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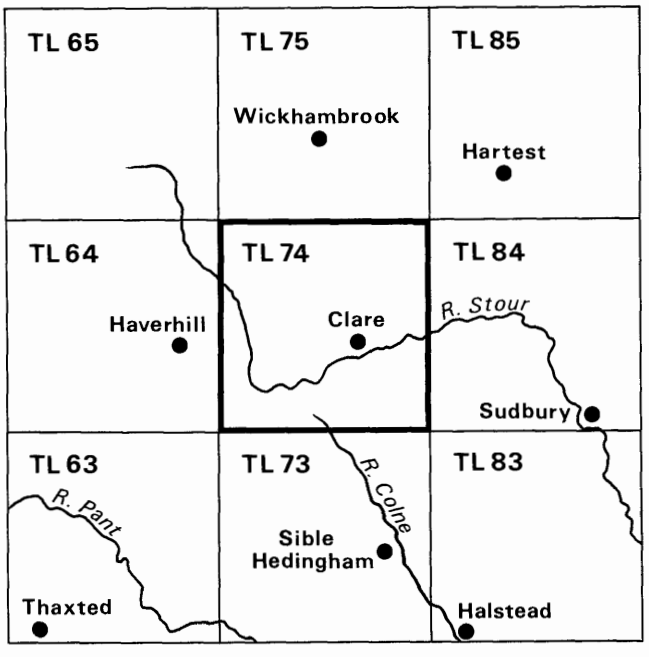


# The sand and gravel resources of the country around Clare, Suffolk

## Description of 1:25 000 sheet TL 74

R. J. Marks



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## PREFACE

National resources of many industrial minerals may seem so large that stocktaking appears unnecessary, but the demand for minerals and for land for all purposes is intensifying and it has become increasingly clear in recent years that regional assessments of the resources of these minerals should be undertaken. The publication of information about the quantity and quality of deposits over large areas is intended to provide a comprehensive factual background against which planning decisions can be made.

Sand and gravel, considered together as naturally occurring aggregate, was selected as the bulk mineral demanding the most urgent attention, initially in the south-east of England, where about half the national output is won and very few sources of alternative aggregates are available. Following a short feasibility project, initiated in 1966 by the Ministry of Land and Natural Resources, the Industrial Minerals Assessment Unit (formerly the Mineral Assessment Unit) began systematic surveys in 1968. The work is now being financed by the Department of the Environment and is being undertaken with the cooperation of the Sand and Gravel Association of Great Britain.

This report describes the sand and gravel resources of the country around Clare, Suffolk, shown on the accompanying 1:25 000 resource map. The survey was conducted in 1979 by R. J. Marks, under the supervision of P. I. Manning, assisted in the drilling and sampling programme by J. R. Gozzard. The work is based on a geological survey at 1:10 560 carried out by D. Millward in 1978-79. J. D. Burnell, ISO (Land Agent) was responsible for negotiating access to land for drilling. The ready cooperation of landowners and tenants in this work is gratefully acknowledged.

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1 November 1981

The first twelve reports on the assessment of British sand and gravel resources appeared in the Report Series of the Institute of Geological Sciences as a subseries. Report No. 13 and subsequent reports appear as Mineral Assessment Reports of the Institute.

Details of published reports appear at the end of this Report.

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## CONTENTS

# The sand and gravel resources of the country around Clare, Suffolk

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R. J. MARKS

**SUMMARY**

The geological maps of the Institute of Geological Sciences, pre-existing borehole information, and 85 boreholes drilled for the Industrial Minerals Assessment Unit form the basis of the assessment of the sand and gravel resources of the country around Clare, Suffolk.

All the deposits in the district that might be potentially workable for sand and gravel have been investigated and a simple statistical method has been used to estimate the volume. The reliability of the volume estimates is given at the symmetrical 95 per cent probability level.

The 1:25 000 map is divided into three resource blocks, containing between 6.8 and 9.5 $km^2$ of sand and gravel. For each block the geology of the deposits is described, and the mineral-bearing area, the mean thickness of overburden and mineral and the mean gradings are stated. Detailed borehole data are also given. The geology, the position of the boreholes and the outlines of the resource blocks are shown on the accompanying map.

**Notes**

Each borehole registered with the Institute is identified by a four-element code (e.g. TL 74 SW 46). The first two elements define the 10-km square (of the National Grid) in which the borehole is situated; the third element defines a quadrant of that square, and the fourth is the accession number of the borehole. In the text of the report the borehole is normally referred to by the last two elements alone (e.g. SW 46).

All National Grid references in this publication lie within the 100-km square TL unless otherwise stated. Grid references are given to eight figures, accurate to within 10 m for borehole locations (In the text, four- and six-figure grid references are used for more extensive locations, for example for farms).

**Bibliographical reference**

MARKS, R. J. 1982. The sand and gravel resources of the country around Clare, Suffolk: description of 1:25 000 resource sheet TL 74. **Miner. Assess. Rep. Inst. Geol. Sci.**, No. 97.

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**INTRODUCTION**

The survey is concerned with the estimation of resources, which include deposits that are not currently exploitable but have a foreseeable use, rather than reserves, which can only be assessed in the light of current, locally prevailing, economic considerations. Clearly, neither the economic nor the social factors used to decide whether a deposit may be workable in the future can be predicted; they are likely to change with time. Deposits not currently economically workable may be exploited as demand increases, as higher-grade or alternative materials become scarce, or as improved processing techniques are applied to them. The improved knowledge of the main physical properties of the resource and their variability, which this survey seeks to provide, will add significantly to the factual background against which planning policies can be decided (Archer, 1969; Thurrell, 1971, 1981; Harris and others, 1974).

