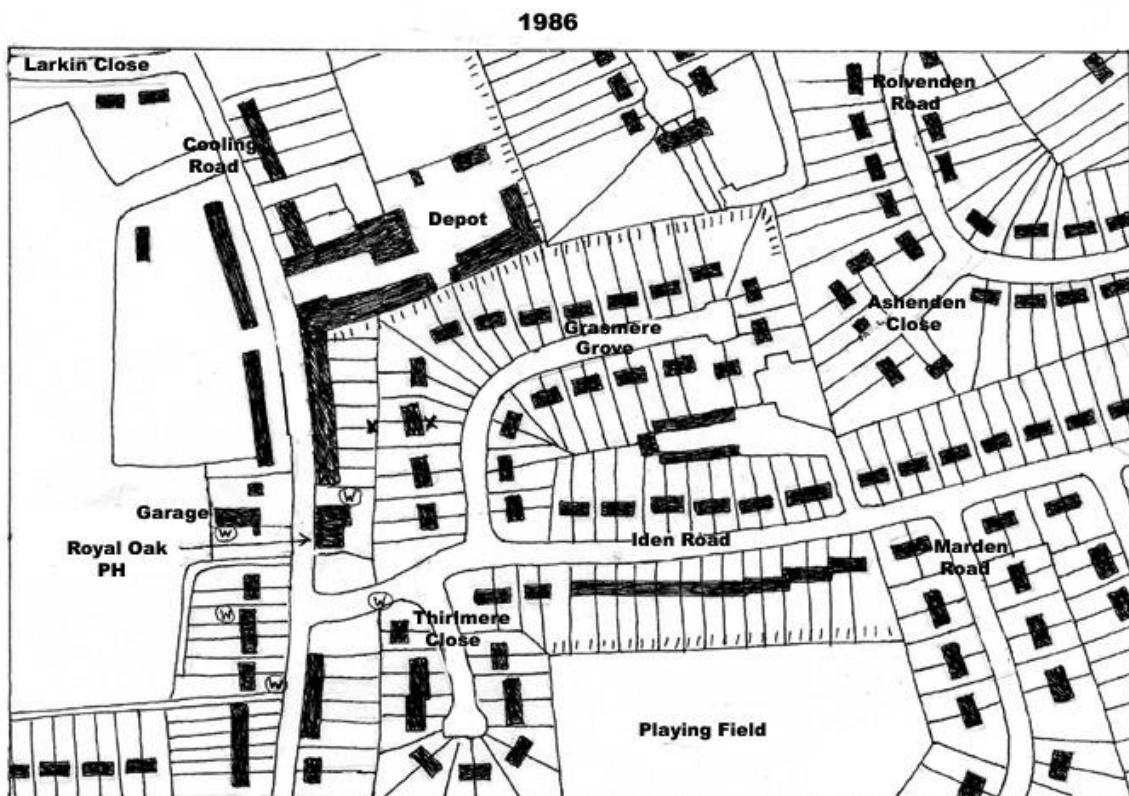
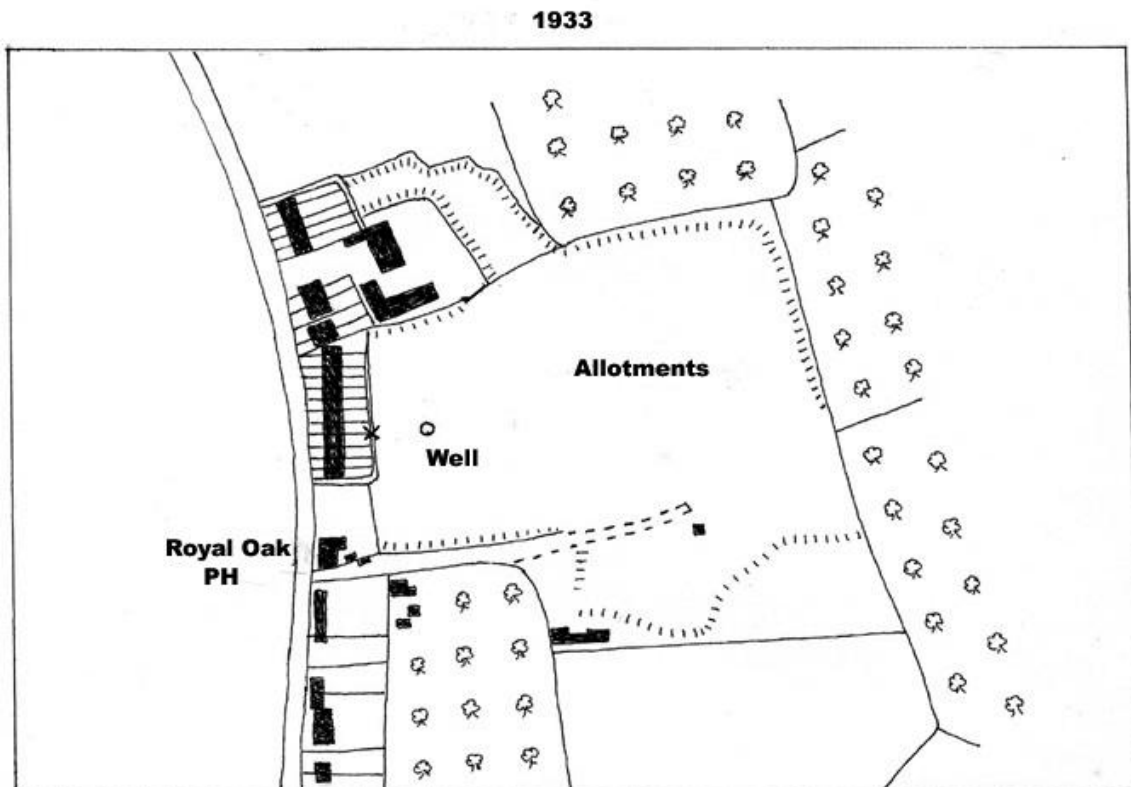


Fig.25 Nursery Brickfield



did not work it for long and must have moved out of the area by 1842 since he was not listed in the tithe records as leasing or owning any brickworks at that time. It would appear that he moved to Strood, since a Thomas Janes (presumably his son) was working the Janes Brickfield on Cuxton Road by 1867,

In 1842, the brickfield was owned by Messrs William Maiden and Thomas Smooker, who had owned other land in the vicinity since at least 1835. They were both described as "gentlemen" and Maiden in fact lived at Stratford, Essex with only Smooker living nearby in Bill Street. There is no evidence that they worked the brickfield themselves and they more than likely lived off the income from leasing land in the vicinity. There was no lessee for the brickfield in 1842 and it was described as arable land, indicating that it was probably disused at that time. A John Hone lived in the cottage in the brickfield (see Fig.23) and was apparently related to Henry Hone (see Tilemaking at Wainscott). There is no evidence that he was using this site and it is likely that he had been made redundant when the brickfield ceased operations.

The nursery ground adjacent had been worked by William Beadle since at least 1835 and we have met him before as the owner of land at Wainscott and Four Elms Hill. He was something of an entrepreneur and held land at various places in this area, being mainly a market gardener. At this location, he seems to have concentrated on producing young fruit trees and seeds which must have been to supply the many orchards in the surrounding area. In 1847, he is suddenly listed as being a brickmaker in addition to his other activities and must have acquired the adjacent brickfield as a sideline. Considering his success in other ventures, it is perhaps not surprising that he realised the potential market for bricks and decided to cash in on it. He died in 1858 and the business was continued by his widow Mrs Mary Ann Beadle, who was described in 1861 as a nurserywoman and brickmaker with a workforce of 8 men and 2 boys. The nursery and brickfield were operating side by side (see Fig.23) but the latter was still only a small scale operation. The presence of a kiln and the lack of washbacks indicates that they concentrated on producing red bricks, like the Wickenden's Brickfield they were too small to compete with the vast brickfields around Manor Farm. The 1861 Census identifies some of the local workforce :-

James Curtiss (39)
John King (17)
William. Swann (57)
John Swann (24)
William Williams (52)
Samuel Morgan (50)
John Hone (48)
Richard Hone (17)

John Hone had moved out of the brickfield cottage into a house on Bill Street itself, presumably because it was now being used as a office / store. He had converted the house to become the Old Oak Inn and, like some other brickfield workers in the area, was a part-time licensee to insure against periods of winter lay offs. William Williams has been mentioned before as owning property at Home Street and had moved to a house at Bill Street, his rental income thus helping him out when laid off.

By 1865, Mrs Beadle's daughter (also called Mary) had taken over the business but appears to have ceased the brickmaking side since she was now only described as a nurserywoman and florist with a workforce of 2 men. The brickfield thus seems to have remained disused for a number of subsequent years. The likely reason for this is that all the brickearth had by now been removed from the available area and any continuation would have involved digging up the nursery ground, which perhaps she was unwilling to do. The excavations to this date must have been relatively deep for such a small area and this is confirmed in a report by the Geological Survey ie "... a spread of brickearth at 120-130ft O.D., from 2-4ft thick, has been worked together with 10-15ft of the underlying Thanet Sand...". This explains why there is such a steep drop today behind houses at numbers 17-45, Iden Road. The extraction of so much Thanet Sand in addition to the brickearth also points to the production of red bricks since this material was much used for this purpose.

The next period of use was initiated by the firm of Alfred Horsnail & Son who were an established firm of coal merchants at Medway Coal Wharf on Canal Road. It seems that they were attracted by the growing market for bricks and their advantage was that they could inject capital into buying land and equipment to set up a much bigger operation. By 1878 they had acquired both the old brickfield and the nursery ground to the north and proceeded to dig up the brickearth which had previously remained untouched. By 1895 (see Fig.24) the brickfield had doubled in size and a new kiln and buildings were erected in a central position. The apparent lack of washbacks indicates that they were still producing red bricks and the diggings must have been up to 20ft deep to remove a similar depth of Thanet Sand as before.

In 1895, the son Alfred Bevans Horsnail took over and seems to have instigated a change in working practices. For a start, he wanted to extend operations even further north but was frustrated in being unable to buy enough land to extend the diggings on a broad front. Instead, he obtained merely enough for an L-shaped extension but this was excavated down to the chalk layers in a much deeper operation than before (see Fig.24). The necessity for acquiring chalk as well as the appearance of washbacks indicates that he was now producing stock bricks to meet a growing local need. The restricted area of the chalk excavations, however, meant that the pit was relatively narrow with high, vertical walls and this was potentially dangerous. The result was a fatal accident which was reported in the Chatham & Rochester News for 30th November 1895 :-

"BURIED ALIVE AT FRINDSBURY A son killed in sight of his father.

A shocking fatality occurred at the Nursery Brickfield, Bill Street, Frindsbury on Tuesday afternoon. William Sayer, the landlord of the Royal Oak beerhouse on Bill Street, was at work with his father and brother in a chalk pit when nearly 10 tons of earth fell suddenly and without the slightest warning, buried him beneath it and killing him almost instantly. Sayer, who was married and leaves a widow and one child, was a tall, fine, manly fellow weighing 18 stones. He was well known in the neighbourhood by his pugilistic capabilities, he being an expert boxer. Mr Coroner W.J. Harris and a jury, of which Mr G.H. Boucher was chosen foreman, inquired into the circumstances of the death at the late residence of the deceased on Wednesday evening.

James Sayer, labourer, residing at Bill Street, identifier the body of the deceased as that of his own son. He was 29 years of age and was by occupation a beer retailer and labourer. He was engaged working in the chalk hole at Nursery Brickfield on Tuesday at about 2 o'clock filling baskets, when a quantity of earth, witness thought from 8 to 10 tons, fell from the top of the pit upon him, completely burying him out of sight. There was no undermining and the earth was further back than the face of the chalk. Witness could not account for the fall other than through it being affected by the recent rains. Witness and another of his sons were working on the stage but there was no one on the earth that fell.

Henry Sayer deposed that deceased was his brother. Witness was also present in the chalk pit on Tuesday. The fall was so sudden that he could scarcely tell what happened. The earth fell "like a flash of lightning" and covered his brother who was working underneath. Witness went at once down the hole and, with assistance that came shortly after, he got the earth away as quickly as he could but it was nearly half an hour before they came across his brother. He was then quite dead.

Dr Packman was summoned and came before witness and the others had uncovered the deceased. Witness was at work down the pit in the morning and the deceased was giving him a spell in the afternoon. Dr Alfred Packman, surgeon in practice in Strood, said that when the deceased was recovered he was quite dead. On examination, he found a deeply lacerated wound over the left temple and blood all round the nose. The face was very much swollen. There were no bones broken. Witness was of opinion that concussion of the brain had taken place followed by suffocation which caused death. With such a weight of earth upon him, there was no chance for him.

The Coroner stated that he was literally buried alive. The jury returned a verdict of Accidental Death, "

Horsnail, in keeping with many other quarry owners in the area, had neglected to inform the Mines Inspector that the workings were now over 20ft in depth and came within the new legislation. The Inspector, Mr C. le Neve Foster, only discovered about the workings and the accident by chance as his report reveals :-

"When I was visiting some quarries in the neighbourhood of Rochester in February 1896, I learnt by chance that a fatal accident had happened at Bill Street in November 1895. The owner admitted that he was aware that the Quarries Act applied to his pit but gave no excuse for having failed to report the accident as required by the statute. In order to impress upon the quarry owners in the Rochester district the necessity of giving me notice of accidents, I felt it my duty to ask your permission (the Home Office) to be allowed to take legal proceedings. The fine which was imposed will no doubt have made it plain to quarry owners in the neighbourhood that they cannot disobey the law without running the risk of being prosecuted."

His accident register records that the incident occurred on November 26th 1895 at 2.15 p.m. which was the 8th hour of the deceased's shift. Horsnail was prosecuted in 1896 under Section 2 of the Quarries Act 1894 and Section 11 of the Metalliferous Mines Act 1872 for not notifying a fatal accident. He was fined £2 with 15/- costs.

The Mines Inspector felt that the case was sufficiently important to act as a precedent and it was mentioned in his Annual Report to the Home Office. Horsnail thus had the dubious honour of being one of the first persons to be prosecuted under the new legislation to act as an example to other quarry owners in the area. All this may have had some effect on Horsnail since he seems to have withdrawn from brickmaking and concentrated on the coal side of his business. In 1897 he leased the brickfield to A.W. Jordan of Hillside Villa, Strood who was recorded in the Quarry Statistics for that year as excavating brickearth and chalk. His agent was James Sayer, who was the father of the man killed in 1895, and he was presumably in charge of the actual brickfield since Jordan only appears to have been a speculator. The workforce is shown as only 1 man engaged in excavating the chalk with 4 men. involved in the brickmaking. Unless there were seasonal workers who were not included in the return, the brickmaking operations had been reduced, perhaps reflecting the withdrawal of available capital from Hornbill's other business activities.

Jordan had surrendered his lease by 1898 to Charles Sidney Roberts who was a builder living at 11, Jersey Road, Strood. Roberts moved his building yard to the site and carried on the brickmaking as a side line but it was never again anything other than a small scale operation. This is indicated in statistics for 1898 and subsequent years which showed that only brickearth was being excavated and the chalk pit had apparently been abandoned. There were 8 men digging the brickearth in 1898 but this was reduced to only 2 from the following year, the diggings apparently being concentrated on the eastern side of the brickfield (see Fig.24). There was only 1 man listed as a brickmaker in 1898 and no returns were made from 1899 since this side of the operations ceased to be the responsibility of the Mines Inspector,

In 1900, Roberts took his son Herbert into partnership and a division of responsibility occurred. The brickworks continued operating as C,S, Roberts & Son but the building side was left to the son who traded as H.E. Roberts sole trader. The latter erected a joinery works on site and became a builders merchant as well, thus the site must have been quite congested. By 1908, C.S. Roberts had bought the land from the Executors of A. Horsnail and leased it back to his son, leaving him to take over control of all the business operations. About 1909, Peggy Day's sister had to rescue a small girl who had fallen into the slurry in a washback, showing how dangerous these places were to children who were nevertheless fascinated by them. The brickworks had finally ceased by January 1910 and the joiners shop was pulled down soon after, thus ending the Roberts' connection with the site.

Some invoices have survived from 1903/04 and these give a valuable Indication of the operation of the brickworks at that time. A trade discount of 2.5% was allowed on the purchase of bricks only and invoices were converted to receipts by affixing a 1d stamp and signing an acknowledgement over it. The types of brick were :-

Type	Price/1,000 (Nov 1903)	Price/1,000 (Jan 1904)
R. Stocks	23/-	
H. Stocks	26/-	22/-
C. Stocks	29/-	
Pkns	24/-	
Place	20/-	21/-
Reds	50/-	

The initials R, H and C applied to stock bricks are not readily understandable but they were obviously different grades as is reflected in the price. What is interesting is the much higher price charged for red bricks which perhaps explains why local houses only used them for decoration around windows, etc. H.E. Roberts supplied sand to builders but this does not appear to have been excavated on site since there is a reference to it being brought from Aylesford. The site was subsequently taken over for allotments for which purpose it was ideal, having a wide flat area exposing a sandy soil. The buildings were variously used as a stable by the smallholder Mr Dean and as a builders yard by W. Richardson. Today the area is unrecognisable (see Fig.25) due to the construction of a housing estate and the only indication of past use are the steep slopes which were the boundaries of the brickearth pits.

Finally, it must be asked whether there was ever any mining on site. There was definitely a deep 3ft shaft (see Fig.25) which was open in the 1930s when the area was allotments and that had been fenced round. It was used by local people to dump rubbish and unwanted furniture and was never filled to the top. It is most unlikely that this was ever a mine since chalk was readily obtained from the chalk pit to the north. In addition, the site was regularly inspected (at least after 1896) by the Mines Inspector and it was always termed as a quarry. If there had been any underground excavations anywhere on site, the whole site would have been classed as a mine which was never the case. This shaft is more likely to have been a water well used for the slurring process and may even have dated from the time when the area was a nursery. Whatever its origin, the shaft itself is still potentially dangerous since it is not known how it was treated by the builders of the houses on Grasmere Grove. The infill prior to this time will by now have rotted and settled and, unless a solid concrete cap was installed, the top is likely to subside. The precise location is difficult to determine and that shown in Fig.25 is based on memories of locals who can remember when it was open.

Another feature remembered from earlier this Century was an apparent well in the alleyway at the rear of Nursery Terrace. This was covered by a 6ft square concrete slab and opposite the 4th house up from the Royal Oak Public House. It does seem in an odd position for a well and the description of the cap is very similar to the one at West Street. It can only be speculation as to whether it had any connection with the brickfield or whether it was perhaps a much earlier chalkwell. No other shafts have been traced within the brickfield but that is not to say that none exist.

5.10 West Street Shaft

By now, the reader should have realised that within this relatively small area a great deal of chalk extraction has taken place over the years, both from surface and underground. Bearing this in mind, we will now look more closely at the site of the subsidence in 1967 and attempt to determine its cause.

5.10.1 The Collapse

Between the houses facing onto West Street and Bill Street Road there is an alleyway (see Fig.28). On the 21st November 1967, Mrs Jean Thompson and her small son Mark were walking along this alleyway when the ground subsided to reveal the top of a shaft. It is not known for certain what happened but Mrs Thompson fell

down the shaft whilst her son had a lucky escape. His cries brought the local householders to the scene where they discovered a deep shaft which was about 4ft across at the top.