The survey provides information at the 'indicated' level "for which tonnage and grade are computed partly from specific measurements, samples or production data and partly from projection for a reasonable distance on geologic evidence. The sites available for inspection, measurement, and sampling are too widely or otherwise inappropriately spaced to permit the mineral bodies to be outlined completely or the grade established throughout" (Bureau of Mines and Geological Survey, 1948, p. 15).

It follows that the whereabouts of reserves must still be established and their size and quality proved by the customary detailed exploration and evaluation undertaken by the industry. However, the information provided by this survey should assist in the selection of the best targets for such further work. The following arbitrary physical criteria have been adopted:

a The deposit should average at least 1 m in thickness.
b The ratio of overburden to sand and gravel should be no more than 3:1.
c The proportion of fines (particles passing the No. 240-mesh B.S. sieve, about 1/16 mm) should not exceed 40 per cent.
d The deposit should lie within 25 m of the surface, this being taken as the likely maximum working depth under most circumstances. It follows from the second criterion that boreholes are drilled no deeper than 18 m if no sand and gravel has been proved.

A deposit of sand and gravel that broadly meets these criteria is regarded as 'potentially workable' and is described and assessed as 'mineral' in this report. As the assessment is at the indicated level, parts of such a deposit may not satisfy all the criteria.

Pre-Pleistocene rocks, which are usually consolidated and devoid of potentially workable sand and gravel, are referred to as 'bedrock'; 'waste' is any material other than bedrock or mineral; 'overburden' is waste that occurs between the surface and an underlying body of mineral.

For the particular needs of assessing sand and gravel resources, a grain-size classification based on the geometric scale 1/16 mm, ¼ mm, 1 mm, 4 mm, 16 mm, 64 mm has been adopted. The boundaries between fines (that is, the clay and silt fractions) and sand, and between sand and gravel material, are placed at 1/16 mm and 4 mm respectively (see Appendix C).

The volume and other characteristics are assessed within resource blocks, each of which, ideally, contains

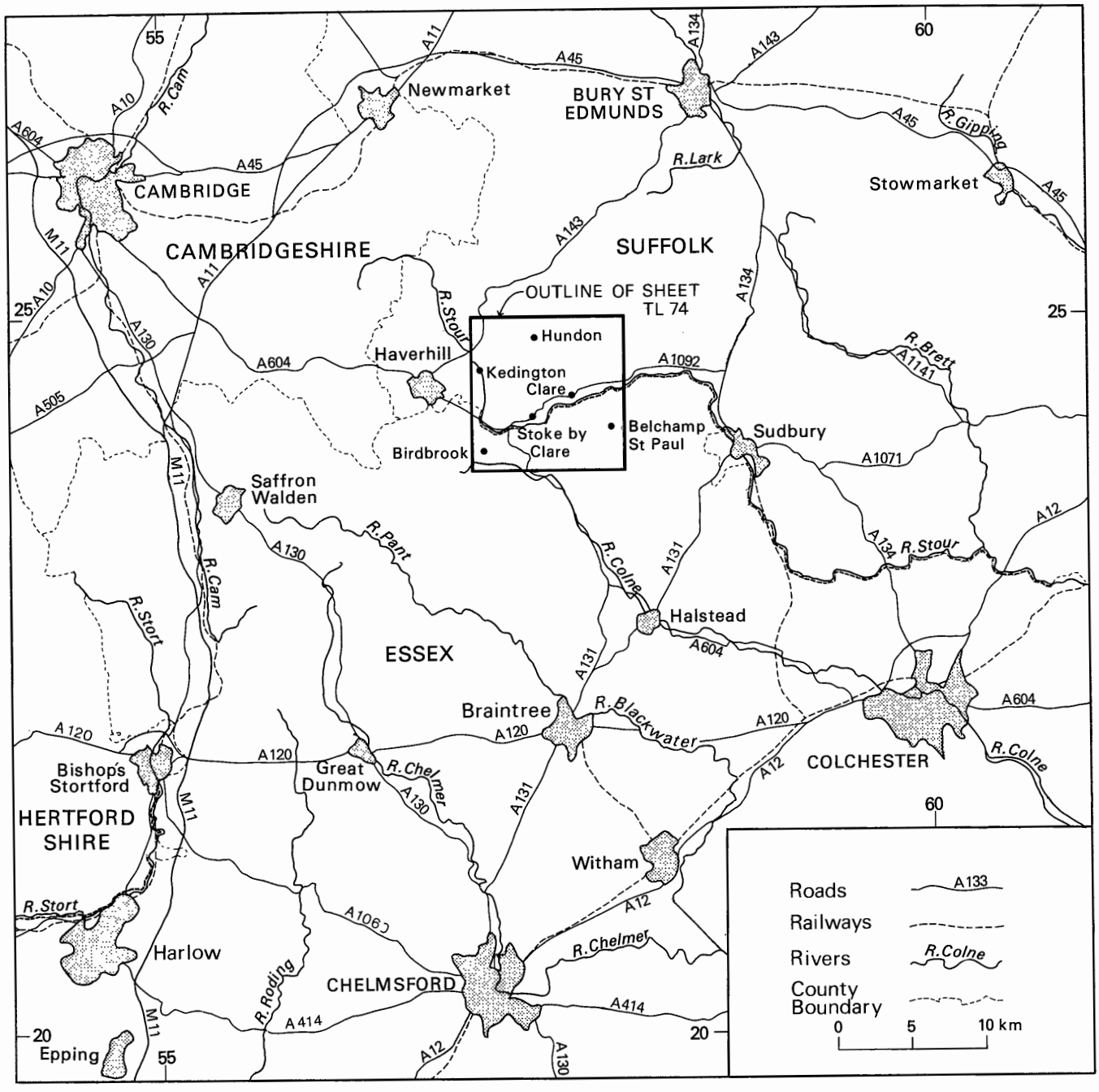



**Figure 1** Map showing the location of the resource sheet area.

approximately 10 km$^2$ of sand and gravel. No account is taken of any factors, for example, roads, villages or land of high agricultural or landscape value, which might stand in the way of sand and gravel being exploited, although towns are excluded. The estimated total volume therefore bears no simple relationship to the amount that could be extracted in practice.

It must be emphasised that the assessment applies to the resource block as a whole; valid conclusions cannot be drawn about mineral in parts of a block, except in the immediate vicinity of the actual sample points.

## DESCRIPTION OF THE DISTRICT

The district covered by this assessment lies mid-way between Cambridge and Colchester with the A604 main road passing across the south-west corner (Figure 1). It covers 100 km$^2$ of rural country astride the Suffolk and Essex border, which follows the meandering course of the River Stour. The small river-side town of Clare forms a local centre for intensive arable farming of the surrounding countryside. The district produces mainly cereal crops, but sugar-beet, potatoes and beans are also included in the rotation. This pattern of agriculture is adapted to the heavy soils derived from the Boulder Clay, and to the relatively low rainfall. The district is covered by a network of minor roads linking numerous villages.

Sand and gravel has been extracted from a number of mainly small pits (Figure 2) in the past. The largest, Stoke Road Pit [763 444], yielded aggregate from the River Terrace Gravels during the Second World War to build the now-disused military aerodrome situated between Ovington and Ridgewell. The pit has since been converted into a recreational facility. There are only two other pits of any size: one [709 432] at Wixoe was dug also in First Terrace gravels and has since been filled and returned to agriculture; the other [746 468], at Chilton Street, was excavated in Glacial Sand and Gravel, upper, and has now been planted with coniferous trees.

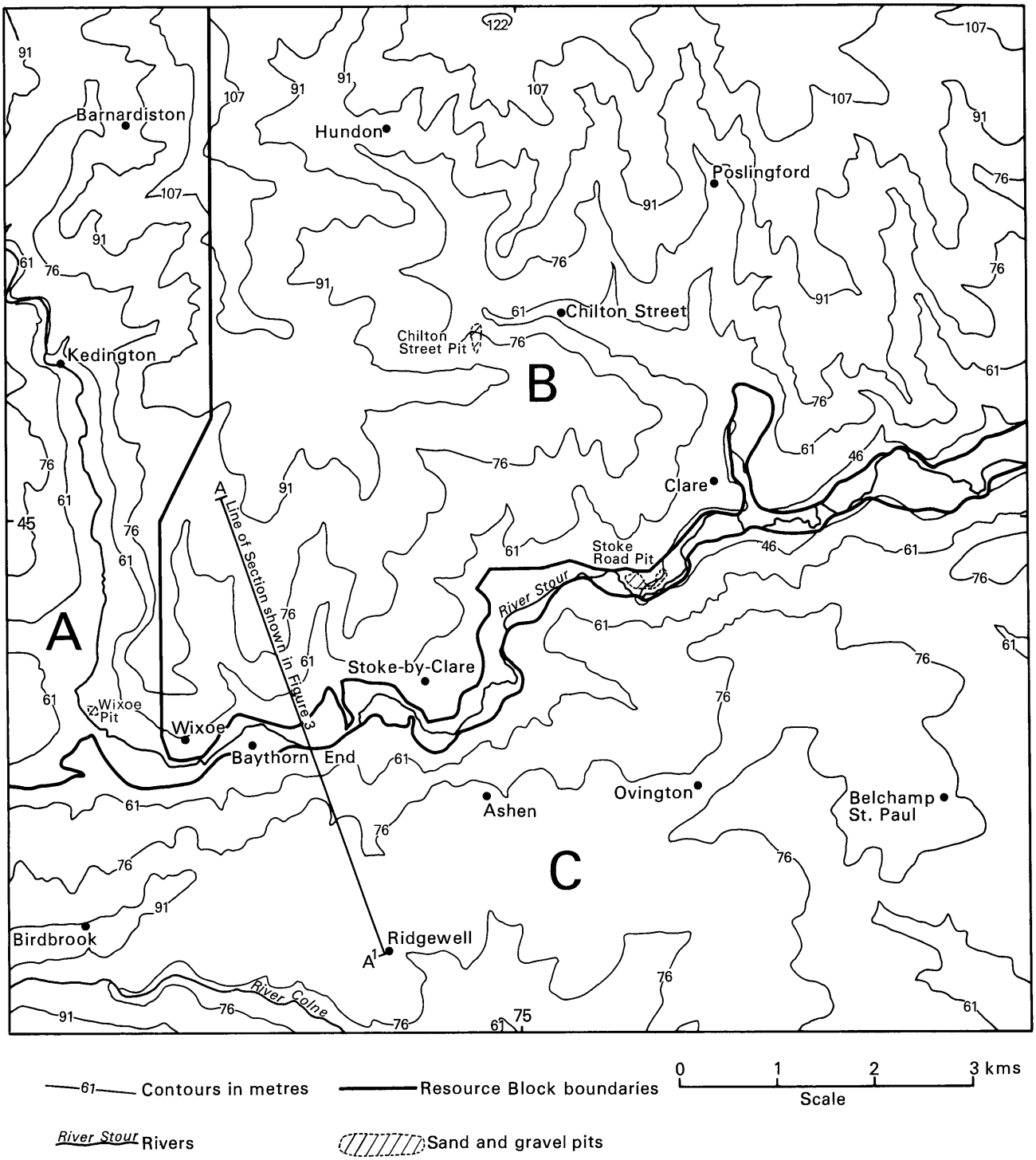



**Figure 2** The topography of the district with resource block boundaries and locations mentioned in the text.

The principal objective of this survey was to assess the aggregate potential of the sand and gravel deposits. The borehole programme proved mineral resources mainly associated with the Stour valley and covering a total area of 23.5 km$^2$. Statistical assessments are offered on the basis of three resource blocks (Figure 2).