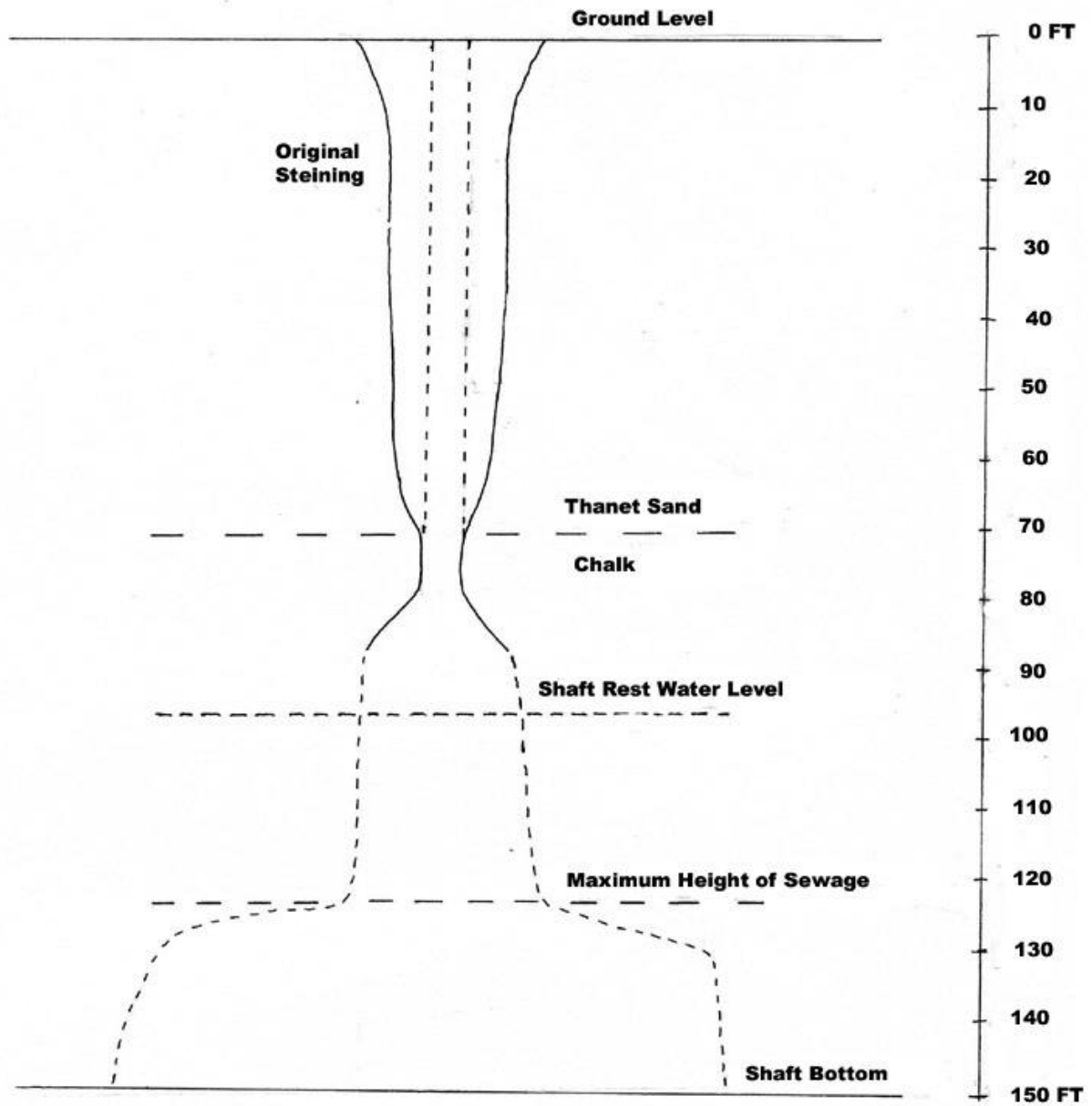
The local emergency services were called and Fireman Howard Myers was lowered down on a rope to attempt a rescue. The top of the shaft was extremely unstable and, upon reaching a ledge at about 50ft, he was struck by falling rubble and had to be brought out with chest injuries. Before this, he had seen the body floating at the bottom of the shaft and it must be presumed that death had been instantaneous. His place was taken by Fireman Ronald Bolstridge but he was also struck by rubble and was brought out with a broken arm. Both men had also been hampered by fumes since the shaft was being used as a cesspit by several of the local houses. A third attempt by Station Officer John Lipscombe was also unsuccessful and rescue attempts were called off for the night. The shaft top was getting wider as further collapses occurred and the body could no longer be seen. In view of the danger of collapse, no further descents were made during the next day although Council workmen carried out trial digging in the immediate area to see if there was another shaft entrance. On the 23rd November, members of the local Royal Engineers Bomb Disposal Team volunteered to attempt to retrieve the body and shuttered the shaft top with metal rings. Lt Col Ian Wilson was lowered down in a makeshift wooden cage but was unable to reach the bottom due to further collapses, his progress also being hampered by a large concrete slab jammed across the shaft at about 75ft. Another attempt by Maj George Fletcher on the following day managed to get further but there was no sign of the body, it had presumably been buried by the falling rubble. He managed to gauge the water depth at about 4ft by using a pick axe on a rope. This was the final attempt and arrangements were then made to infill the shaft with 976 cubic yards of gravel in an operation that took five days.

5.10.2 Structure of the Shaft

It is difficult to determine the actual dimensions of the shaft since no exact measurements appear to have been taken at the time and we must rely on the accounts of the persons who actually descended it. As a result, we have varying descriptions of depths, etc, which is only to be expected since the persons involved had their minds on other matters and were not used to estimating distances underground. It is a common thing to overestimate distances if you are not used to exploring mines and this must be taken into account. In addition, no note was taken of the geological strata in the shaft and the various horizons at which changes occurred. What is known for certain, however, is the original depth of the shaft since a boring was put down through the infill in 1969 to test for settling. This revealed that solid chalk was reached at a depth of 150ft from surface which would be the original shaft depth.

Whatever the original nature of the shaft, it had been capped over with a concrete slab and converted into a cesspit for use by the local houses. At the time of the accident, it was still being used for this purpose and 8 sewer pipes plus 1 road drain emptied into the shaft top. The erosive effect of this outflow had, over the years, loosened the brick lining and caused most of it to fall away. This in turn exposed the looser strata underneath which had also started to collapse into the shaft and, in so doing, undermined the concrete slab which had fallen away. Locals claimed to have

Fig.26 West Street Shaft – Projected Structure



Ground Level = 173ft O.D.
Volume of infill = 26,352 cu ft
Volume of collapsed steining & shaft sides = 9,415 cu ft
Volume of sewage = 20,000 cu ft
Total volume of original structure = approx 55,000 cu ft
Volume of unknown shape below 123ft = 29,000 cu ft

heard rumblings a few days previously which might have been the slab falling down the shaft. A shallow earth crust was left which collapsed under the weight of Mrs Thompson as she walked over it.

All eyewitness accounts confirm that the diameter of the shaft narrowed part way down and the depth of this constriction can be averaged out at 70ft. This is almost certainly where the top of the solid chalk was reached and a ledge at this point would have supported the lining above. The average diameter from descriptions works out at 5ft at this point and this would have been the original diameter all the way to the top before the lining collapsed. It was at this constriction that the slab had become wedged across the shaft. All accounts confirm that the shaft widened out again lower down and one of the firemen claimed to have seen passages leading off. Perhaps the most reliable account is that of Major Fletcher who seems to have descended deepest and he states that the shaft widened to form a chamber about 20ft across. Water was met at an approximate depth of 80ft and this was plumbed to a depth of 4ft before meeting an obstruction of rubble and sludge.

The borehole put down in 1969 was a single trial through the centre of the infill to test for settling. The borehole casing was forced through the infill by means of blows from a weight on surface. Gravel infill was present to a depth of 123ft where it rested on the layer of organic material originally present. The weight of the infill would have compressed this layer from its original depth. Between 123-128ft traces of yellow brick fragments were found and these would have been the original brick lining which had fallen away. The organic material continued to a depth of 150ft, at which point solid chalk was reached representing the original bottom of the shaft. The fact that the brick fragments were extremely eroded, and were only found in the top 5ft of the organic material, indicates that the sewage had been entering the shaft for a number of years before the lining collapsed. A rough calculation reveals that this probably happened about 1955. Unfortunately, no parallel or diagonal bearings were carried out and it is not known if there were passages leading off from the shaft bottom or whether it was just a wide chamber.

Checks during the boring operations revealed that the average depth of standing water in the shaft was 96ft. This would equate with the approximate 80ft water level found during the rescue operations since the level would have been temporarily raised by the great amount of material that collapsed from the sides during the descents. This water would eventually drain laterally from the shaft and the level would return to 96ft again. This is equivalent to an apparently high Rest Water Level of 77ft O.D. and there is no evidence of a perched water table. A clue is given in an article by T.V. Holmes in the Essex Naturalist of 1887. *"The conversion of the newly-discovered Frindsbury denehole (NO connection with this one) reminds me of the fact that, in addition to converted or perverted deneholes, the inhabitants of towns and villages situated on the chalk have been, and in many cases still are, accustomed to drain into cesspools excavated from that formation. Indeed, provided that the supply of drinking water is obtained from some distant source, chalk from its singular combination of softness and coherence is remarkably well adapted to the cesspool system of drainage."*

For a long time the liquid refuse percolates through the sides so as to obviate any necessity of emptying the cesspool, but gradually, percolation almost ceases in

consequence of the deposit of greasy matter. Then, after being emptied, the sides of the pit are chipped so as to obtain a fresh chalk surface and everything goes on as before. It is obvious that this physical enlargement of the pit would often result in the making of an excavation which might with equal probability be supposed to be either a disused cesspool or a perverted denehole. It may be remembered that the deep denehole at Eltham Park, discovered in 1878, the floor of which was 140ft below the surface, had been used as a cesspool in the time of former owners of the land for at least a century - perhaps for two or three in the opinion of Mr Flinders Petrie. Yet the only existing evidence of this former use - apart of course from the drain to the shaft - consisted of a deposit of inodorous mud about 6 inches thick. The shaft was capped, when discovered, by a semi-circular brick arch the crown of which was only 6 inches below the surface."

Thus what has happened in this case is that the deposition of sewage has gradually coated the shaft walls with an impervious layer. Since the shaft was capped over, nobody could get down to perform the unpleasant job of emptying it and chipping the walls to expose a fresh surface. Since it was so deep anyway, the original builders knew it would be a great many years before it filled up. It can be presumed that the semi-solid sewage level had reached the 96ft mark in the shaft and this represented an effective barrier to downward drainage. Liquid waste would collect on top of this but rapidly drain out laterally. A rather macabre calculation based on the estimated period of use gives a likely total sewage volume of approximately 20,000 cubic feet. Allowing for the additional volume from the collapsed lining and shaft walls, calculated at some 9,415 cubic feet, together with the 26,352 cubic feet of infill used, this gives an underground structure consisting of over 55,000 cubic ft. Thus, collating all this information gives a projected structure as follows (see Fig.26). A 5ft diameter shaft lined in brick to a depth of 70ft where it continues in solid chalk. Widening to 15ft diameter at a depth of about 75ft and rapidly widening further to about 21ft, forming a bell-shaped chamber to the bottom at a depth of 150ft. Probably passages off at the bottom with maximum dimensions of 25ft in height and total length of 76ft. This of course is pure conjecture since access was impossible and the estimated 29,000 cubic feet of space below a depth of 123ft could take many shapes.

It is worth mentioning an interesting phenomenon that was discovered during the boring operations. Although the average depth of standing water was 96ft as previously stated, this was found to vary considerably over the last 4 days of drilling with no apparent explanation. A great volume of water was continually added to the boring tubes in the initial stages to flush out the gravel and this water drained away rapidly, no standing level being recorded to a depth of 110ft where drilling stopped on the 5th day. On the 6th day, standing water was reached at 115ft and the drillers ceased adding water. At the end of the day they had reached 138ft but the level of water was up to 96ft. On the 7th day, they found the water level had dropped to 125ft overnight and drilling was continued to its final depth of 151ft. On the 8th day a check revealed that the water level had risen to 96ft again

5.10.3 Origin of the Shaft

It is obviously man-made and there are three possible explanations as to its original purpose. A positive identification could have been made if the shaft bottom had

been accessible but this is no longer possible. As a result, we must compare the evidence for and against each likely structure and draw a conclusion from the overall probability.

(a) Well

Arguments Against

1. A calculation puts the local water table at about 15ft O.D. The bottom of the well is at 23ft O.D. and, even if the water table was higher, it would have been too shallow to be effective.
2. Although the houses on West Street were built in 1878, the houses next to the shaft are of a later date, ie Randolph Close in 1886 and Rose Tree Cottage in 1883. If it was a well then it is more likely to have been connected with the latter houses and yet the date of building corresponds to when mains water was laid on. It is unlikely that the builders would have sunk a well when a mains connection was so much easier and cheaper.
3. Whereas some back alleys led to communal wells, it is unlikely that one would have been positioned in the alley itself. This, coupled with the fact that its use as a cesspit seems to date from the building of the houses, indicates that it already existed.
4. Prior to building, the land was only an open arable field, there was no reason for a well to exist here.
5. It is known that the shaft widened out upon reaching the chalk and this was not a necessary feature of a well.

Arguments For

1. It was very deep (150ft) and nearby deneholes are much shallower.
2. It could have been sunk to supply water to the surrounding houses and abandoned when mains water was supplied.

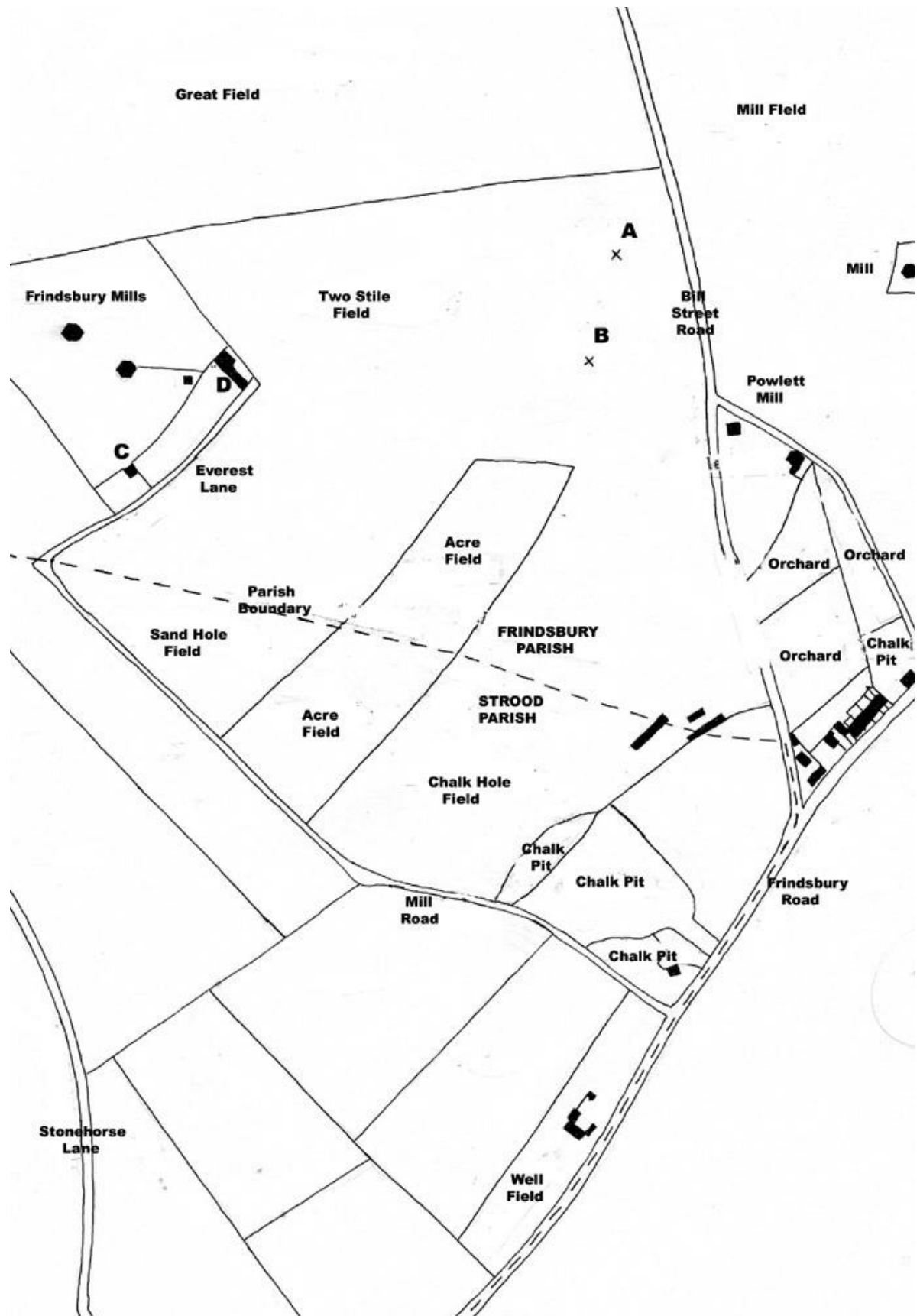
The arguments are so heavily weighted against it being a well that such a feature can be discounted,

b) Denehole/Chalkwell

Arguments Against

1. A depth of 150ft is much greater than usual for such features.
2. Chalk was met at a depth of about 70ft and there was no need to go so deep before extracting it by driving lateral chambers.
3. The original field extended to Mill Road (see Fig.27) where the chalk was so near the surface that it was quarried in a chalk pit at the junction with

Fig.27 Frindsbury & Strood in 1842



Frindsbury Road. It would make more sense to sink a chalkwell at the southern end of the field where it needn't be so deep.

4. During the boring operations in 1969, strange changes in water level were noted. The average level of standing water in the shaft was 77ft O.D. but at one point it had dropped to 48ft O.D. Since the bottom of a denehole is a dead-end, and the sides of this shaft had been made impermeable by sewage, there should be no way that the water could escape.

Arguments For

1. The shaft was sunk into the chalk and the belling out is feature of deneholes and chalkwells.
2. A denehole has been found at Eltham Park which is 140ft deep and had a brick lining, having to descend 115ft before reaching the solid chalk. Like this shaft, it had been capped and converted into a cesspit.
3. Since it was situated in an arable field with no nearby settlement, it is more likely to have had a use connected with the field and a dene hole sunk for marling is the most logical answer.
4. Very large fields are often the result of combining smaller ones by grubbing out boundary hedges or copses. If this was the case, the position of the shaft might be explained by the fact that the original owner of the field held no land further south and had to sink to this depth to obtain the chalk.
5. A shaft of approximately 100ft exists nearby in the rear garden of No 10, Windmill Street. The top collapsed in 1940 and it was badly infilled since it subsided again in 1961 to a depth of 25ft. Again, it appears too shallow to be a well and there is no reason why this house should possess its own well when neighbouring houses apparently didn't, it being too inaccessible to be a communal one. Deneholes are often found in groups and this may be another one (see A & B of Fig.27).
6. In 1842, the land where the shaft is situated was a large field which straddled the parish boundary (see Fig.27). It was occupied by a Benjamin Hilbert, who farmed several fields in the Frindsbury area, and it was described as arable. The Strood part was called Sand Hole Field which seems unusual since there is no evidence of a sand pit. However, it is more likely that this was a corruption of Sound Hole Field and the word "Sound Hole" was a local alternative name for denehole. The Frindsbury part of the field was called Two Stile Field which is also strange, since this is the only field in the parish which mentions a stile. Since there is no evidence of a footpath ever crossing the field, there seems no necessity for stiles in the first place and the farmer would use gates for access. Even if there was a footpath, there would obviously be a stile at either end and this does not seem to be a feature that would be sufficiently significant to name a field after. It is more likely that "Stile" is a corruption of another word but no similar word has yet been found. One possibility (and this is slight) is in the form of writing used in the Tithe Records.

A capital "H" has embellishments which are similar to a capital "S" and small "t". Could poor writing of "Hole" have been mistaken for "Stile"? Some of this is tenuous speculation but there is a possibility that this was a field with two deneholes, maybe the two at the northern edge.

Much of the evidence here is circumstantial but, taken in total, it points to a great possibility that the shaft was a denehole. The big argument against is the fact that it went so deep into the chalk when this was not necessary.

(c) Chalk Mine

Arguments Against

1. There was a Frindsbury Chalk Mine but similar mines in other brickfields were sunk from the brickfield itself where the brickearth had already been removed. The ground here is much higher than the adjacent brickfield and the brickearth layer is still present, indicating that it was never part of the operations.
2. The Mines Inspectorate first listed the Frindsbury Mine in 1896, by which time the area had already been built on. There would have been insufficient space for a winding shaft.
3. The site of the winding shaft has already been identified in the brickfield itself thus there would be no need to sink another.
4. The shaft widens out in the chalk at a depth of about 80ft to form the beginning of a chamber. Since the shaft is 150ft deep, this would make the mine passage at the bottom some 70ft high and similar mines only have passages about 25ft high. Not only would there be no need to excavate such a large passage but it would also be dangerously unstable.
5. If there were passages at the bottom of the shaft, why did the sewage and water build up in the shaft instead of flowing away along the passages?

Arguments For

1. The land used to belong to the West family who operated the adjacent brickfield.
2. The existence of such chalk mines in brickfields was often not reported to the Mines Inspector who usually discovered them by accident. The mine could thus have been operating many years before 1896 when it was first mentioned.
3. The depth of the shaft was exactly 150ft and such preciseness is not necessary for wells or deneholes which are only sunk to where the chalk or water is found. Such exact measurements are, however, found in mine shafts and the same depth was used for a chalk mine shaft at a Plumstead brickfield.

- 4) Chalk mines are not worked below the water table since there is sufficient chalk to excavate above, thus avoiding expensive pumping costs. A depth of 150ft is about the maximum the workings could go and still remain dry.

The evidence points to the fact that it is not impossible for it to be a chalk mine shaft but it would still be in a position which is not really effective. The apparent huge size of the chamber does not indicate efficient working practices but the exact depth is still a major factor in assuming it was associated with a chalk mine.

5,10.4 Conclusion

There are really only two possibilities, ie denehole or chalk mine. Whereas each has evidence in its favour, there are also factors against. There is insufficient evidence to point to the shaft being exclusively one or the other. There is, however, a third possibility which would answer the arguments against both features, ie it was originally a denehole which was subsequently adapted for use by the Frindsbury Mine as a ventilation shaft. The arguments in favour of this are as follows :-

1. It has been recorded that chalk mines in the Plumstead brickfields occasionally broke into the bottom of old denehole workings. Since the existence of these is not usually apparent, they were both unexpected and a nuisance. An interesting comment was made by a Mrs Gladys Watt of Strood in 1967 :-

"My father was a brickmaker on the Frindsbury Brickfields and he used to tell us that, when he went down the pits that were sunk to excavate the clay, he could see that the area was riddled with underground caves."

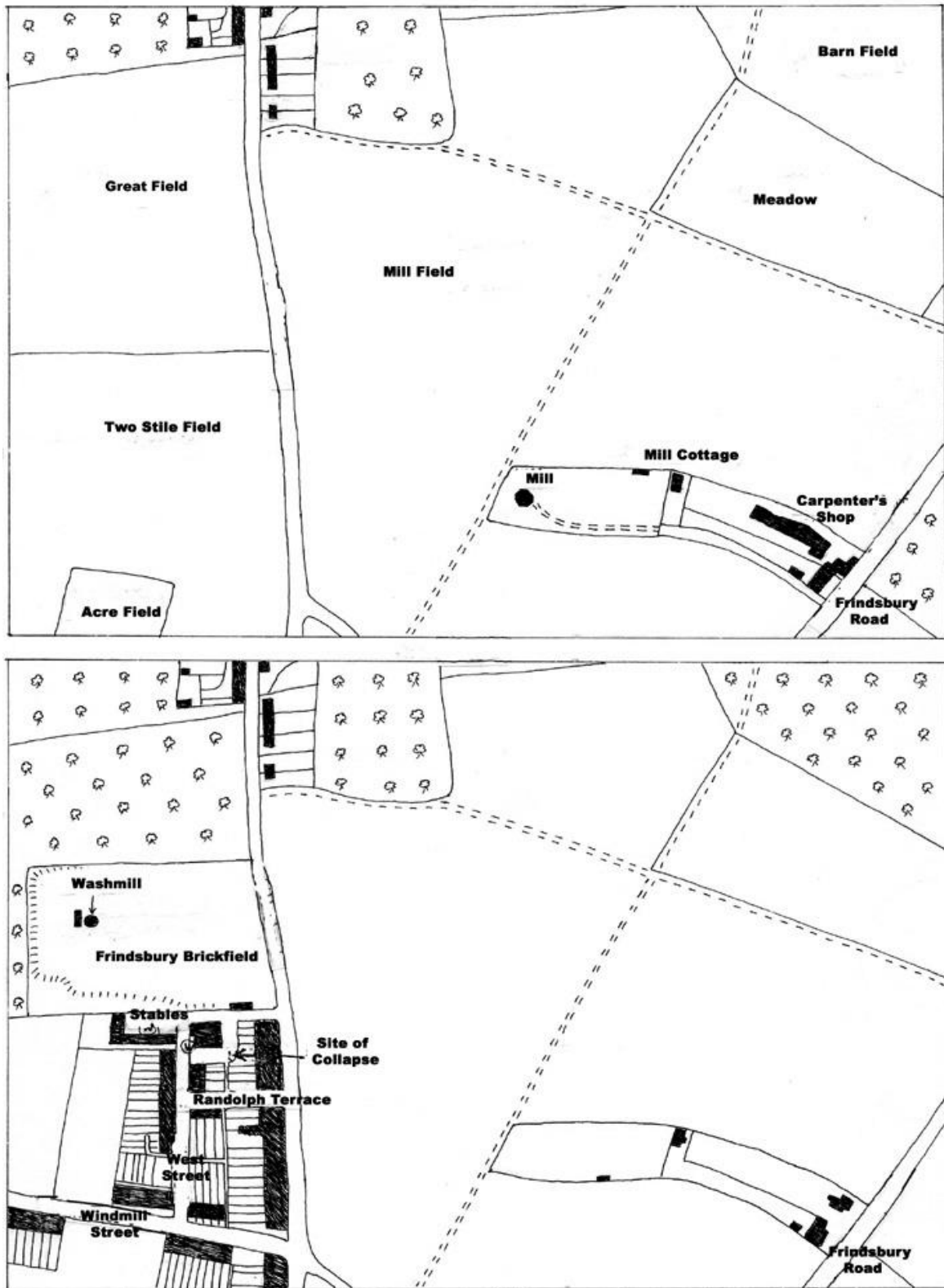
The information contains inaccuracies in that it was chalk that was mined and not clay but this is understandable when it is realised that this was a half-remembered tale from childhood and she had no knowledge of mining. What is interesting is the reference to caves underground since deneholes were often mistaken for such by local miners and quarry workers. Since an actual denehole was discovered in the quarry itself, there is no reason why others did not exist in this area.

2. Deep pillar & stall type workings would need two shafts to allow a flow of air for ventilation. If the mine workings broke into the bottom of a denehole here, whether by accident or design, it would be a ready made ventilation shaft that only needed brick steining at the top to make it safe. At surface, it would only need a grille across the opening and could even have been contemporaneous with the houses before being abandoned to its more ignoble fate.
3. If we assume that mine workings broke into the bottom of the denehole, and this was at 150ft, an average passage height of 25ft gives a possible original depth of 125ft for the denehole which is more believable. Again, it would explain the belling out at about 80ft which could have been the top of the denehole / chalkwell chambers.
4. If we accept the above scenario, then the shaft was abandoned by the mine at or soon after the time the houses in this area were built. The West Street

terrace was built in 1878, Randolph Terrace in 1886 and Rose Tree Cottage (next to hole) in 1888. It is tempting to place the abandonment date around the mid-1880s in view of its use as a cesspit by the houses. This is not certain, however, since the houses could originally have had ordinary cesspits and then utilised shaft at a later date in view of its greater capacity and cheapness since it didn't need emptying. It is thus difficult to speculate on a date of abandonment but it was probably sometime before the turn of the century.

5. There are several reasons why such a shaft might have been abandoned and one of these would have been if the roof was getting unstable due to the size of the chamber. It would be fairly simple to sink an alternative ventilation shaft elsewhere and perhaps the mine workings were being driven in another direction anyway. If this represented the edge of the mineral lease, this section of the workings would be abandoned as soon as the maximum amount of chalk had been extracted. So, if the shaft was then used as a cesspit, why didn't the sewage flow into the rest of the mine?
6. There are many examples of sections of mines being sealed up in other parts of the country. In Rhosydd Slate Mine in Wales, an abandoned section was in fact converted into an underground reservoir by bricking up the passage. Lathkill Sough (drainage level) in Derbyshire was bricked up on abandonment since it passed under the River Lathkill and caused this to dry up in summer. It would thus be no particular problem in this case to brick up the passage leading into this section of abandoned workings so that the sewage did not interfere with the rest of the mine. Having said this, it is also known for such underground dams to begin to leak after a number of years as mortar begins to disintegrate. The dam in the Lathkill Sough referred to above has had to be repaired in recent years since it began to leak and caused the river to dry up again. If we accept the possibility of a dam in this mine, we must also accept that it could have started to leak.
7. Another feature found in some mines is where a roof fall causes water to back up along a passage and the deposition of silt at the blockage. Such blockages have been known to clear themselves when the pressure of water has built up sufficiently or when some external force has interfered with them. This was demonstrated during the clearance of the Magpie Sough in Derbyshire where a collapse had caused millions of gallons of water to be held back. Attempts at digging in the collapse caused the material to shift and released large volumes of water until the collapse consolidated itself again.
8. Applying this theory to the present shaft, it is thus possible to speculate that the water and sewage was held back due to either a dam or a collapse. The vibration of the drill in the infill could quite easily have caused the blockage to shift and thus temporarily release a large volume of the water held back in the shaft. This would explain why, during drilling, measurements of the depth of water changed, ie 96ft - 115ft - 96ft - 125ft - 96ft.

Fig.28 Frindsbury Brickfield



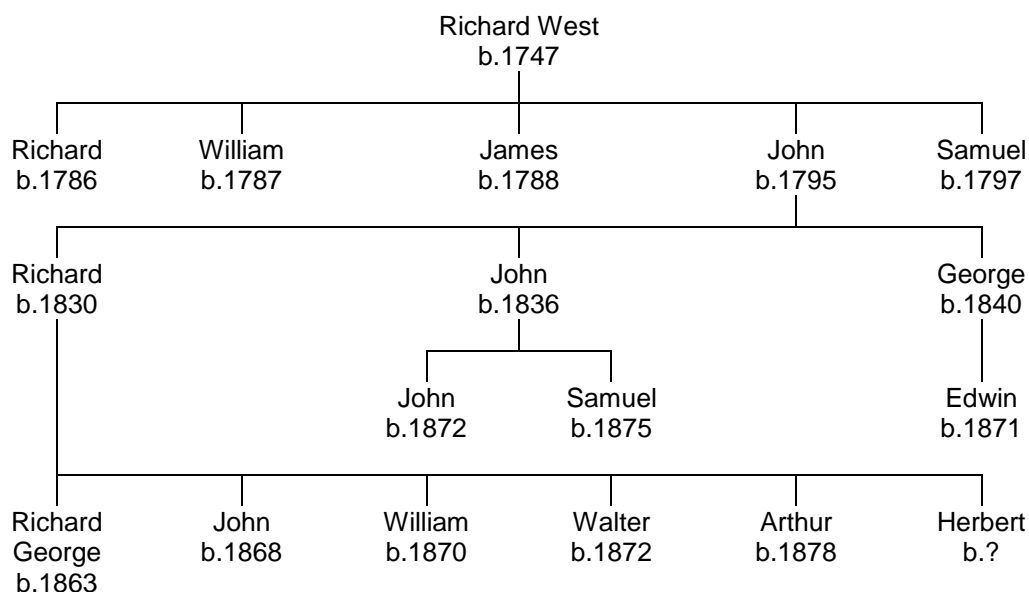
This anomaly in the water levels is perhaps the most telling piece of evidence and, based on the evidence available, the theory of a denehole converted into a ventilation shaft for the Frindsbury Chalk Mine is perhaps the most likely explanation. If this is indeed the case, then further shifts in the blockage may cause the shaft infill to drop at some time in the future.

5.11 Frindsbury Brickfield

This brickfield was originally situated on the west side of Bill Street but then extended to the eastern side as reserves of brickearth were used up. The two sides have sometimes been regarded as two separate brickfields, with the western part called West's Brickfield, but this is not the case. It is not as old as the Nursery Brickfield and the Tithe records of 1842 (see Fig.28) show that the land was still being used for agriculture at that time. The western section was part of the 40 acre "Great Field" which was farmed by John Oakley of Larkin Hall. The eastern section consisted of the 22 acre "Mill Field" farmed by Samuel Stroughill of Home Farm. Projecting into the latter was a parcel of land containing a flour mill, carpenter's shop and 2 houses. This was still the case in 1861 when the first O.S. map was surveyed.

A brief explanation is also necessary to avoid confusion over the road name between the two brickfields. Bill Street was the actual name of the hamlet to the north and this name was also applied to the section of road running south to Bingham Road. From this point onwards, it was called Bill Street Road as far as the junction with Frindsbury Road. This caused a lot of confusion and the matter has been resolved in recent years by renaming the two sections. The section from Hollywood Road to Maybank's Factory is now called Cooling Road, whereas the section between here and Frindsbury Road retains the old name of Bill Street Road.

Before looking at the early history of this brickfield, we must digress slightly to understand the set up of the West family who were responsible for its conception. The Wests were an important Strood family for whom a separate history would be a worthwhile study, unfortunately there has been no scope in our research to do other than look at the branch immediately involved with the brickfield.



A Richard West was born in 1747 and entered the building trade, a business that was successfully developed by many of his descendants until the beginning of this century. He was an enthusiastic Methodist and was responsible for inviting John Wesley to preach in Strood as well as building the Zoar Chapel in 1796. By 1810, he was on the Strood Parish Church Committee and helped to demolish the old Church in 1812. West was made a Freeman of the City of Rochester in 1774 and this honour was bestowed on many of his male descendants. It gave the right to vote as well as free education for sons at the Sir Joseph's Mathematical School. The descendants that concern us can be summarised in the above family tree.

Of the original Richard West's sons, it is known for certain that James and John senior followed their father into the building trade at 153, High St, Strood. Samuel became a market gardener but nothing is known about the others. James had taken over the business by 1823 and was succeeded by his brother John senior between 1845-70. In 1851, John senior had a workforce of 6 men including his sons Richard and John junior but the former left to set up on his own business in 1859. John senior retired in 1870 and the business was taken over by John junior and George, who traded as a partnership from 1871-80. From this date they split up, John junior trading from High St, Strood with a workforce of 22 and George from Station Road, Strood with a workforce of 20. Their respective sons followed them into the business but these two branches of the family remained builders only.

The branch that interests us is that of Richard who split away from his father John senior in 1859. He set up as a builder at Prentice St, Strood for a few years but seems to have returned to High Street in 1865 to go into partnership with his father until the latter's retirement in 1870. At this time, he left his 2 brothers to carry on the business and moved to set up his own builders firm at Cuxton Road, Strood. He carried on here with a workforce of 30 men until he retired from building in 1881, leaving the business to his sons Richard junior and John. These traded as West Brothers until the beginning of this century.

Although mainly a builder, Richard senior speculated in brickmaking although this was probably originally for his own use. He was manufacturing bricks as a sideline by 1867 and concentrated on it full time from 1889 when he left the building side of his business to his sons. It would appear that his other sons William and George followed him into brickmaking, the former taking over from 1895 and the latter from 1900. In later years, Richard senior lived at Weston Road, Strood where he lived until his death in 1910 at the age of 80.

Frindsbury Brickfield was started by Richard West about 1867 to the west of Bill Street. In its early years, it would only be a small scale operation, worked on a part-time basis, and it probably supplied just sufficient bricks for West's own building purposes. The obvious advantage for him was that he had a guaranteed supply of bricks of known quality and he did not have to rely on finding suitable material at his various building sites to make them in situ. The brickfield would have increased in size when he expanded his building firm in the 1870s and it is likely that from this date he increased the output to sell them on a commercial basis. The row of houses in West Street next to the brickfield were built by Richard West in 1878 and this is how the street acquired its name. The Inland Revenue valuation of 1909 showed that he was still the landlord of numbers 1-10 and obtained rental income therefrom.

It would seem logical to assume that these houses were built for his brickfield workers and this perhaps gives the date from when the brickfield expanded to become a proper commercial operation. A further confirmation is given in the 1881 census which lists a Thomas Dennis (51) as a newcomer to the area. Dennis lived on Bill Street and was described as a brickmaker, previously from Aylesford.

The Dennis family were connected with this brickfield until it closed and it is likely that Thomas Dennis was brought in by West to take advantage of his experience. Other brickmakers were listed as living nearby and the brickfield clerk was a Thomas Heath (20) who had moved here from Essex.

The 1880s were thus a period of increasing activity in the brickfield and much of the original area was dug to remove the overlying brickearth. A steep drop of some 20ft at the southern edge of the brickfield reveals that they must have extracted some of the Thanet Sand as well. These excavations revealed a denehole (see Fig.29) in 1886 which was explored by C. Bird of the Rochester Natural History Society :-

"Quite recently a denehole has been found on Frindsbury Hill by Mr J. West while clearing the brickearth and loam from the surface at his brickfield. The chalk here is covered with about 34ft of sand, loam and surface soil, consequently we have a well-defined shaft down to that depth. It then goes about 17ft lower, widening out. The shaft is 4ft in diameter and on opposite sides are two sets of holes for climbing down. The hole was completely filled in with surface soil, loam and flints and the position was denoted by a circular depression on the surface."