TOPOGRAPHY

The district (Figure 2) forms part of the gently undulating Boulder Clay plateau that covers much of west Suffolk and north Essex. Here the plateau has a gentle slope to the south-east, falling in elevation from over 107 m (350 ft) above OD in the north-west to around 76 m (250 ft) above OD in the south-east. It is dissected by the valley of the River Stour which flows from the north-west, where it has an elevation of 60 m (200 ft) above OD, due south to Wixoe; thence it turns east, flowing across the district to Cavendish, where it has cut down to 45 m (150 ft) above OD. The ground to the north of the Stour is dissected by tributary streams, whereas to the south of that river it is less deeply dissected, containing the headwaters of the River Colne in the west and those of Belchamp Brook in the east.

GEOLOGY

The geology of this district is depicted on the New-Series 1:63 360 sheet 206 (Sudbury) and described in the corresponding memoir (Boswell, 1929). The ground was resurveyed for the purpose of this assessment at a scale of 1:10 560 by D. Millward of the Institute's Eastern England Land Survey Division in 1978-79 (Millward, 1980).

The geological sequence is summarised in Table 1, where the deposits are listed, as far as possible, in order of increasing age. The vertical relationships between the deposits are schematically illustrated in the geological section (Figure 3), the line of which is shown on the Resource Map and in Figure 2.

**Table 1** Geological sequence.

| | |
|---|---|
| DRIFT | |
| **Recent** and **Pleistocene** | Alluvium |
| | River Terrace Deposits |
| | Head |
| | Boulder Clay |
| | Glacial Silt |
| | Glacial Sand and Gravel, upper |
| | Barham Sands and Gravels |
| | Kesgrave Sands and Gravels |
| SOLID | |
| **Pleistocene** | Red Crag |
| **Cretaceous** | Upper Chalk |
| | Middle Chalk |

**Solid**

Chalk The bedrock over the whole area is Chalk; the Upper Chalk underlies the drifts of the plateau areas, with a narrow strip of Middle Chalk subcropping in the Stour 'tunnel-valley' as shown on the Resource Map. Only the Upper Chalk reaches the surface from beneath the drift sequence and outcrops are restricted to the sides of the Stour valley, ground immediately south of Clare, between Kedington and Wixoe and an isolated outcrop south of Baythorn End. These outcrops coincide with places where the chalk surface (Figure 4) rises to elevations of between 60 and 80 m above OD.

The chalk is a soft pure white limestone at outcrop, whereas beneath the drift, particularly where weathered and saturated with water, it may have a putty-like consistency. The Upper Chalk can be distinguished from the Middle Chalk by its fauna; the two members are separated by the thin hard, nodular Chalk Rock. Flint bands are characteristically common in the Upper Chalk.

**Drift**

The Middle Pleistocene stratigraphy of southern East Anglia has recently been revised by Rose and Allen (1977), whose account is used as the basis for this text. However, in addition to the formations described by these writers, the sequence proved by IMAU boreholes includes a localised, though clearly defined, occurrence of sand and gravel which is found above, within and below the till sheet. This has been termed the Glacial Sand and Gravel, upper.

The chalk surface is largely concealed by a thick sequence of drift deposits which consist predominantly of Boulder Clay. The Stour tunnel-valley (Figure 4; Woodland, 1970), which closely coincides with the course of the present valley, is known to be incised into the undulating chalk surface to a depth of the order of 140 m in the vicinity of Clare. Its steep-sided nature is demonstrated by boreholes SW 57 and 58 which show the slope of the chalk surface to be steeper than 33°. There is a considerable rise in the floor of the tunnel-valley north of Wixoe where it has a broader form and a depth of the order of 20 m. The Colne valley in the south overlies a similar feature in the chalk surface which joins the Stour tunnel-valley at Wixoe. These features are buried by glacial drift which exceeds 150 m in thickness in the deep section east of Wixoe.

Woodland (1970) described several tunnel valleys in East Anglia and suggested that they were formed by the erosive force of debris-laden subglacial streams. He suggested that such streams were confined by the overlying ice so as to flow under hydrostatic pressure, which enabled them to sculpt an irregular base and ultimately to rise at the glacier snout and flow from the edge of the ice-sheet as outwash (meltwater) streams. His concept is supported by evidence from the IMAU boreholes which suggests that older deposits of Barham Sands and Gravels, Kesgrave Sands and Gravels and Red Crag were removed from the area of the tunnel-valley before the erosion of substantial thicknesses of the underlying chalk.

It is often difficult to distinguish between the various sand and gravel deposits, solely on the basis of their appearance at the surface, except for the easily-recognised River Terrace Deposits. Accordingly, the Red Crag, the Kesgrave Sands and Gravels and the Barham Sands and Gravels have not been differentiated on the geological base of the sand and gravel resource sheet (see map legend). The Glacial Sand and Gravel, upper, is distinguished only where it has been positively identified. However, all these deposits have been separately identified in the IMAU borehole records, and, as a consequence of this, the Red Crag (which is classified as a solid formation) is separately described here and included in the section on drift deposits.

Red Crag Although this deposit is not separately mapped on the Resource Sheet, it may form the lower portion of the undivided sequence in the Stour valley. It has been identified in 6 IMAU boreholes as resting on Upper Chalk and generally underlying Kesgrave Sands and Gravels adjacent to the Stour valley. Only boreholes NE 41 and SW 33 proved Red Crag to the south of the valley, though it may be present at depth beneath most of this area. However, it is absent in IMAU boreholes SE 15 and 29 where Glacial Sand and Gravel, upper, overlies Upper Chalk. To the north of the Stour valley, Red Crag is present around Stoke-by-Clare and was proved in IMAU boreholes NE 18, and SW 39, 42 and 46. However, to the north and west it is likely to be absent. Its feather edge probably coincides approximately with the original margin of the Red Crag basin of deposition, though this will have been modified to some extent by several later erosive periods.