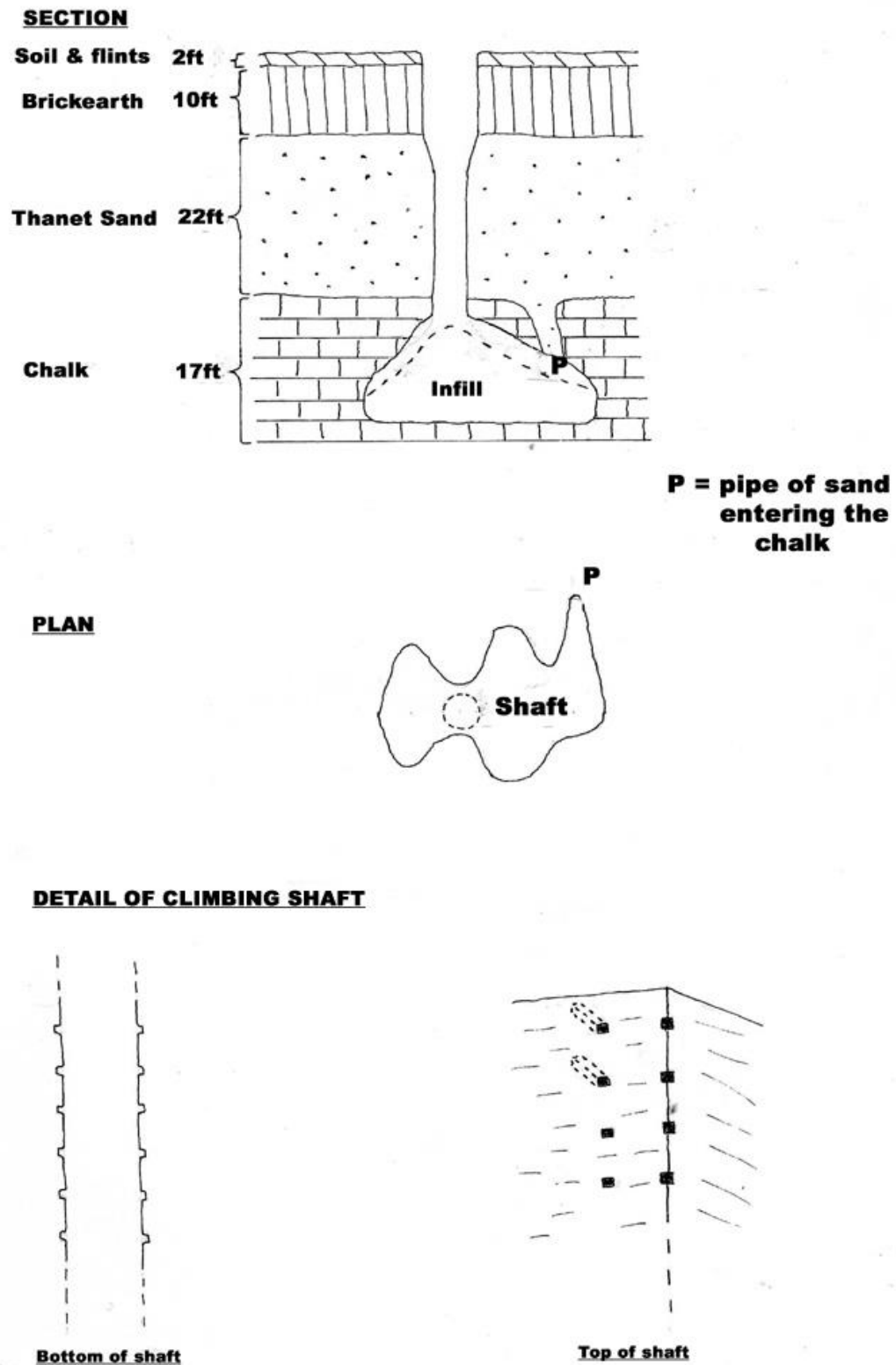
The denehole was subsequently explored by F.C.J. Spurrell of the Essex Natural History Society who was the acknowledged expert on deneholes at that time. He mentioned it in an article where he was comparing methods of descent in shafts :-

"...The mode of descent by corner holes is curious. It was first noticed (and actually employed) in England when a denehole was discovered at Frindsbury near Rochester, a year or so ago. At the time the hole was being examined, the state of the shaft was thus:-

The upper 2ft of disturbed soil and 10ft of brickearth, which was very hard and sandy, had been cleared away for bricks then Thanet Sand 22ft to chalk. The shaft was of the ordinary circular form in the chalk and some way up in the Thanet Sand but then it commenced to become angular and, at the junction of the Thanet Sand with the brickearth, presented a rectangular form, the edges being nearly rectangular with dimensions of 6ft x 7ft 6ins.

The footholes in the lower part were placed as usual and were of the usual depth; as the shaft got too wide the holes were placed, one row in an angle and another about the width of a man's chest on the left of the angle in the broad face. At this part the holes were very deep, as deep as the whole extent of a man's arm. In ascending, therefore, when the widening began the climber had to throw himself over to one side only and pass his arm up to the shoulder, hugging the rock to his body whilst shifting his leg and other arm, which in its turn hugged the rock.

Fig.29 Denehole in Frindsbury Brickfield



The descent appeared to be much less agreeable where the critical change in attitude had to be made. The man who showed these old means of ascent and descent was singularly agile. To ordinary people the process would have been attended with great risk, which is not the case with the ordinary process. The original shaft was probably circular and regular from top to bottom. The splaying out above was clearly the result of a late alteration and appeared to be coincident with the irregular enlargement of one of the equal sized caverns below. In a pamphlet by Mr C. Bird called "Rochester Deneholes", this shaft is drawn in the figure as circular from top to bottom. This was not the case as is above described."

A further comment was made by T.V. Holmes (from the same Society as Spurrell) who had also carried out much research on deneholes :-

"At the beginning of March, the Rev. H. Day of Frindsbury kindly informed me of the recent discovery of a denehole at that place. Various circumstances, however, prevented me from visiting Frindsbury before April 14th 1887 when Mr Walter Crouch and I found the pit covered in and about to be converted into a cesspool. We were accordingly glad to learn that it had been thoroughly inspected by, amongst others, Mr F.C.J. Spurrell who had taken measurements of it and notes of its peculiarities.

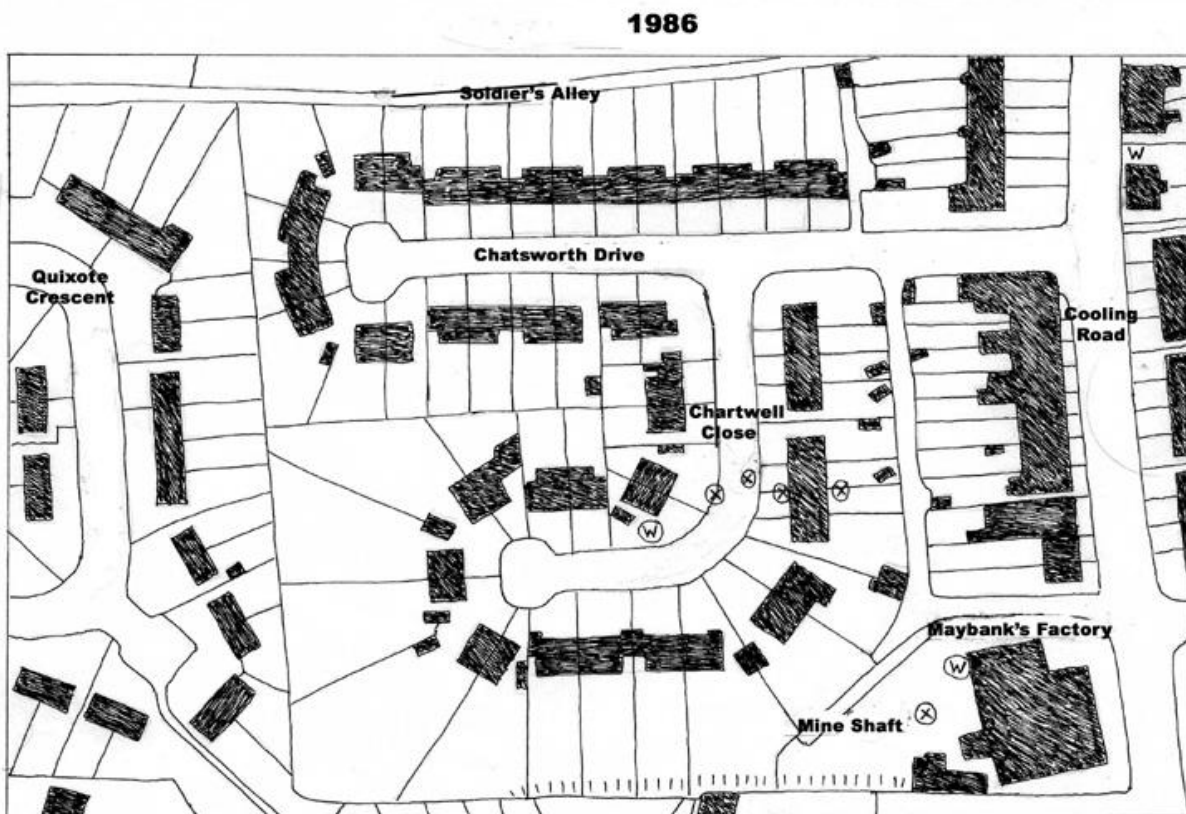
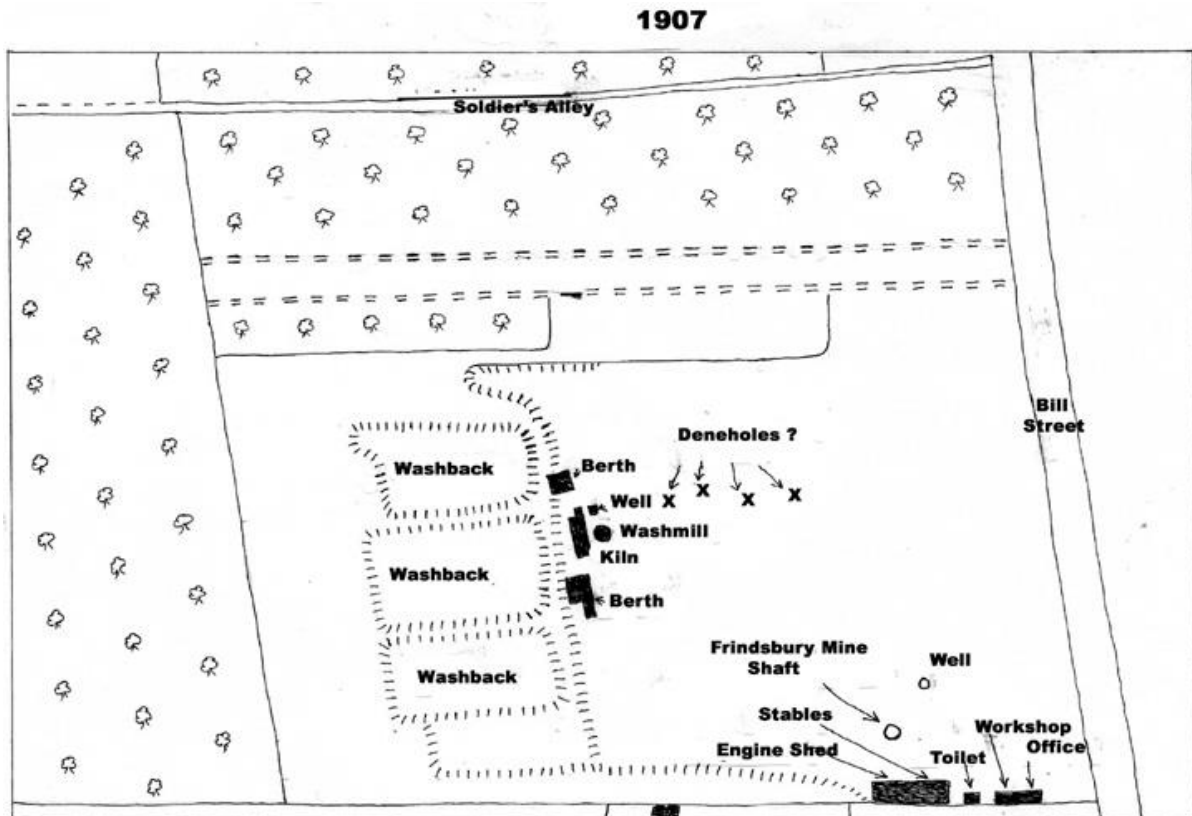
It was discovered during the making of an excavation in the brickyard of Mr West, which is situated westwards of the road between Frindsbury and Bill Street, and is only a few yards south of the latter place. We were informed that the section of the shaft shewed more than 30ft of loamy beds above the chalk, the thickness of the chalk roof being less than 2ft. Mr Spurrell, in his well known paper, states that there are many holes in the chalk hills near Rochester but that 'they usually enter the chalk immediately' there being no humus whatsoever.

The Frindsbury pit thus furnishes a curious exception to the general rule being nearly in the centre of a belt of overlying Tertiary ground which, measured along the Frindsbury and Bill Street Road, is just half a mile in breadth, the chalk cropping out on both sides of it."

At this point, it is worth clearing up some confusion regarding this denehole. Henry Smetham in "The History of Strood" mentions two deneholes in this brickfield but he confused the above articles which are all referring to the same denehole. There was thus only one denehole which was ever reported by the brickfield. Bird mentions that the brickfield owner was a J. West but Smetham says it was R. West. There is no evidence that it was owned by anyone other than Richard West at this time and Bird must be mistaken. Spurrell seems to have had a poor opinion of Bird's recording ability anyway! The adaptation of the top of this denehole with a rectangular cross-section and parallel climbing holes makes it almost unique and it is a pity that it is no longer accessible. The only other known example was found at Brambling and the shaft was 4'3" x 2'7" with normal footholds. It was also cut through brickearth and may have been associated with a brickfield.

The original Frindsbury denehole was obviously of an early date, possibly from when deforestation took place. It was re-worked later to provide more chalk for marling and this is when the top part of the shaft was converted. It is quite likely that the

Fig.30 Frindsbury Brickfield (West)



original shaft walls at the top were beginning to crumble due to the exposure of the brickearth layer and this section had to be cut away to reach solid material. With such an operation, perhaps a rectangular section was the most stable alternative. The deep holes found could well have supported wooden stemples for a ladder. Holmes mentions that the chalk at the top of the chamber was only 2ft thick and this indicates that the chamber was enlarged upwards during re-working as well as removing the pillars between the trefoil chambers. The pipe of Thanet Sand which intruded into the end of the chamber would have made the roof unstable and this probably determined the extent of reworking.

The infill in the chamber probably fell from the shaft top during the accidental re-opening. The original circular depression at surface indicates that the shaft had been blocked with branches part way down and the partial infill was beginning to subside anyway. It is difficult to pin down the actual location of this denehole but an aerial photo dated 1946 indicates no less than 4 potential features in a rough line (see Fig.30), one of which was still open in the 1930s. This field in 1842 was exceptionally large for the time and indicates that the original field boundaries had been grubbed out. Since deneholes are often found in lines these features could indicate a line of deneholes that were originally within a hedge line or shave that had been removed. The period of reworking could even date from this time. The one puzzling factor is the report that it was being converted into a cesspool in 1887. It was definitely within the area where brickearth was being removed and this can be narrowed down to within the brickfield itself (see Fig.28). There were no houses built on this ground at that time and the only possible explanation is that it was for use by the brickfield itself. The south-east corner had already been excavated to a great depth and it could not have been located here. Since the only other buildings at that time were in the centre of the area, this is the most likely location and it does in fact tie in with the 4 features already mentioned.

By 1889, Richard West had handed over the building firm to his sons and concentrated on his brickfield. He developed a larger operation and in 1891 this was described in an advertisement of the time :-

"... extensive premises covering an area of about 3 acres comprising clay pits, kilns, moulding sheds, grinding mills and pugmills, replete with modern steam powered machinery capable of producing an immense output of manufactured bricks. Large numbers of hands employed in operative departments of the trade under the active personal supervision of the principal."

All of this indicates a number of buildings which is puzzling since the map of 1895 (see Fig.28) shows hardly any, unlike the later one (see Fig.30). The earlier one indicates a small scale operation such as was the case about 1880. Perhaps the explanation here was that most of the machinery was in wooden sheds which were regarded as temporary by the Ordnance Survey and omitted from this edition. If this was the case, then the rectangular building next to the washmill shown in 1895 would be a kiln since this could not be made of wood. There is no sign of washbacks so it is not known if stock bricks were being made at this time. The mention of grinding mills is interesting and perhaps ties in with Spurrell's description of the brickearth here as being very hard. Such mills would thus be useful in

pulverising the brickearth and chalk to make the slurry, unless it is a reference to the washmills themselves.

It would appear that there was also a stationery steam engine, which drove the pugmills in the berths as well as the washmills. Richard West appears to have retired by 1895 and his son William took over, living first at 1, Windmill Street and then moving to Cliffe Road. William seems to have greatly expanded the operations and acquired land to the north and west to provide a new supply of brickearth. Three washbacks and two berths were erected as well as a proper office, workshop and stable. By 1900, there is no further mention of William and his place was taken by his brother Arthur who now became manager of the Frindsbury Brick Company until 1902. The workforce at this time totalled 18 which included 12 men, 4 boys and 2 women. This was made up of 2 teams of brickmakers together with 5 crowders and an engine man.

At the turn of the Century, the West family relinquished their interest in the brickfield and it was taken over by George Bluett Winch. The Winch family had many business interests in the Medway area, including a large brewery at Maidstone and the firm of solicitors called Winch & Winch of New Road Ave, Chatham. A partner of the latter firm, C. Whyman, is presently preparing a biography of the Winch Family so it is not intended to duplicate this work other than to give a brief introductory background.

George Winch was a solicitor and became the first Mayor of Chatham in 1890. He married Mary Bluett and her name was retained by their son who was George Bluett Winch. The latter became a solicitor and was a Colonel of the East Kent Yeomanry during the Boer War, he died at Boughton Monchelsea in 1948. He started in the family brewery business and formed the Medway Insurance Co Ltd to provide cheaper rates of insurance for the brewery's public houses, just one example of his business acumen which was to become apparent in later years. Being a good businessman, he realised the advantage of forming several holding and trading companies with which to purchase land and operate businesses without paying too much tax. The multiplicity of such companies makes it difficult to unravel the sequence of ownership of the Frindsbury Brickfield and the following companies are known to have had some connection with G.B. Winch :-

Medway Insurance Co Ltd 5, New Road, Chatham.

Formed by Winch predominantly to provide insurance for the public houses belonging to the family brewery. It purchased land and leased it to raise income. Company was bought out for its assets by the Northern Assurance Co Ltd in 1925 and wound up .

Northern Assurance Co Ltd 79, High St, Chatham.

Bought out the above company in 1925 and Winch was appointed as one of its directors. Eventually incorporated into the Commercial Union Insurance Company. Secretary was H. Coote.

Kent Estates & Investment Co Ltd 5, New Road, Chatham.

Purchased and leased land. Was probably also bought out in 1925 for its assets by Northern Assurance Co Ltd since it was reformed as Kent Estates &

Investment Co (1925) Ltd. Secretary was originally A. Vallence and later W. Lovatt.

City of Rochester Land & Investment Co Ltd 5, New Road, Chatham.
Purchased land and built houses.

City of Rochester Industrial Dwellings Co Ltd 5, New Road, Chatham.
As above but probably built factories. The secretary was A. Vallence.

Frindsbury Brickfield Co Ltd 5, New Road, Chatham.
Winch was a director together with a Mr Durrant (builder) and Mr Coulson (oil & coal merchant). This was the operating company that actually worked the brickfield and probably bought out the Wests' firm of Frindsbury Brickfield Company and incorporated it. Secretaries were George Lacy from 1903, A. Vallence from 1914 and Charles Bertenshaw from 1920.

The address of 5, New Road, Chatham was that of the solicitors firm Winch & Winch and became the registered office of Winch's companies. He bought land in many areas of Medway but mostly in Strood and Luton, possibly with an eye to future house building when the brickfields closed down. We will now attempt to unravel the sequence of ownership of the brickfield.

In 1900, Winch purchased Mill Field east of Bill Street together with Home Farm and associated land. At that time, the brickfield was still being operated by the West family trading as Frindsbury Brick Company and Winch must have anticipated their urgent future need for new supplies of brickearth. The logical future extension was across the road on Mill Field which not only had large reserves of brickearth but also had the space to allow the business to expand. By 1903, the Wests had sold the business and Winch purchased the land to the west of Bill Street on which the brickfield was situated. This transaction was part of a wholesale division of the parcel of land known as Great Field. Winch acquired further land to the north of the immediate brickfield for expansion and other parts were leased by L. Coulson (mentioned above), City of Rochester Land & Investment Co Ltd and Northern Assurance Co Ltd. The latter two companies subsequently began buying up other land in the area and building houses thereon.

Winch sold the brickfield to the west of Bill Street to Medway Insurance Co Ltd but at this stage retained the other land in his own name. Together with Durrant and Coulson, he bought out the brickfield from the West family and the Frindsbury Brickfield Co Ltd was formed by 1903 and took over the brickfield lease. Arthur West was retained as manager for a short time to ensure continuity of operations but was later replaced. Winch then turned his attention to the land to the east of Bill Street and decided to split the old Mill Field into two parts. The larger northern half was sold to Medway Insurance Co Ltd and he retained the southern half on which houses and the Ship Inn were built to become Bingham Road. He must have been planning the future expansion of the brickfield and realised that more houses would be required for the workers. It is interesting to note that Strood R.D.C. Rating Records show the brickfield between 1908-10 as being owned by Kent Estates & Investments Co Ltd rather than Medway Insurance Co Ltd who definitely owned it previously and also subsequently. If this is not a mistake, then it indicates some internal transfers of

ownership for an obscure business purpose. In 1925, the brickfield was bought by Northern Assurance Co Ltd as part of their take over of the previous company and they remained as the owner until the brickfield closed.

Having looked briefly at the complex ownership situation, we can proceed to the operation of the brickfield itself. By 1903, the brickfield was still only being worked to the west of Bill Street but it had now been taken over by Frindsbury Brickfield Co Ltd under the control of their manager James Butler. The company retained the name of the brickfield as well as the trade mark on the bricks which was the letters "FBC". Reserves of brickearth on this side must have now been almost exhausted and by 1905 the company had leased the area to the east of Bill Street. Although the main operations had now been transferred across the road, the old brickfield area was still occasionally used, up to the final closure, for brick burning and digging brickearth from the area behind the washbacks. The section next to the road was sold to build houses, a Baptist Church and a garage belonging to Strood Motor Company. A period of great expansion took place to the east of Bill Street (see Fig.31) and, sometime around 1920, the Frindsbury Brickfield Co Ltd was taken over by a Mr Ivory with financial backing from a Mr Doubleday. Ivory was usually known by his nickname of "Pistol" which is said to originate from his prowess as a marksman.

Little is known about the operations in the early days but we have been lucky enough to talk to a Mr Elphick who worked there as a brickmaker between 1924-28, and Albert Haselden, whose father was involved in transporting the bricks and took him there as a boy prior to the closure. We can thus piece together the method of operation in the 1920s, which is not likely to have changed much from the earlier period.

The brickmaking season varied with the weather but usually ran from the end of April to mid-September. Outside this period, the men were laid off except for a few involved in "Scrying" or the sifting of ashes. This took place on the northernmost part of the brickfield where rubbish was dumped in piles up to 20ft high. It was brought from the Council dump at Luton in horse-drawn carts and allowed to rot down. The men threw the rubbish against an angled mesh screen about 6ft high by 4ft wide so that only the ashes passed through. The paper; etc. remained on the mesh and was taken away and burnt. Eventually there were so many complaints about the smell of the rotting rubbish that the Council stopped the practice. Brickearth was dug from many parts of the site to a depth of about 6ft and this explains the steep banks remaining today at the rear of Bingham Road and on the playing field.

There were 7 washbacks in a line served by 4 berths in which the pugmills were operated by flat belts from a long drive rod extending the length of the berths. This drive rod was powered by a Blackthorn diesel engine situated in the engine shed and passed between the berths and washbacks. One problem was the existence of a public footpath passing through the middle of the brickfield and the drive rod had to be taken underneath this to avoid accidents. The washmill was sunken and brick lined, 15ft in diameter and 5ft deep, and Mr Haselden thinks that there might have been two side by side. It was operated by an overhead shaft driven by the diesel engine and the slurry was made by mixing the brickearth with lumps of chalk and occasionally river mud. The supports of the main launder were held up by concrete

Fig.31 Frindsbury Brickfield (East)

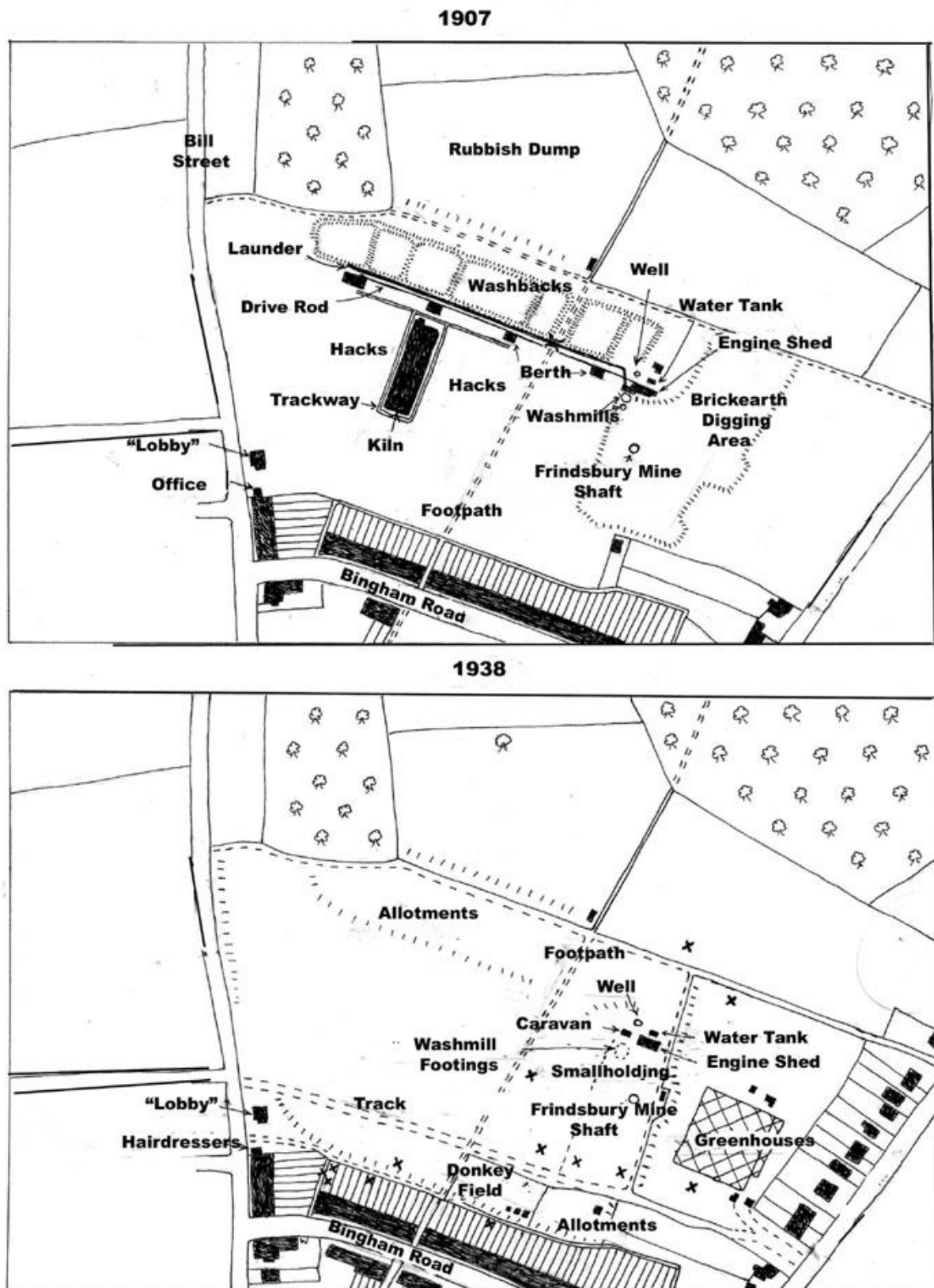
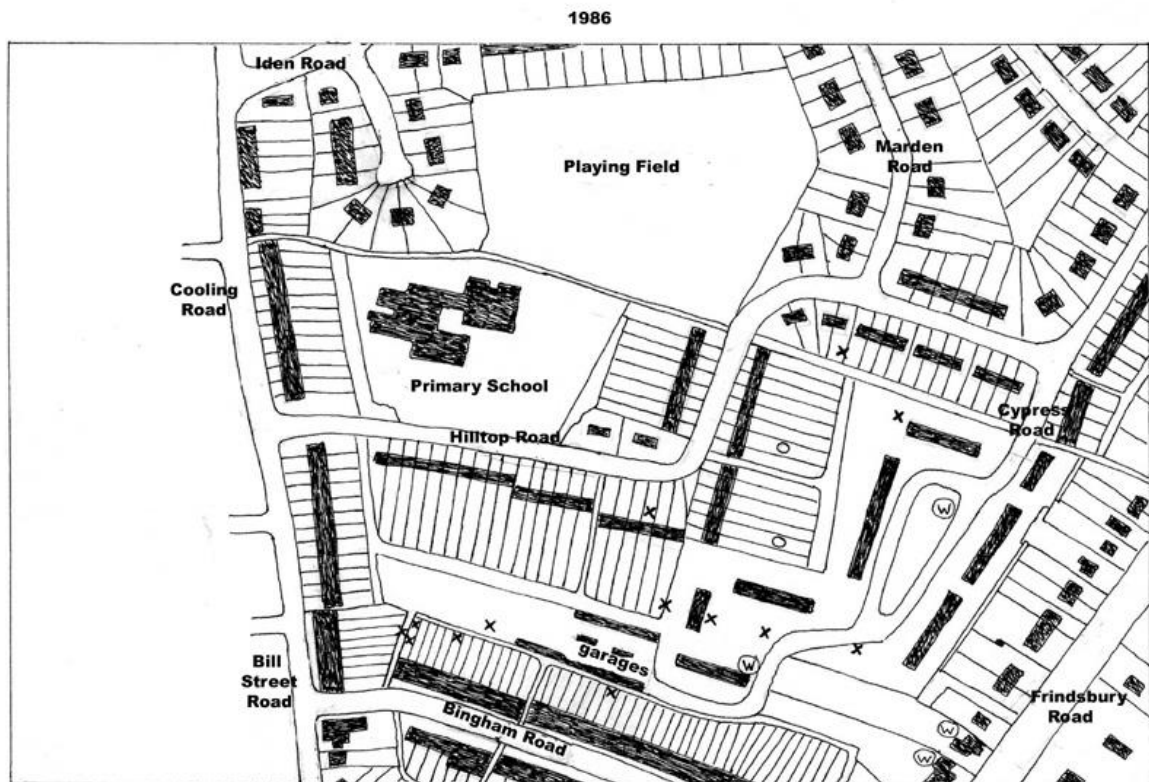
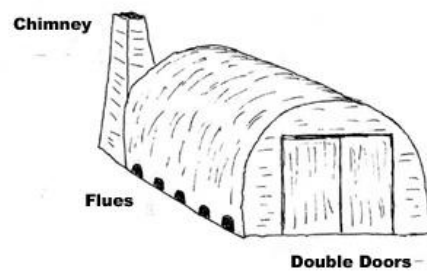


Fig.32 Frindsbury Brickfield (East)



Brick Kiln of Late 1920s



bases, 3ft square by 3ft high, and it was parallel with the drive rod except where it passed over the footpath. More launders criss-crossed each washback and wooden boards were used to block off the main flow and direct the slurry where required. Each berth had a team of 6 brickmakers and the method of operation was fairly standard (see "Brickmaking"). The teams produced 1,000-1,500 bricks per hour, working from 6 am to 6 pm, and averaged 30/- per week plus a bonus. Each team had an alarm clock so that the moulder and off-bearer could change places on the hour to keep up output. The workers wore long sackcloth aprons and the men kept their trousers out of the clay by tying string around the knees. A number of women worked in the brickfield and a Mrs Ralph can remember Mrs Denness pushing wheelbarrows of bricks about. There was an industrial dispute in 1923, probably over wages, when the men were locked out but its outcome is unknown.

The Hacks were located next to Bill Street and the green bricks were allowed to dry for about 5 weeks. The crowders then built the clamps and these were located either side of the road, usually up to 3 at a time being fired. The total workforce at that time was :-

24 brickmakers (6 x 4 berths)
6 crowders
3 sorters
2 skintlers
1 engine driver.

As well as stock bricks, the company made a few red bricks and a kiln was used for firing these. This was a single kiln with a series of flues underneath, double doors at one end for access and a small chimney at the other end to draw off the fumes (see Fig.32). It was eventually demolished and the company reverted to the traditional clamps to make stock bricks only. The map of 1907 shows a large building which is described as a kiln (see Fig.31) but this is something of a puzzle since no other reference has been found to it. Its size is much greater than the one remembered from the 1920s and there appears to be a trackway linking it with three of the berths. Several possibilities have been considered and the most likely one is that this was a Hoffmann's Continuous Kiln which was part of the original investment on this side of the road. As part of an attempt at mechanisation to increase output, green bricks could be transported on flat wagons directly from the berths to hacks positioned around the kiln. Small turntables would allow the wagons to negotiate the sharp angles. Once dried, the bricks could be loaded straight into the separate kilns and this would cut down greatly on handling time. Whatever its true function, the larger building had been demolished by the 1920s and replaced by a smaller version.

The brickfield office was located on Bill Street and staffed by a clerk and a girl assistant. From a small window they paid out the wages and made out the loading tickets for lorries which collected the bricks. Next to this was a large wooden shed, 15ft square by 20ft high, known locally as the "Lobby" or the "Engine Shed". Its original function is unknown but in the 1920s it was used as the workers' rest room. It is interesting to note that a similar building in the Cemetery Brickfield, Plumstead was also called the "Lobby" but again nothing is known of its function.

The bricks were sold locally and a contract was agreed with the partnership of Robert Ivory (son of the director) and William Haselden to deliver them. The former lived on Bill Street and the latter on Windmill Street in a house appropriately named "Leyland". They rented part of the premises of the Strood Motor Company and used a lean-to shed next to the Lobby in which to store the fuel for their lorries. Originally they had 6 solid-tyred chain-driven Peerless lorries with trailers but then replaced them with Leyland lorries. In fact they bought the first Leyland lorry sold in Kent, the second incidentally being sold to West the builder, who lived next door to Haselden.

The brickfield finally closed in 1931 when the brickearth supplies ran out and the company moved to Hoo Brickfield on Vicarage Lane, taking the machinery and some of the workforce with them. Bricks from this site were used to make the air raid shelters at Shorts Aircraft Factory in Strood. Some disagreement occurred over the general sale price of bricks with Haselden recommending a standard 45/- per 1,000 and Ivory wishing to charge separate prices for 1st and 2nd stocks. Regardless of this, the Hoo Brickfield only lasted for 3 years and the partnership of Ivory and Haselden split up. The latter concentrated on building up the transport firm of W.E. Haselden & Son Ltd, which is still flourishing today. Ivory moved his operations to the Newington Brickfield (trade mark "N") and also started the Funton Brick Company at Iwade (trade mark "RHO") where he produced Fletton-type bricks.

Following closure of the brickfield, the land remained undeveloped for over 20 years and was gradually reclaimed during the 1930s by the demolition of the washbacks and buildings (see Fig.31). An unofficial track was made across it from Frindsbury Road to Bill Street as a short cut for traction engines and lorries heading for the West Street oasthouse. This was a popular route but was eventually closed off by the Council. The ground was ideal for agriculture and the northern part was divided into allotments. James Denness, the ex-engine driver of the brickfield, took over part of the eastern area as a smallholding and retained the old engine shed. He lived on Bingham Road but kept a caravan on site where he sometimes stayed. Although he had moved to Hoo Brickfield with the company, when that site closed he found himself unemployed and had to support his family by other means. One enterprising idea was to cut up the many abandoned barges at Whitewall Creek and bring them back to this site in sections. Here, with the assistance of his family, he chopped them into firewood which could be sold. Apart from this, he used the area to grow vegetables, etc.

The rest of the eastern area was taken over by Henry Bishop who built a number of greenhouses and ran a flourishing market garden business until the 1950s. The remainder of the old brickfield was still unused and overgrown and made an ideal playground for the local children. Many local residents can remember playing here then and how it was divided up into the "territories" of the children of Bill Street and Bingham Road. During the war, 3 anti-aircraft guns were sited in the north-west corner of the brickfield and the gunners lived on site in huts and tents. They are said to have shot down one plane which crashed nearby at Broom Hill. Also during the war, a detachment from the Auxiliary Fire Service were based across the road and a concrete water tank, 20ft in diameter and 8ft deep, was sunk on the brickfield next to the Lobby. The old office was converted into a ladies hairdressers and was run by Miss Joan Maddison until its demolition in 1955, when houses began to be built on the brickfield.

5.12 Frindsbury Mine

This was the main reason for this whole study and has been left until last. Facts are, unfortunately, very few and underground access has been impossible to date. We must thus rely on the few facts available, together with local knowledge and comparison studies, to guess at its history and extent.

The first official mention of the Frindsbury Mine was in the 1896 Report of the Mines Inspector C. le Neve Foster. It was in the same year as the mention of the Nursery Brickfield and the wording is significant, ie "Kent appears for the first time as a mining county, for chalk is being obtained near Rochester by a true underground working." It will be noted that Foster does not say that this was a new mine, merely that it was added to the list of working mines. It would appear that he paid the area a rare visit in February 1896 and must have accidentally discovered the existence of this mine, since the brickfield excavations did not exceed 20ft and would not have been previously inspected as a quarry. Like so many of the operations in this area, the proprietors did not voluntarily register the mine with the Mines Inspectorate and sought to carry on without official interference as long as possible. So how long had Frindsbury Mine been worked? Some indication of this can be obtained by comparing it with the South Metropolitan Mine which was a similar operation sunk in the Gregory's Brickfield at Plumstead. This was not registered with the Mines Inspectorate until 1899 and yet it had been worked since about 1850! Bearing this in mind, however, the small scale working of the Frindsbury Brickfield in the early days would not have needed sufficient chalk to justify a mine on this type of scale. It is thus likely that the Frindsbury Mine dates from the time when Richard West began to concentrate on brickmaking which would be about 1880. It is interesting to note that the 1881 Census includes a James Foster of Windmill Street whose trade was that of chalk digger.