This formation typically comprises 'clayey' pebbly sand. The gravel portion is characterised by a significant percentage of ironstone (Table 2) and the sand is largely composed of reddish brown iron-stained quartz. The mean recorded thickness of the Red Crag is 5.9 m and its maximum thickness is 10.4 m proved in borehole SW 46.

Kesgrave Sands and Gravels This deposit has been proved in 9 IMAU boreholes. It appears to have an area of subcrop similar to, though slightly more extensive than, that of the Red Crag. Typically the Kesgrave Sands and Gravels rest on Red Crag and are overlain by the Barham Sands and Gravels. However, they are also found directly overlying Upper Chalk and underlying Boulder Clay. As with the other two members of the tripartite sequence of sand and gravel deposits that underlie the Boulder Clay, the Kesgrave Sands and Gravels have not been separately identified at outcrop (see above). It is likely, however, that the outcrops immediately north of borehole NE 41 and south-east of borehole SW 46 are partly composed of this deposit; other outcrops could be cited. The Kesgrave Sands and Gravels are probably present, though they may be thin, beneath much of the southern and eastern areas, but few assessment boreholes have penetrated the thick overlying boulder clay. The deposit is proved as far north as Stoke-by-Clare, Poslingford and Cavendish in boreholes NW 26, NE 18, 20, 37, and SW 39 and 46. To the north of these places, many boreholes show Boulder Clay resting on

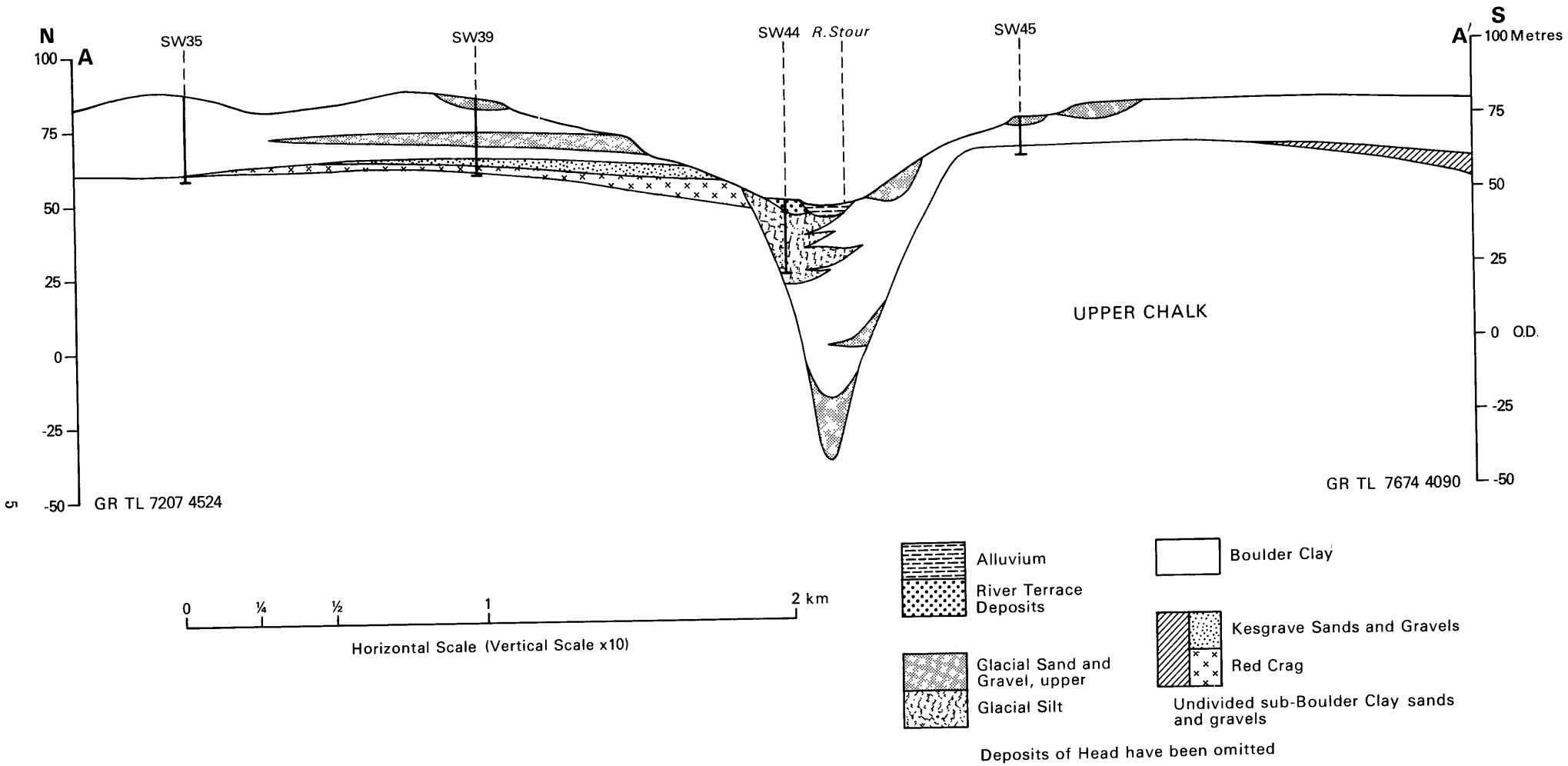



**Figure 3** Schematic section showing the relationship between the drift and solid formations. The lines of section are shown on Figure 2 and the resource map.