The Annual Lists of Mines subsequently included entries for Frindsbury Mine as follows :-

Year	Employees Underground	Employees Above Ground	Chalk (Tons)	Clay (Tons)
1896	1	16	400	1,500
1897	1	18	400	1,500
1898	1	18	400	1,500
1899	1	1		
1900	1	2		
1901	1	2		
1902	1	2		
1903	1	2		
1904	1	2		
1905	1	2		
1906	-	-		
1907	-	-		
1908	-	-		
1909	1	2		
1910	abandoned			

The apparently drastic drop in workforce in 1899 was due to the fact that surface brickfield workers were then covered by the Factory Inspectorate and ceased to be included in returns. It is, however, useful in determining how many men were actually involved with the mining operations. Again, it must be remembered that the Legislation classified the whole of the site as a mine and the output of 1,500 tons of clay per annum was obtained solely from the surface diggings and not underground. The returns value the clay (or brickearth) at £75 in total which makes it 1/- per ton. Since 1 ton makes about 350 bricks, for which the brickmaking gang would have been paid 1/5d, this value is obviously far below the final sale value to the company. The returns of output from this mine are suspect anyway since they show round figures and it is very likely that the proprietors just guessed at a figure and repeated it in subsequent years. No separate figure of output is available from 1899 onwards since other chalk mines in Kent were then registered and the official return only showed the total output for the county.

Bearing this in mind, together with the proprietors' mistrust of officials, the output of chalk shown as being 400 tons per annum cannot be taken as a reliable figure and is very likely to be understated. The fact that only one person apparently worked underground in the early years is no true guide to the extent of the workings since chalk is a very easy material to mine and only requires hand picking. If the return is to be believed, one miner could manage to produce that output once the mine had been developed and a good underground transport system adopted. What is more likely, however, is that the person included on the return was the only full-time miner and he was assisted at peak times by others. The returns indicate that the mine ceased production between 1906-08 and had a single year of reworking before abandonment. This seems strange since the brickfield continued to require chalk during this period and if a cheaper outside source had been obtained, such as from the local quarries, there would be no need to rework the mine. The suspicion here is that the proprietors merely neglected to send in a return for these years and it was never followed up due to its relatively small importance. By 1910, however, it was officially classed as abandoned and ceased to be included in returns.

Unfortunately for posterity, in keeping with similar mines in the South East, no plan of the mine was deposited with the Mines Inspector upon abandonment. There is thus no official record of the underground workings or the number and location of shafts to surface. In order to hazard a guess at these features, we must look at various sources of information.

The Denness Family has been previously mentioned in connection with the Frindsbury Brickfield. Thomas Denness was brought over from Aylesford about 1880 to provide technical expertise and all the family (including the women) were greatly involved in subsequent operations in the brickfield. His son George was the foreman brickmaker and, in turn, his sons followed him into the industry. One son, Fred, worked at another brickfield and apparently invented the downdraught kiln for which he received a royalty based on one brick in every 1,000. The other son James started at Frindsbury Brickfield at the age of 11 and subsequently became the engine driver until the brickfield closed. Like all engine drivers at mines, he took a great pride in his machinery and the engine shed was forbidden territory to other workers. The following information on the operation of the mine was passed onto his son Fred who has kindly related this to us.

Although a static diesel engine was used to operate the washmill and berth machinery (see Fig.3D) there was an Invicta traction engine which was kept overnight in a large wooden shed. Descriptions of this tie in with the "Lobby" previously mentioned and may explain why it is sometimes referred to as the Engine Shed. There were two shafts on site, the main one for winding and a well for pumping. Each morning, the traction engine was driven out of the shed and operated a pump at the well via a flat belt from the engine flywheel. This was stepped to allow different speeds. Water came up the pump pipe and out of a spout into a large wooden tank, about 12ft square and 3ft high. Pumping was continued until the well was dry and the water was subsequently used for the brickmaking operations. The traction engine was then re-positioned at the winding shaft where the flat belt drove a wooden windlass which had a flywheel on the side. The windlass had a metal winding cable which wound small iron trucks, about 2ft square by 18ins high, up the shaft. These were attached onto the winding rope with chains which hooked into rings at each corner of the truck.

At surface, a moveable length of rail was positioned under the truck which was pushed to the side where it met a trackway, heading to the washmill via an incline. James Denness never actually went underground but told his son that there were several levels off the shaft. The method of working was to drive adits from the shaft like radiating spokes but their length was not known. When a level was safely worked out, the shaft was sunk a further 15ft and more adits driven, this time alternating between the position of the upper adits.

The area of the mine and engine shed was taken over by James Denness as a smallholding when the brickfield closed and his son Fred can remember it from the 1930s (see Fig.31). His father never allowed him or his sister to go near the old shaft which at that time was covered by part of a wooden barge bottom, about 15ft across. It had been partly infilled with rubble, tin cans and timber to within 10ft of the top but this was only loosely stacked. His father, when cutting up the old barges, never used the elm ribs and these were thrown down the shaft. Some rubble had been thrown down the well but there was still water therein and it was very deep. It was eventually slabbed over and covered with soil. The winding cable was being used as a fence and was about 500ft long. A number of subsidences had occurred over the years in the area around the shaft (see locations marked "X" on Fig.31 which have been supplemented by aerial photo evidence) and these had been blamed on the collapse of the mine workings. James Denness had been very surprised when permission was granted for building in the 1950s and said that he expected future subsidences in the area towards Frindsbury Road and Bingham Road.

Albert Day worked for a year in 1954 for Presnail (Builders) Ltd and he was involved in the levelling of ground in this area prior to the building of numbers. 48-78, Hilltop Road. He remembers a shaft which had collapsed at the top leaving a crater 20ft across. It was filled with rusty cans and copper wire which was sold for scrap by the workmen. A concrete raft was built over the top of this and the area built on. He remembers that all the houses here were built on concrete raft foundations but never knew why. There are local rumours that the houses here suffered subsidence cracks subsequent to building and had to be remedied. A concrete garage at the

rear of Hilltop Road is also said to have cracked up in recent years due to subsidence.

On the other side of Bill Street, Alfred Haselden remembers a shaft (see Fig.30) which was still open just prior to the closing of the brickfield in the early 1930s. It appeared to have some kind of staging across the top but was about 10ft in diameter with a steining of chalk blocks. Nearby was a long building, half of which was still being used as a stable. The other half was a disused engine shed which was empty except for a flywheel pit and a shaft passing through the wall. In a nearby shed was a well. During the Second World War, the Auxiliary Fire Service had a detachment based here and a wooden hut was erected to accommodate them. The shaft was then converted into a cesspit. Subsequent to this, a local man called Biddick committed suicide here by driving in a stake, attaching a rope around his neck and jumping down the shaft. Following this, the shaft was filled in.

The O.S. map of 1907 (see Fig.31) shows 3 circular features next to the engine shed east of Bill Street, two of which appear to be shafts and a larger one which is clearly a washmill. The northerly shaft corresponds with the location of the well but the southerly shaft is a puzzle. If it was a drawing shaft for the mine it is in a very inconvenient position. Since it is so near the engine shed it would have been little trouble to devise a power take-off to wind the shaft but this would have been obstructed by the washmill machinery between. If it was meant to be so near the washmill, it would logically have been positioned to the right of it so that there was direct access and sight from the engine shed. In addition, there would have been no need for a trackway incline from the shaft since the chalk would be raised immediately next to the washmill. The Ordnance Survey have confirmed that their circular symbol is a standard size for any circular feature up to 6ft in diameter, beyond which it is drawn to scale. Thus there may be no significance in the fact that this small circle is the same size as the well. Since A. Haselden seems to remember a second adjacent washmill, it is likely that the southerly circle is really a smaller washmill. This would make sense since the drive for both washmills would then be in line. During the 1930s, this area merely consisted of brickwork footings and this appears to be confirmed by the aerial photo of 1946. This suggests that there were in fact two washmills here which had been levelled. The absence from the map of a winding shaft has no real significance since the Ordnance Survey often seemed to omit these features, the one to the west of Bill Street is similarly omitted.

At this point, it is worth comparing other areas where chalk mines were sunk in brickfields. The ones around Plumstead were similar operations and, fortunately, more information is available on the underground structure. From such a comparison, we can make assumptions on the potential structure of the Frindsbury Mine. The following descriptions are extracted from "Caves & Tunnels in Kent" by H. Pearman.

The Essex Naturalist Society visited the mines in 1903 and published the following report. *"... Descent via a hand-cranked winch led to a lofty gallery which runs through the chalk to a working face, 300-400 yards away, where the miners were busy with pick and shovel. The mine consists of a set of these galleries with cross tunnels which form a square with the shaft at its centre. Down the centre of the main galleries are 2 rows of flat metals on which run the small trolleys used to convey the*

chalk from the working faces to the shaft. The chalk is even in texture and the walls are dressed fairly smooth by the pick. Very great attention is paid to the joints or planes of fracture of the chalk; the direction of a passage may need to be altered or it may be abandoned altogether if the direction of the joints makes either the roof or the corners of the passage unsafe. All the corners need constant attention, for falls occur here frequently, and any error of judgement in shaping a corner may have dangerous consequences. The mine manager himself superintends the driving of all new headings, shapes the roof and trims the corners; the workmen do the rough cutting after the roof has been secured Huge pillars, never less than 15-20ft square, are left to support the roof".

The Geologists Association visited the mines in 1906 and published the following report. *"The brickyards, four in number, obtain chalk by shafts which are 120ft, 80ft and 150ft deep; the South Metropolitan Mine being entered by a sloping tunnel. Below Gregory's Brickyard the aggregate length of the galleries is stated to be at least 2 miles. The tunnels are, as a rule, 9ft wide at floor level diminishing to 3ft at the roof, and 25ft high, but these proportions are modified according to the harder or softer nature of the chalk and the presence of joints, etc. This mine was opened about 50 years ago and the existence of ancient workings can hardly be doubted. In April 1904, for instance, a large subsidence occurred in the Cemetery Brickfield and part of the western "puddle-pond" (washback) sank 8ft. Several subsidences have taken place in adjacent brickfields. These subsidences can only be explained by the presence of old workings but the entrance to these remains to be discovered. A denehole discovered in the Cemetery Brickfield a few years ago ran down 90ft through Tertiaries and chalk, branching at the bottom in three small tunnels which ran out only a few yards from the shaft".*

The Woolwich Antiquarian Society visited the mines in 1909 and published the following report. *"The party, including the owner of the mine, became hopelessly lost while exploring the more remote disused galleries. ,Our guide was a man who had worked in the mine most of his life but we wandered in vain for over an hour. ,We were reduced to our last candle when, by lucky mischance, one of the party fell a distance of about 6ft. Happily he escaped without injury and discovered that he was in the newer workings and was able to direct us until an easier way out was found. The first sinking in the South Metropolitan Brickfield was merely a shaft and a heading out below, just like a denehole. Long after the men had driven their galleries considerable distances, they and the chalk were brought up the vertical windlass. At the present time, for greater convenience, there are steps leading down to the workings but the chalk is still lifted up the original shaft".*

The mines are mentioned in "Folk Memory" by W. Johnson published in 1908 ie *"... These workings, the proprietor informs me, have been opened only 50 years but occasionally subsidences betray the presence of older galleries. The chalk was used for brick making and not marling..."*.

The last mine was abandoned in 1920, all trace of the workings was lost and houses built on top of the brickfields. In 1937, the ground collapsed in a playground producing a crater 80ft by 60ft and 30ft deep, the same place as a previous one in 1916. In 1938 a garden collapsed in Alliance Road and Woolwich Borough Council hired a firm of consultants to bore test holes. In 1939, one of their workmen died

when ground collapsed beneath him and his body was subsequently recovered at a depth of 30ft. Over the following 4 years there were 5 more subsidences. In 1950 the Council finally sunk boreholes and shafts to locate and survey the old workings which were completely filled in with a slurry of fly ash.

By assimilating all the foregoing information, the available evidence now points to the shaft behind Maybank's Factory (see Fig.30) as being the original winding shaft of the Frindsbury Mine. It possibly originates from around 1880 and was being used at least up to 1905 when the brickmaking operations transferred across the road. The disused engine shed here probably contained a steam engine which was used for winding in the shaft as well as operating other machinery. The official statistics show that the mine was abandoned in 1910 and yet James Denness was apparently engine driver at another shaft across the road subsequent to this. This raises three possibilities :-

1. James Denness was actually referring to the mine on the west side of Bill Street. This is unlikely since he would only be aged 18 in 1910 and thus really too young to be in charge of a winding engine. In addition, he specifically referred to a shaft on the east side of the road.
2. There were two separate mines and a new unregistered mine was sunk on the east side in 1905 when operations transferred across the road. This might explain why the statistics for 1906-08 showed that the old mine was not working. If this was the case, however, there would be no need for the reworking of the old mine for a brief period in 1909.
3. There were two separate shafts into the same workings. When operations moved across the road in 1905 it would be more efficient to sink a new shaft onto the workings (see Fig.31) which was located nearer to the washmill complex. When Winch bought out the old firm in 1903, he already owned the land on the east side and must have planned the future move across the road. He could thus arrange for the mine workings to be extended under the new area in time for a shaft to be sunk ready for the move. Rather than sterilise an area of brickearth, it would be easy to develop the workings from underground until the surface brickearth layer had been removed from the area where the new shaft was to be located. The map of 1907 confirms that the first excavations on this side were in fact at this location (see Fig.31).

A further clue appears in the official statistics which shows that the underground workforce had increased to 2 between 1905-06, indicating that development work was being carried out in the mine at the same time as normal extraction. Once the new shaft and main galleries had been driven, the mine could be worked once again by a single full-time miner. It is possible that the new company were not being completely honest with the mines inspector and were only making returns for the old shaft which was already known about. Thus, if the new shaft was being used from 1906, they could easily say that the old one was disused between 1906-08. The single year of working in 1909 could have been due to use of the old shaft for remedial or development work and it was abandoned in 1910 except for ventilation.

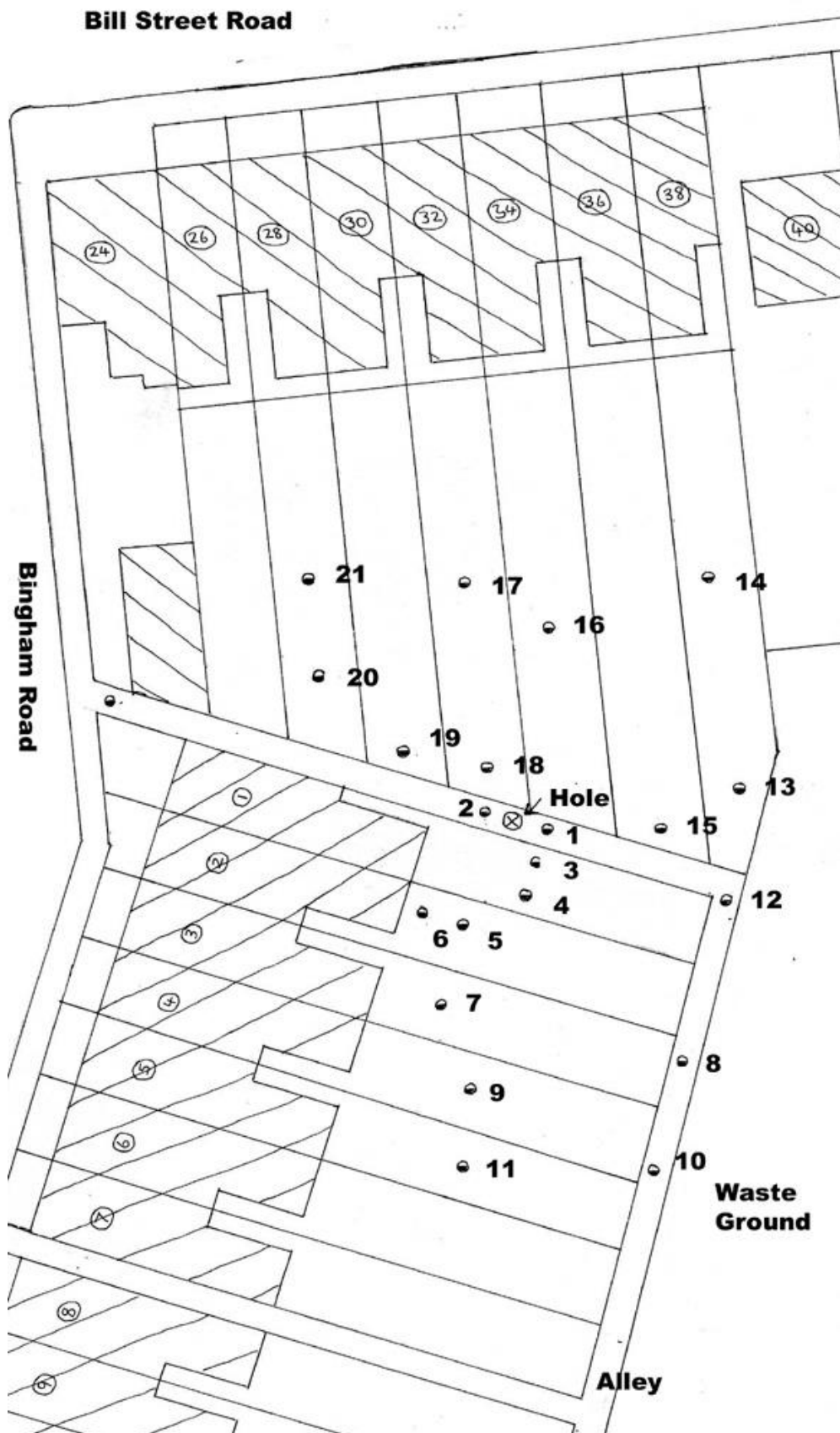
Theory (3) is quite plausible considering the track record of mine and quarry owners in this area in respect of obeying the legislation. By the end of the 1920s, the mine seems to have been genuinely abandoned since, by that time, chalk was being brought in from off the site - presumably because it was finally cheaper to buy than to mine it in situ. The site of the eastern shaft was located by Fred Denness and confirmed by an aerial photograph dated 1946. It was the one found by Albert Day and is now built over.