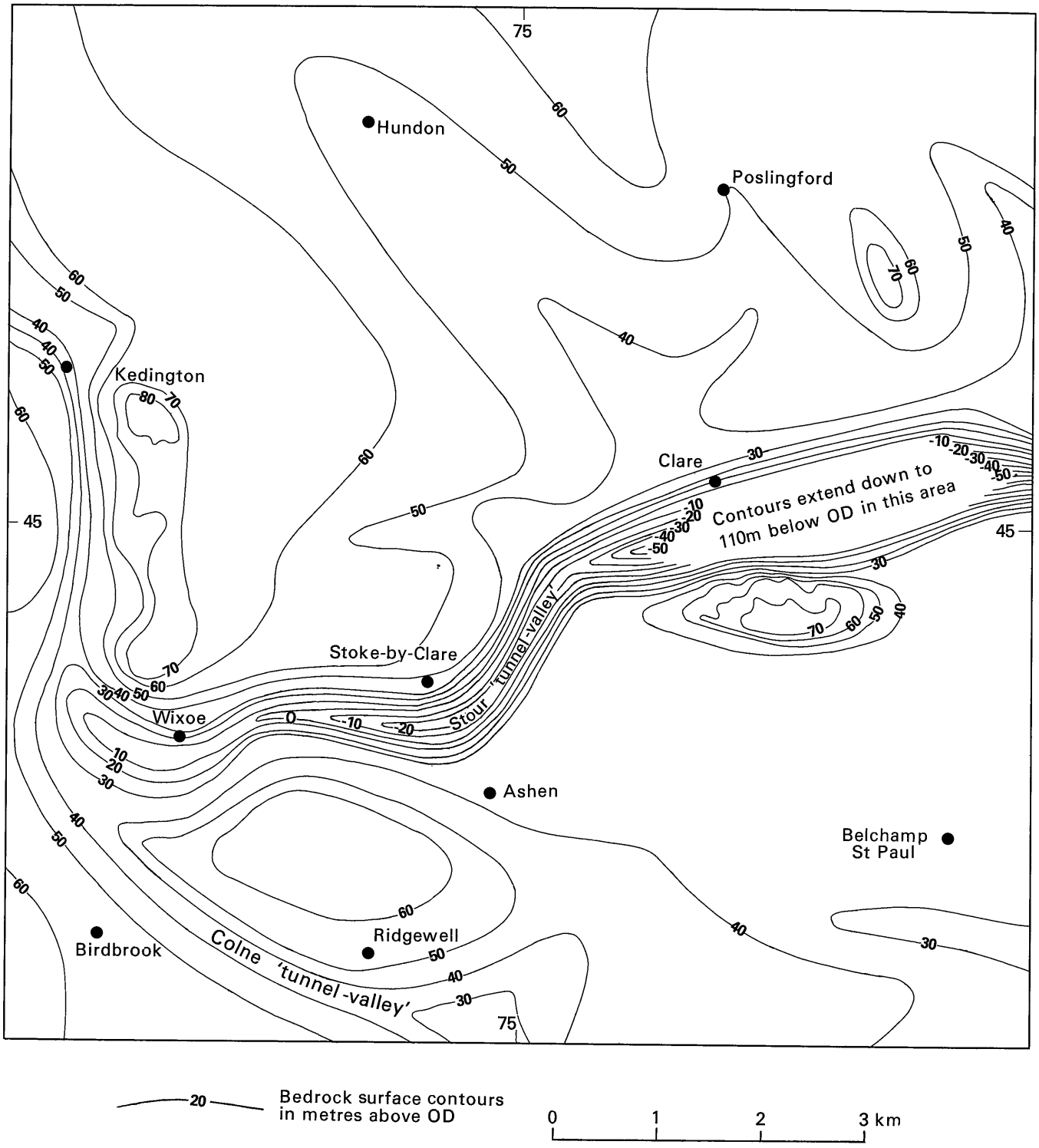



**Figure 4** Map showing the bedrock surface contours.

Upper Chalk, though some non-IMAU borehole records show thin sequences of sand and gravel between the two.

The Kesgrave Sands and Gravels are typically an orange-yellow to pale grey fine and medium quartz sand with silt and clay forming a total of 15% by weight. They are exposed in the banks of the road [7976 4528] to Bower Hall. They have a mean recorded thickness of 6.0 m and a maximum thickness, proved in borehole NE 37, in excess of 17.2 m.

Barham Sand and Gravels These sands and gravels have been proved in 5 IMAU boreholes, all in the area just north of Stoke-by-Clare, where this deposit underlies Boulder Clay and rests on Kesgrave Sands and Gravels. In this area the deposit probably forms the upper portion of the undivided sand and gravel outcrop. While it may be present elsewhere beneath the thick mantle of Boulder Clay, it would appear to have a more restricted subcrop than either the Kesgrave Sands and Gravels or the Red Crag and is almost certainly absent in the north and west.

The Barham Sands and Gravels have a maximum thickness of 3.9 m in borehole SW 43 and a mean recorded thickness of 2.0 m. This deposit has a variable lithology, though it commonly comprises an orange-brown 'clayey' pebbly sand and is thought to be the main glacial outwash of the Anglian Glaciation. It is composed of a mixture of material from the underlying deposits together with components from the Boulder Clay,

normally including a small percentage of chalk. In this report the deposit is taken to include the 'rubified sol lessive' and associated deposits of Rose and Allen (1977).

Glacial Sand and Gravel, upper This deposit is found at several levels within and beneath the Boulder Clay, to which it is closely related; it forms numerous outcrops in this district which can often be correlated with sequences in adjacent boreholes, as, for example, at borehole SW 39. Here the evidence suggests that the mineral bodies have a lensoid form, as seen in section on the valley side to the south of borehole SW 39 and in plan at the site of this borehole on the plateau. Such outcrops have a generally circular form and the deposits rarely extend beneath Boulder Clay beyond their mapped boundary. This is illustrated by boreholes NE 38 and SW 51, where, though the boreholes are adjacent to outcrops of Glacial Sand and Gravel, upper, the deposit is absent at depth. Similarly, the sinuous outcrop [742 425] north of borehole SW 50, which might be expected to extend southwards beneath the Boulder Clay, is absent in that borehole, indicating that the deposit may rest on the valley flank, its extent again probably coinciding with that of the mapped outcrop. The longitudinal form of this deposit and the close spacing of such outcrops suggests an association with the development of the tunnel-valley. However, whereas this deposit is present on the 'shoulders' of the tunnel-valley there is no evidence of its presence in the deep central section east of Wixoe, though some relatively thin seams are recorded at depth to the east of Clare. Glacial Sand and Gravel, upper, is present right across the valley in the shallower section around Kedington. Elsewhere on the plateau the outcrops appear to form 'trains' which may once have been continuous. Most of these appear to be associated with minor valleys, for example the headwaters of the Colne and Belchamp Brook, as well as the main Stour tributary at Clare. This evidence, in total, supports the hypothesis that there has been little erosion since glacial times and the deposition of the till sheet. It also suggests that the localised occurrence of this deposit probably resulted from minor glacio-fluvial meltwater activity during the deposition of the till sheet. The deposit has a mean recorded thickness of 4.0 m, with a maximum of 10.0 m proved in borehole NE 18.

The deposit is heterogeneous, as might be expected from its mixed derivation, and comprises a variety of lithologies centred on 'very clayey' sandy gravel; it is generally characterised by varying amounts of chalk, which is usually present in the gravel and sand fractions, as well as among the fines, where it occurs in comminuted form.

Glacial Silt A small outcrop [794 429] of this deposit is mapped at Belchamp St Paul overlying Glacial Sand and Gravel, upper. It has also proved to be an important component of the complex glacial drift of the deeper central section of the Stour 'tunnel-valley' where it underlies fluvial deposits in IMAU boreholes NE 31 and SW 44. At neither site was the full depth of the deposit proved, and, more importantly, its relationship with the other glacial deposits was not determined. Both upstream and downstream of each site the 'tunnel-valley' is filled with Boulder Clay to a depth of at least 20 m. However, in auxiliary borehole NE 15, Boulder Clay with Glacial Silt is recorded between 19.5 m below OD and the floor of the tunnel-valley at 112 m below OD.

The deposit comprises a laminated silt with fine sandy partings. Clay laminae are present at certain horizons and fine rounded chalk pebbles are found in other parts of the sequences.

Boulder Clay This, the most widespread of the drift deposits, has a blanket-like form over much of the district, giving rise to an undulating plateau topography and reaching thicknesses in excess of 40 m in places. The Boulder Clay is also the dominant deposit in the Stour tunnel-valley where it is associated with the Glacial Sand and Gravel, upper, on either side and fills the deep central section at Wixoe, though to the east sequences of Glacial Silt and Glacial Sand and Gravel, upper, are also present in the lower part.

This firm to stiff, slightly sandy silty clay typically contains abundant pebbles of rounded chalk, much angular flint, some quartz and quartzite and other minor erratics of igneous and metamorphic rocks and sandstone. The upper four metres is commonly weathered to brown and mottled brown and grey. In the upper part of this zone the deposit is commonly decalcified to sandy clay with flint pebbles. Below, the Boulder Clay becomes grey with additional clasts of shale. In places the base is particularly sandy and gravelly with chalk either absent or in trace amounts (see the borehole NW 23). In the tunnel-valley, the deposit is devoid of many of the less common erratics, so that the chalk becomes relatively more abundant.

Head This deposit is well developed as thin spreads on most of the lower valley slopes and therefore masks many drift boundaries, particularly in the Stour Valley. It is derived locally from older drift and solid formations and thus has a very variable lithology ranging from brown clay to orange-brown sandy clay with chalk and flint pebbles.

River Terrace Deposits These are developed only in the Stour valley east of Wixoe where they form isolated outcrops on either side of the alluvium. Their bench-like form rises a few metres above the floodplain. The terrace deposits are characteristically 'very clayey' sandy gravel composed largely of angular patinated flint with a smaller proportion of chalk (Table 2). They generally have a thin cover of pebbly sandy silt and have a mean recorded thickness of 4.0 m with individual recorded thicknesses ranging from 2.1 m to 5.0 m.

Alluvium This forms the floodplain of the Stour valley and the main tributary valleys at Clare and west of Wixoe, and is also present in the valleys of the headwaters of the Colne. The alluvial sequence, which has a mean recorded thickness of 6.4 m, is typically capped by clayey silt. This usually overlies a thicker silt and peat sequence that may include angular flint, rounded chalk pebbles, and fresh-water gastropod and bivalve shells, as well as the usual debris of plants, including grasses and wood. The base is characterised in main valleys by a bed of gravel which has a mean recorded thickness of 3.3 m.

## COMPOSITION OF THE SAND AND GRAVEL DEPOSITS

Potentially workable sand and gravel is present in the Red Crag, Kesgrave Sands and Gravels, Barham Sands and Gravels, Glacial Sand and Gravel, upper, River Terrace Deposits and Alluvium. Many of the sand and gravel deposits have similar gradings (Figure 5), and their gravel fractions have similar compositions (Table 2). This reflects the fact that the later deposits contain reworked material from earlier underlying drift deposits, as well as incorporating material from more distant sources. As a consequence, the members of the tripartite sequence of sands and gravels that underlie the Boulder Clay all have a similar composition, and the Glacial Sand and Gravel, upper, has similarities with the River Terrace Deposits and sub-alluvial gravels. Determinations of the mean composition of the gravel fractions (Table 2) show that all these deposits are largely composed of flint, but substantial proportions of chalk, quartz or ironstone are present in certain deposits; quartzite, sandstone, argillaceous rocks, septarian nodules, limestone and fossil debris often form small percentages, and pyrite and metamorphic and