The area of the underground workings can only be guessed at in the absence of a plan. If the mine owners had been honest in restricting mining to under their own property it would be quite easy but we can never be sure. There was no way of checking in those days and it is quite likely that the chalk was mined efficiently rather than legally! Another possibly unique feature to consider is whether the workings were on more than one level. Evidence from James Denness suggests that they were and this is not common in such chalk workings which tended to be on one level only. Such a spread, however, is dependant on the area available and the area of the old Frindsbury Brickfield was relatively small. If the West family had in fact been honest about mining under their own property, they would soon have worked out the available area and the only direction for extension was downwards. Once such a technique was used, it is likely to have been copied at the new shaft. One advantage of this is that the area of potential collapse would be restricted at surface and thus not interfere with the brickfield operations as happened elsewhere. Whether or not there were in fact several levels, it is certain that the upper levels would be fairly shallow and probably at a depth of about 30ft on the eastern side. James Denness had noted several subsidences around the eastern shaft and it is unlikely that the workings here extended within a greater radius than say 150ft. Around the western shaft, a similar radius could be projected but the upper levels here are likely to be slightly deeper due to the higher surface level of the shaft.

The projected connection between the two sets of workings runs very close to the rear of Bingham Road and is likely to have been developed itself by means of side galleries. It is interesting to note that a strip of land along here was left undeveloped by the builders (see Fig.32) which is very strange considering the density of housing elsewhere. Furthermore, there have been regular collapses of ground in the vicinity of 1, Bingham Road (see Fig.31) as follows :-

- a) 1930 - straight drop of about 6ft diameter and 20ft in depth, close to rear of No.1. Filled.
- b) 1935 - drop of 3ft diameter and 1ft depth in alleyway next to No.1 but with deep cracks at side. Filled.
- c) 1936 - straight drop of about 3ft diameter (depth unknown) by back fence of No.1. Filled.
- d) 1940 - as above but nearer house of No.1. Filled.
- e) 1940 - as above but at rear of Nos. 6 & 22. Filled.
- f) 1941 - as above but near rear of No.1. Filled.
- g) 1958 - as above but next to house of No.1. Filled.
- h) 1985 - straight drop about 10ft by 4ft and 30ft in depth, next to house of No.1. Filled.

Fig.33 Location of Dynamic Probe Tests



The common factor in most of these subsidences is that the depth was about 30ft and 3 passages were seen leading off at the bottom of the larger holes. Such features could be due to a collapsed denehole but the telling factor is the disappearance of all the infill over the years. An infilled denehole might subside again as the fill settled but not to the same depth as before. The most likely explanation is that this area lies over the collapsing upper mine workings and the infill is merely being pushed sideways into the passages. If there is little chalk above the roof of the adits, it could well fall into the space below exposing the overlying Thanet Sand. This is very friable and, with the assistance of wet weather, would start to drop into the passage below leaving a void which gradually works its way to the surface. Once the void reaches the surface, it would cause a sudden collapse.

In March 1987, a further narrow collapse occurred in the alleyway at the same location as (b) above. The Council commissioned Harrison & Co, a firm of soil engineers, to carry out a series of Dynamic Probe tests in the surrounding area. This test consists of measuring the rate of penetration of a 50mm probe which is forced into the ground by blows from a standard weight. It shows the resistance of the strata to penetration and can indicate if there are any voids or loose ground present. The location of the probe tests is shown in Fig.33 and a graphical representation of the strata appears in Figs.34-36.

Although it is only a qualitative test, the opportunity could have been taken to obtain more information from the tests as follows :-

1. The Standard Penetration Test gives a "N" value which is the resistance of the strata being penetrated, ie Brickearth, Thanet Sand and Chalk. Had this been calculated as a control value for similar strata elsewhere, then the readings may have indicated the actual strata being penetrated.
2. It would appear that the probes were sunk in a random pattern. The suspicion is that there are pillar & stall workings underneath this area and these are set out in a linear pattern. It would have been more valuable if a series of probes had been sunk in a grid pattern around the subsidence since this might have revealed the existence of passages leading away from the area. The random nature of this test makes it difficult to come to conclusions since some of the probes probably hit the solid pillars of chalk.
3. It would have been useful if all the probes had been sunk to the same depth. It would appear that solid chalk was met under the loose areas at a maximum depth of about 15 metres and yet many of the probe locations were abandoned at a shallow depth. If an unclapsed section of passage existed, then this would have been revealed when the high readings of solid chalk changed to a void. Many of the shallower probes reveal nothing other than that there are no voids at a shallow depth.

Turning to the actual readings, we can estimate the dimensions of the passages from the probes at locations 1-3 (number 4 was missing from the report I saw), 5, 18 and 20, which were the only ones to reach sufficient depth. The bottom of the mine passages appears to lie at a depth of about 15 metres and, assuming the average

height to be 20ft as elsewhere, the original roof of the passages would be at a depth of 8 metres. Assumptions can be made from the individual probes as follows :-

- a) Location 1 appears to indicate that the chalk roof has fallen away and the void is only just beginning to develop. Higher readings were found at a shallower depth than elsewhere (11 metres instead of 15 metres) but this could indicate proximity to a working face which was usually cut in a series of benches like terracing.
- b) Location 2 shows a similar collapse but here the void is very advanced. The diameter of the void is unknown but, if fairly small, it may indicate why there is only a crack at surface instead of a collapse.
- c) Location 3 was the site of the previously infilled collapses and indicates that the infill is settling below 6 metres and probably moving sideways along the passages. There is a probability of a future re-occurrence.
- d) Location 5 is perhaps the most worrying since there has been no prior indication at surface. There appears to be a well-advanced void and the readings between 11-15 metres indicate that there is a large cone of collapsed material from above. This may be the next collapse to occur.
- e) Location 18 indicates that the chalk roof has gone and is lying as rubble on the passage floor. It must be a fairly recent occurrence since no void has yet developed - perhaps even occurring as a result of the vibration from the probe.
- f) Location 20 has a collapsed roof but the void is irregular, indicating that the upper strata is more solid and has jammed as it collapsed. There may be a reason for this as indicated below.
- g) Locations 13, 17, 20, 21 and 22 show a phenomenon that is different from the general trend, i.e much harder strata encountered at a shallower level. This could indicate that the chalk beds are higher at this point, suggesting a fault line running parallel with the alleyway where the chalk has been upthrust. If this was so, then locations 14 and 16 would be expected to be the same but they do not appear to tie in. This theory could only be confirmed by taking core samples but, if so, the existence of a fault line crossed by the workings would contribute to the instability.
- h) The other locations were too shallow to make any definite deductions.

Should a future collapse occur, the opportunity should be taken to confirm the presence of workings and to carry out a survey of the accessible sections. There is no point in filling in the holes since this merely divides the mine into separate sections and hinders future remedial treatment. This can only be a complete infill as carried out at Plumstead and recently at Reigate.

Fig.34 Dynamic Probe Tests

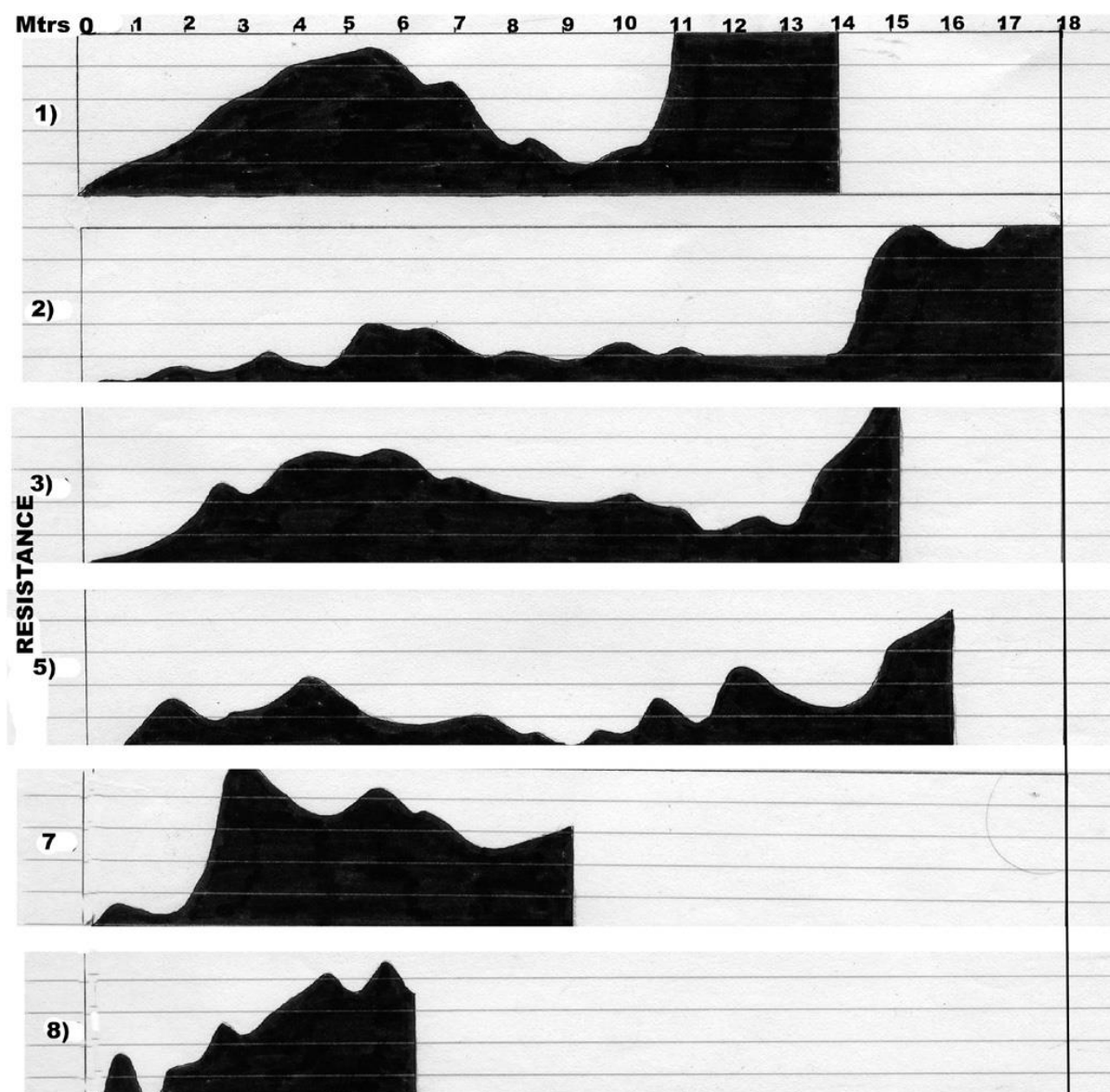


Fig.35 Dynamic Probe Tests

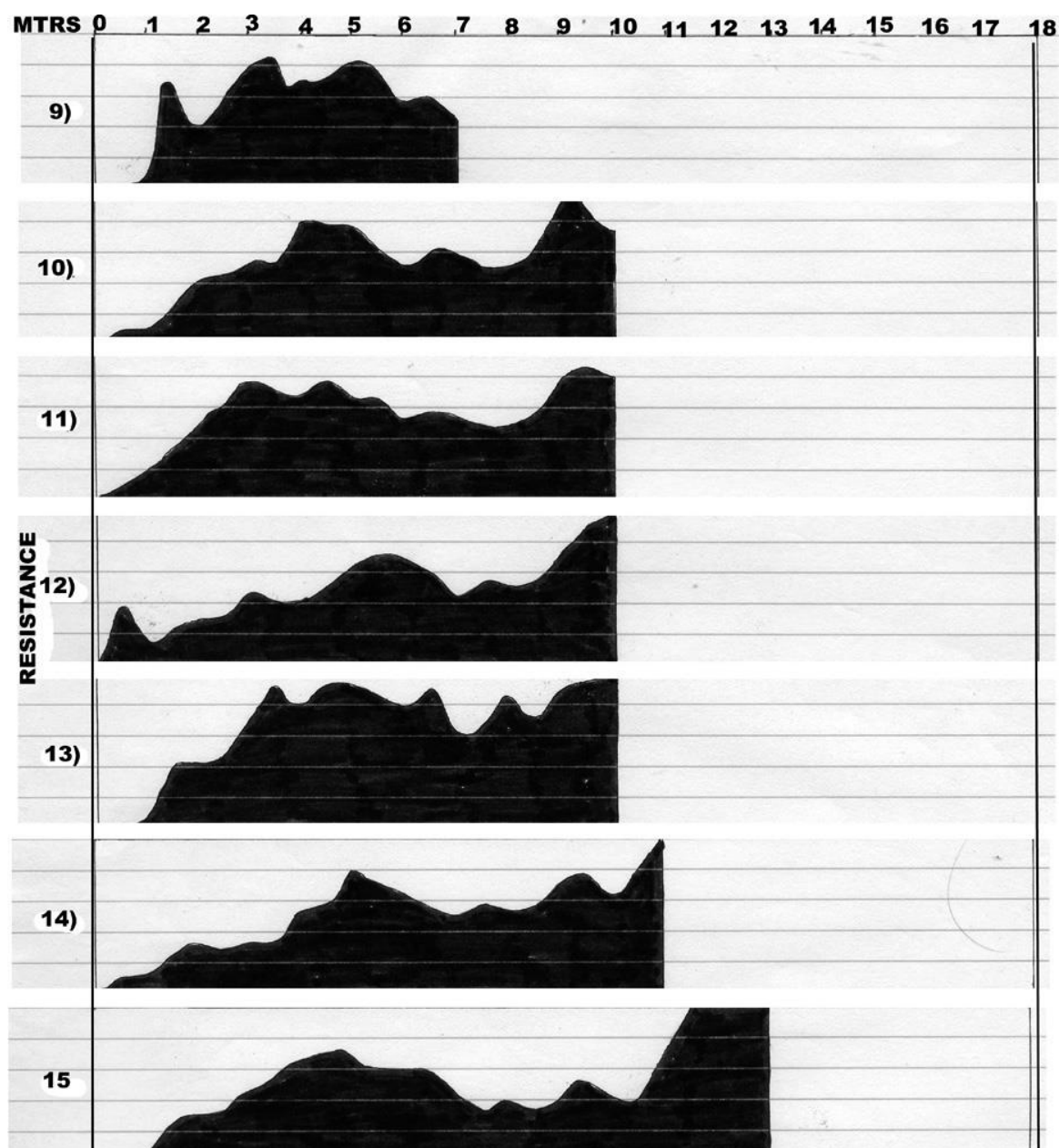
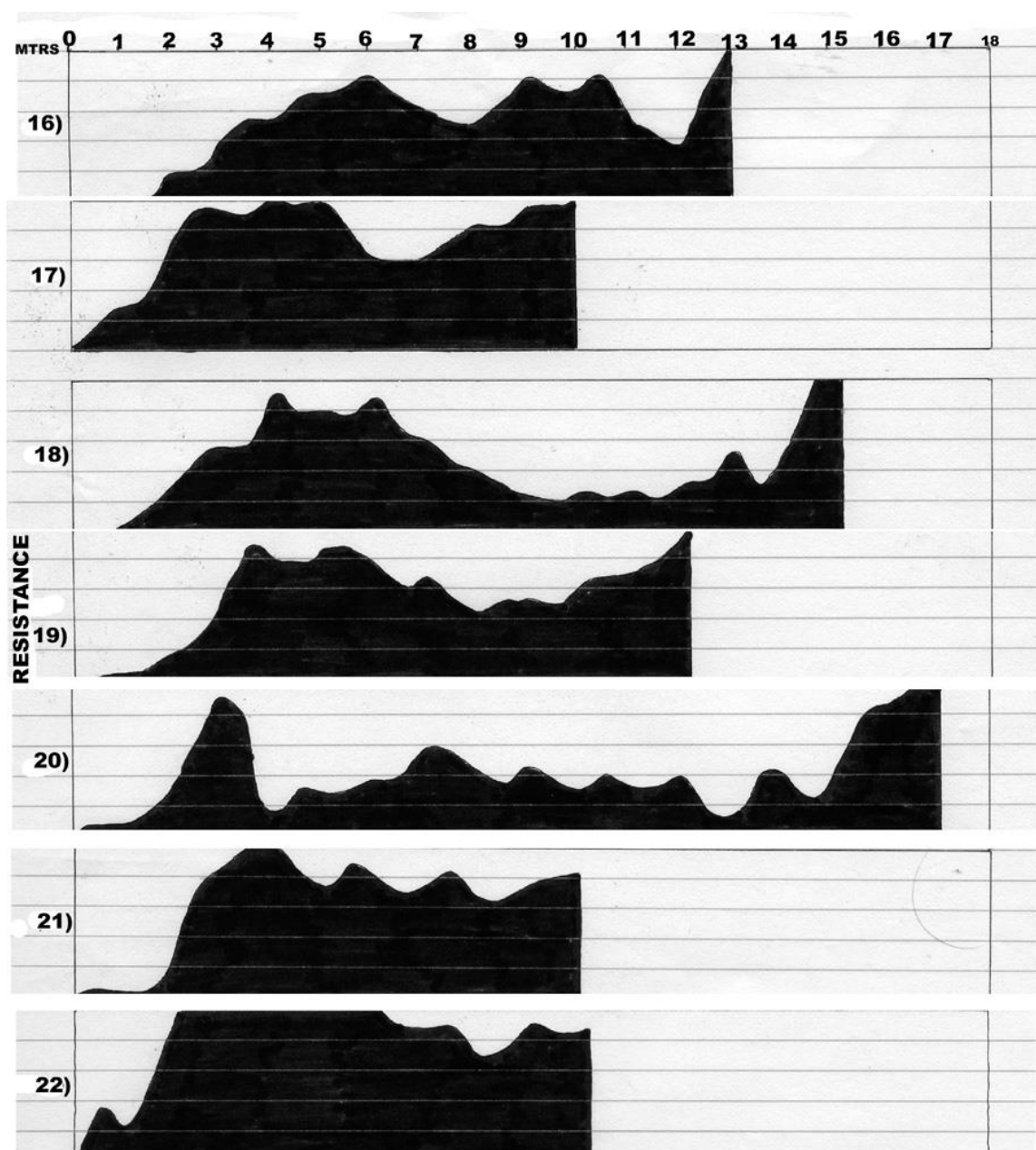


Fig.36 Dynamic Probe Tests



6.0 THE PRESENT PROBLEM

6.1 HOUSING DEVELOPMENT

The reader may be asking how it was that planning permission for housebuilding was granted in an area which had been subject to mining. Although it could perhaps be accepted that the mining activity was not general knowledge, there seems to have been few attempts to ascertain the previous land use which was very apparent from the Ordnance Survey maps. It is a stipulation in any planning application that the previous land use is stated and the respective applications for this area make interesting reading.

Home Farm Estate - 1956

Presnail (Builders) Ltd in respect of Cypress Road, Harden Road, Sholden Road, Iden Road (part) and Hilltop Road (part). Previous use described as farmland. Whilst this was true just prior to building, the area of Iden Road, Harden Road and Sholden Road was originally Wickenden's Brickfield (see Figs.21 & 22). The application for this area of Hilltop Road covering the Frindsbury Brickfield (see Figs.31 & 32) was slightly earlier than this but had been mislaid when enquiries were made.

Chatsworth Drive & Chartwell Close - 1957

Wards Construction (Medway) Ltd in respect of the above area. Previous use described as a smallholding. Again strictly true prior to building but originally Frindsbury Brickfield (see Fig.30).

Grasmere Grove - 1962

Wards Construction (Medway) Ltd in respect of Grasmere Grove, Thirlmere Close and Iden Road (part). Previous use described as disused allotment garden. Again strictly true but Grasmere Grove and Iden Road were originally Nursery Brickfield (see Figs.23, 24 & 25).

Cypress Road Flats - 1962

Presnail (Estates) Ltd in respect of the 8 blocks of flats and lock-up garages on Cypress Road. Previous use described as disused land. Hardly a valid description but originally Frindsbury Brickfield (see Figs.31 & 32).

Rear of Bingham Road - 1980

Medway Property Repairs in respect of proposed additional garages - application refused. Previous use described as vacant land. Again true but originally Frindsbury Brickfield (see Figs.31 & 32) .

None of the above applications can be said to be incorrect since the previous land use description was strictly speaking true prior to application. It is not appropriate for us to comment on procedures in respect of planning permission but perhaps a lesson might be learned for the future. Ordnance Survey maps are available back to the mid-19th Century and these would quickly reveal any previous land use. It is known that industrial sites such as brickfields must have had at least one well and such features should be searched for and properly infilled. An even greater problem in this area is the existence of deneholes and chalkwells for such features are rarely

known about. Some indication, however, can perhaps be obtained by checking old maps for field boundaries (especially the long narrow copses) or for field names in the 1842 Tithe Records. Perhaps more use could also be made of old aerial photos which often show up features invisible from the ground or subsequently covered over. A large collection of over 4 million prints (including RAF wartime coverage of Britain) is held by the National Monuments Record in London.

6.2 REMEDIAL TREATMENT

The big problem in the area of study is that nobody knows for certain how much potential there is for future subsidence. There is definitely a pillar & stall mine but we don't know the extent or condition of the underground workings. Of known features, how effective was the infill prior to building - a rubble infill is certain to settle. How many other features are there that are not known about - it is a certainty that there must be other old deneholes or chalkwells in the area. Apart from waiting for future subsidences to happen (not a pleasant choice), the only way is to carry out a programme of test drilling to discover and enter the workings. Once access has been obtained, an underground survey will reveal the extent of the problem. Such methods have been carried out elsewhere in Britain but they are very expensive.

A further problem is going to be in deciding who pays for this treatment. Whereas the Council is responsible for publicly-owned land, private land remains the responsibility of the landowner. In the case of Plumstead, the residents were lucky enough to enjoy the benefit of a special Act of Parliament, ie L.C.C. (Woolwich Subsidences) Act 1950 but this may not be possible again in the present financial climate. Section 13 of the Metalliferous Mines Regulation Act 1872 put the onus on the person interested in the minerals of a mine to make that mine safe if it is within 50 yards of a public right of way. Where a householder has a freehold lease, he usually owns the rights to any minerals (including chalk) under his property and would thus be liable to take remedial action against any dangerous opening of mine workings on his property. Should he fail to take action, the Council is empowered to carry out the work and make a charge for the necessary expense. This authorisation is laid down in various legislation ie Mines & Quarries Act 1954 - Section 151 (2), Health & Safety at Work Act 1974, Local Government (Miscellaneous Provisions) Act 1976 - Section 25, Highways Act 1980 - Section 165 and Mineral Workings Act 1985 - Section 8(3).

7.0 LIST OF OTHER WELLS

During the course of this research, the location of a number of wells has come to light in addition to the ones mentioned in the text. Some of these have been confirmed by inclusion on old Ordnance Survey maps and others are based on uncorroborated verbal communication. The following is a list of such wells within the area of study which may be of use to future researchers. Where the locations are in areas covered by maps in the text, they have been identified on the latest map by the symbol "W".

1. Two wells at rear of house now demolished. Located at junction of Cooling Road and Lark in Close (see Fig.18).
2. At rear of old Elder Cottage on Bill Street, about 4ft diameter. Now located on Cooling Road opposite junction with Larkin Close.
3. Located in alley off Cooling Road (see Fig.18)
4. Two wells at rear of houses now demolished and presently located on Cooling Road (see Fig.18).
5. In rear garden of Old Vicarage, opposite Royal Oak PH, about 4 ft wide. Now located next to garage on Cooling Road (see Fig.25) and has been capped with concrete.
6. Located in rear yard of Royal Oak PH on Cooling Road (Fig.25).
7. Subsidence in back garden of Park Terrace, about 3 ft deep and 4 ft wide was possibly old well. Houses demolished and now located at rear of 54, Cooling Road (see Fig.25).
8. Next to house that is now demolished and probably supplied ornamental fountain in adjoining garden. Located under Iden Road near junction with Thirlmere Close (see Fig.25).
9. About 3 ft wide and in corner of front garden of Park Terrace next to Soldiers Alley. House demolished in 1958 and replaced by 46, Cooling Road (see Fig.25). The ground over well later subsided and it was filled.
10. Located at side of 35, Cooling Road (see Fig. 30). May be associated with subsidence in 1940s at base of retaining wall by road. Narrow hole inclined towards house and was filled.
11. Pump noted in 1930s in middle of Frindsbury Brickfield (West) when it was being cultivated. Probably associated with a well and approximately located in front garden of 8, Chartwell Close (see Fig.30).
12. Pump noticed in 1930s in shed at rear of Maybank's paper factory (see Fig.30). Presumably associated with well.

13. Pump in yard of old riding stables at West Street (see Fig. 28) presumably associated with well.
14. Pump noted in 1930s at side of old Oasthouse in West Street (see Fig.28). When oasthouse demolished; a well with metal grating was seen under rubble.
15. Pump noted in 1930s next to Ship Inn on Bingham Road (see Fig.31). Presumably associated with well.
16. Behind Mill House which is now 35, Powlett Road (see Fig.19). Was open in 1930s and about 3ft wide.
17. Associated with old Powlett Mill and about 3 ft wide. Filled in mid-1930s and located under 27, Powlett Road (see Fig.19).
18. Pump now located at rear of 39, Windmill Street.
19. Two pumps, presumably associated with wells, in rear gardens of numbers 91 and 93, Bill Street Road.
20. Pump in rear garden of 83, Bill Street Road and presumably associated with well.
21. Pump presumably associated with well, now located next to 10, Bill Street Road (see Fig.19).
22. Pump now located in forecourt of garage at junction of Bill Street Road and Frindsbury Road (see Fig.19).
23. Next to old tenement houses now demolished. Located in school grounds to west of Bill Street Road at its junction with Frindsbury Road.
24. Pump located at side of old Ravenswood Priory School on Mill Road .
25. Located next to 76,.Frindsbury Road.
26. Located at rear of 102, Frindsbury Road.
27. Located next to 114, Frindsbury Road.
28. Pump now located in front of 114, Frindsbury Road.
29. Pump located at rear of 126, Frindsbury Road .
30. Located at rear of 195, Frindsbury Road (see Fig.32).
31. Located at rear of 197, Frindsbury Road (see Fig.32).
32. Next to old Mill House now demolished. Located next to Walmer House on Cypress Road (see Fig.32).

33. Said to have been associated with Bishop's greenhouses in 1950s. Located near flats on Cypress Road (see Fig.32).
34. Next to back door of Cypress House on Frindsbury Road covered over with slabs (see Fig.22) .
35. Noted in 1950s on north side of Cypress House on Frindsbury Road (see Fig.22). about 3 ft in diameter and covered with slabs. Probably connected to pump next to house.
36. At rear of old wooden houses opposite Sans Pareil PH on Home Street, about 4 ft in diameter. Couldn't be filled, despite attempts, so capped in 1950s with 15ft square 1" iron plate and 3 ft of concrete.

Frindsbury in the 1950s



Looking west across Frindsbury Brickfield towards "Donkey Wyles's" orchard



Sad remains of a defunct industry - rotting barges at Whitewall Creek



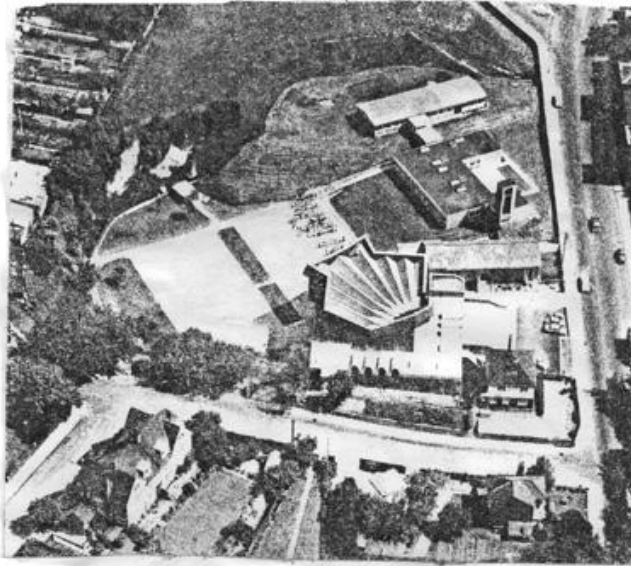
Windmill House at the top of Windmill Street. The house still exists but the wooden boarding has been covered over



Excavating chalk from the quarry near All Saints Church

Mill Road Chalkpit

Much of the original area has disappeared due to infill and landscaping. The only part of the original chalk face can be seen at top left and the adit entrance lies at the base of this under the infill



Frindsbury Road Chalkpit

The rear left hand arch of the retaining wall that exposes the Thanet Sand. This side shows signs of many repairs over the years due to lateral pressure



Brickmaking



Excavating a washback in one of the larger Eastwood brickfields in the 1900s. The slurry launders can be seen in the background.



A brickmaking gang at Rainham in 1890 standing in front of a hack. Note the moulds, large cuckle and brick barrow.

Bricks

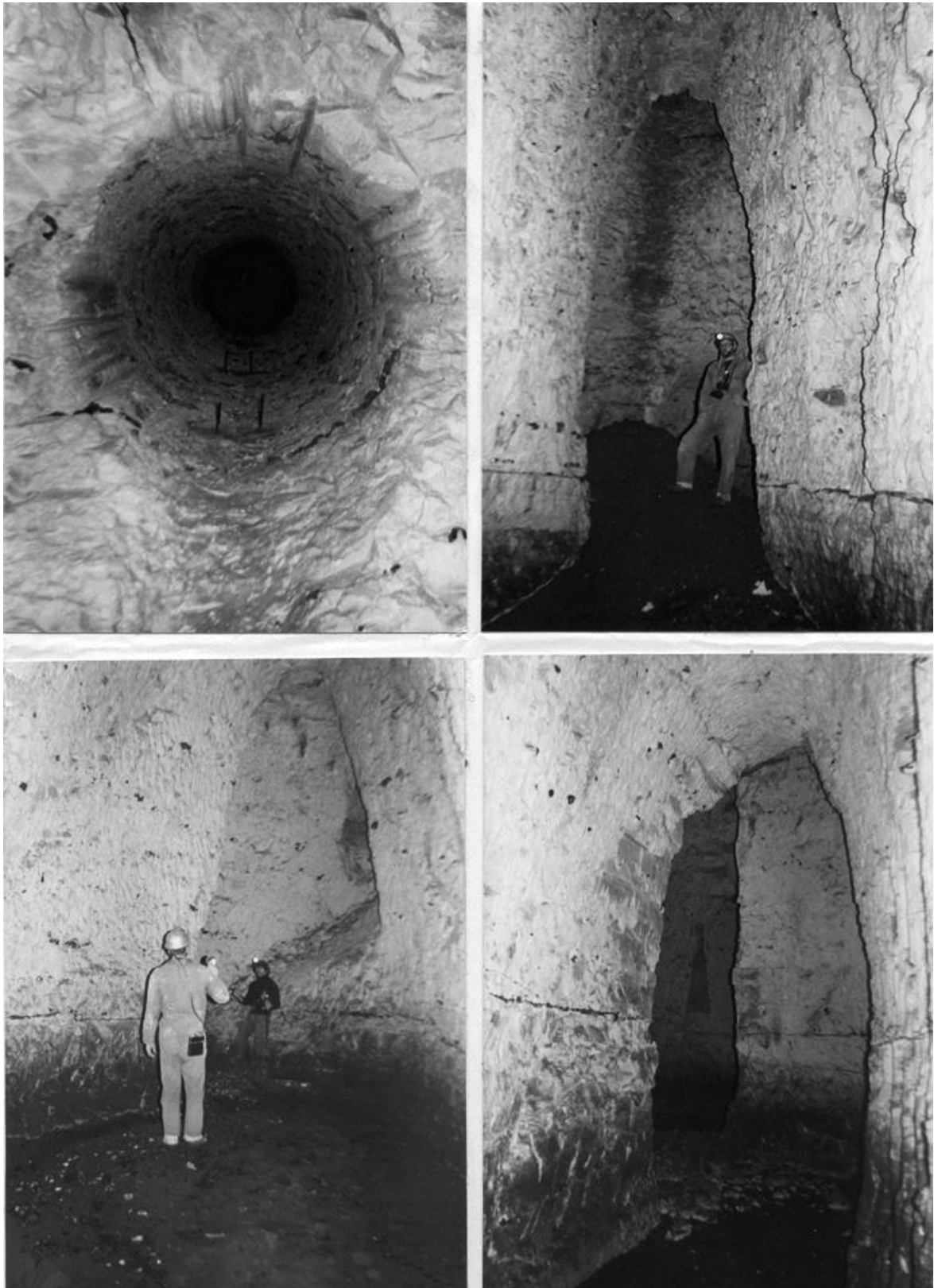


A hand-made yellow stock brick showing the initials “FBC” (Frindsbury Brickfield Company) on the frog. A great many of the older buildings in this area are likely to be built from these.



The same brick compared to a red brick from Newington Brickworks. It can be seen that the latter is slightly smaller and more uniform since it was not hand-made. The Newington Brickworks were owned by the same Ivory who was a partner of Frindsbury Brickfield before it closed.

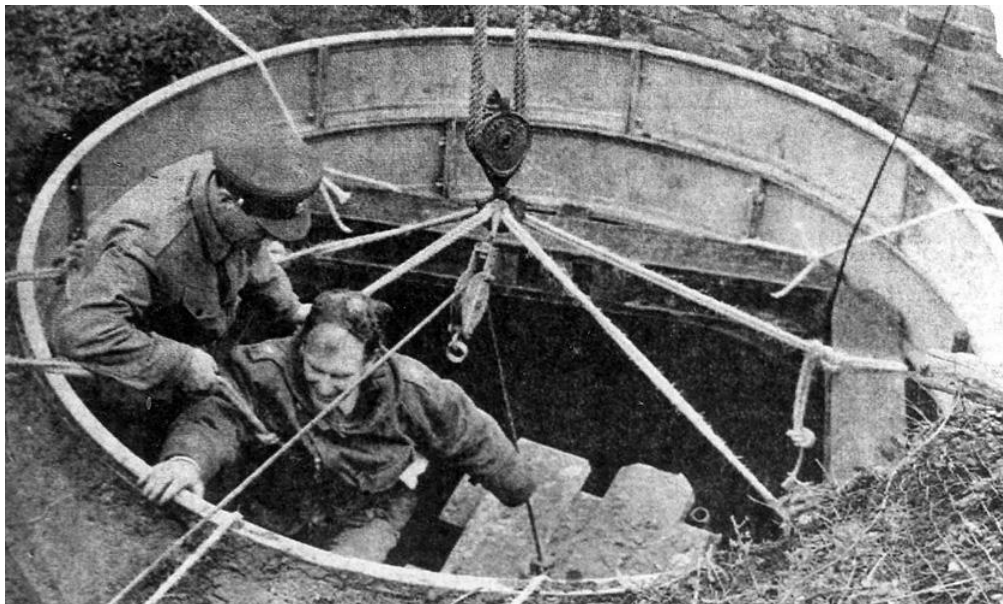
Dartford Chalk Mine



West Street Accident



The first abortive rescue attempt by firemen whilst the top of the shaft was still relatively narrow.



The final attempt by Bomb Disposal personnel. Note that the shaft top had collapsed further and had to be supported.

Aerial Photos from 1946

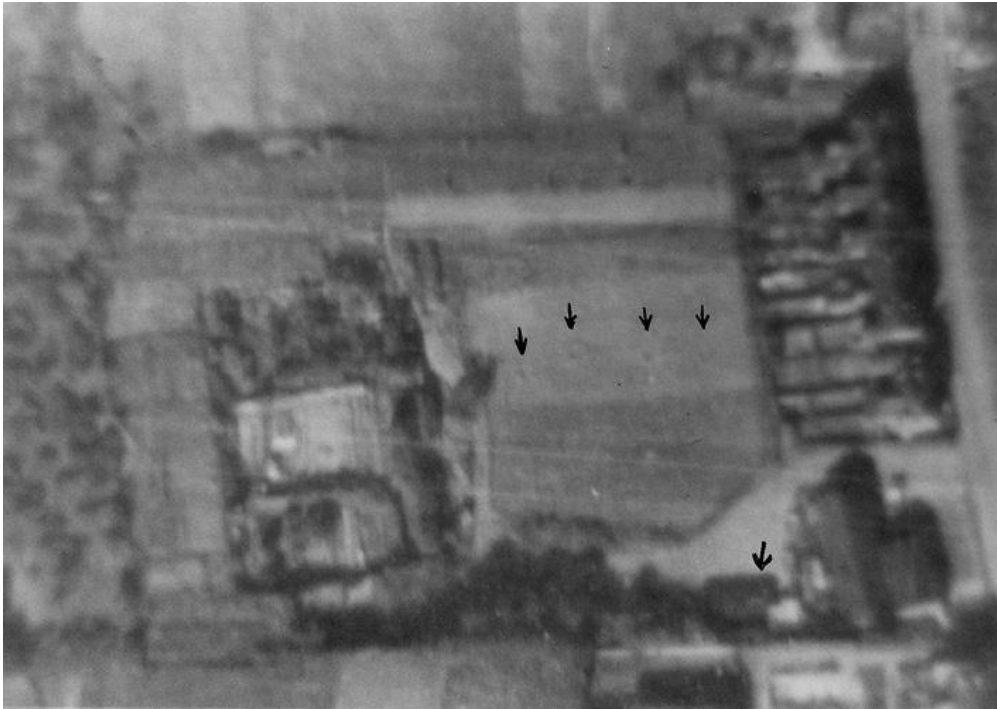


Wickenden's Brickfield - planted as an orchard and this, together with the grainy film, obscures the features. The possible capped shaft may be the lighter patch in the hedge shadow just above where the 3 boundaries meet



Nursery Brickfield – now divided into allotments. The well can be identified to the right of a row of houses on the left hand side.

Aerial Photos from 1946



Frindsbury Brickfield (West) – washbacks have been converted into allotments. Despite grainy film, the line of deneholes can be picked out. The mine shaft is hidden in shadow.



Frindsbury Brickfield (East) – the mine shaft appears as a slightly darker patch just right of centre and the engine shed, etc is above this.

Frindsbury Brickfield in 1929



**James Denness, the engine driver, standing outside the “Lobby”.
The wheel of the traction engine can be seen in the background.**



**Looking north across brickfield from rear of 6, Bingham Road.
Two hacks can be seen in the background with their wooden caps.**

Frindsbury Brickfield in the 1930s



Fred Denness in front of the engine shed. A clay sledge can be seen leaning up against the wall.



The Denenss family and the caravan kept on site during its use as a smallholding. To the right of the caravan is the covered over well.

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