**Table 2** Mean composition of the gravel (+4mm) fraction of the mineral-bearing deposits.

| Deposit | Percentage by weight | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Septarian nodules and Limestone | Iron-stone |
| | W R | Ang. | Patin. | | | | | | | |
| Alluvium | trace | 69 | 6 | 10 | 1 | 3 | 3 | 1 | 4 | 1 |
| River Terrace Deposits | 2 | 70 | 9 | 7 | 2 | 2 | 2 | 1 | 3 | 1 |
| Glacial Sand and Gravel, upper | 1 | 56 | 15 | 12 | 2 | 2 | 3 | 3 | 3 | 2 |
| Barham Sands and Gravels | 5 | 45 | 3 | 9 | 17 | 5 | 2 | 5 | trace | 8 |
| Kesgrave Sands and Gravels | 8 | 61 | 5 | 0 | 14 | 3 | 2 | 6 | trace | trace |
| Red Crag | 15 | 50 | 9 | 0 | 8 | 3 | 1 | 1 | trace | 13 |

W R = Well rounded
Ang. = Angular
Patin. = Patinated

**Minor constituents**

| Deposit | Fossil debris | Pyrite | Metamorphic | Igneous |
|---|---|---|---|---|
| Alluvium | 1 | 0 | trace | 1 |
| River Terrace Deposits | 1 | 0 | trace | trace |
| Glacial Sand and Gravel, upper | 1 | trace | trace | trace |
| Barham Sands and Gravels | 1 | 0 | trace | 0 |
| Kesgrave Sands and Gravels | trace | 0 | 1 | 0 |
| Red Crag | 0 | 0 | trace | 0 |

igneous rocks occur in trace amounts in places. The potential uses of these deposits are closely related to the amount of chalk, pyrite and ironstone (and to a lesser degree patinated flint) that they contain, since these rock types may have deleterious properties.

Red Crag This deposit, which is characterised by seams of iron-pan, is classified as 'clayey' pebbly sand. It has a mean grading of fines 14%, sand 80% and gravel 6% and ranges from 'very clayey' sand in borehole NE 18 to pebbly sand in borehole SW 33.

The gravel fraction is predominantly fine with cobbles present only in boreholes NE 14 and SW 46. This fraction is largely composed of flint (Table 2), of which 20% is well-rounded, having been derived from the pebble beds of the Lower London Tertiaries and London Clay (Tertiary flint). The remainder is angular, ranging through to subrounded, black with some brown flints of which some (12%) are patinated, bearing white, porcellanous-textured 'skins'. Ironstone forms a distinctive lithology in this deposit: it occurs in the form of dark brown tabular iron-pan, commonly associated with iron-cemented micaceous sandstone. Fine subrounded to rounded quartz with some quartzite, argillaceous rocks and sandstone is present in small amounts.

The sand, generally iron-stained, is made up mostly of medium and fine grades but includes a significant percentage of coarse grains (Figure 5). It is composed almost exclusively of subrounded to rounded quartz with angular to subangular grains of flint, iron-pan, and flakes of mica. The fines consist of disseminated silt and clay.

Kesgrave Sands and Gravels The mineral in this deposit consists of 'clayey' sand with a mean grading of fines 15%, sand 82% and gravel 3%; it ranges from 'very clayey' sand to sand or 'clayey' pebbly sand.

The gravel fraction is mostly fine, though cobbles were proved in boreholes NW 26 and NE 41; it is composed predominantly of flint which includes well-rounded Tertiary flints and subangular patinated flint, but is largely formed of the black and brown angular to subangular type. Generally, fine, rounded quartz is prominent and argillaceous rocks, quartzite, sandstone and metamorphic rocks are present in small amounts (Table 2).

The fine sand forms 49% of this deposit with 31% of medium grade. This sand fraction is essentially clean, having a white to orange-yellow colour, and is almost exclusively subangular to subrounded quartz with some mica in the fine grades, while flint shards, occasionally patinated, iron-pan and quartzite form a small proportion of the medium sand. The fines consist mostly of disseminated silt and clay, though seams about 10 cm thick of light grey to orange-brown silt and clay, and of sand with a clay matrix, were proved in boreholes NE 20, and SW 33 and 39.

Barham Sands and Gravels The restricted area of potentially workable sand and gravel in the deposit contains material classified overall as 'clayey' pebbly sand with a mean grading of fines 16%, sand 75% and gravel 5%.

Angular to subangular flint, some of which is patinated, together with some well-rounded flint, dominates the fine and coarse gravel fraction. Mostly fine, subrounded to rounded quartz is also prominent (Table 2). Other lithologies of note include chalk, ironstone, quartzite and argillaceous rocks, while there are small percentages of sandstone and fossil debris. The last-named is mostly composed of belemnite guards and thick shells of Gryphaea.

The sand fraction is largely made up of the medium and fine grades. Subangular to rounded quartz predominates, while flint shards and quartzite occur in significant proportions, particularly in the medium and coarse grades. Chalk and iron-pan form small percentages in some places. The fines fraction comprises disseminated silt and clay, though in places it forms a matrix, completely filling the interstices between the sand grains.

Glacial Sand and Gravel, upper In keeping with its varied mode of occurrence, this deposit has a very variable lithology; its mineral extends into nine of the twelve mineral categories of the mineral classification diagram (Appendix C). The mineral plots fall into two areas: one broad area across the sandy gravel and gravel range of categories, and the other (a smaller group) falls across the sand and pebbly sand range of categories. However, the typical feature of this deposit is a moderate to high gravel content, often with a significant percentage of chalk (Table 2). Overall, the deposit has a mean grading of fines 20%, sand 48% and gravel 32%.

In the gravel fraction, which is made up of fine and coarse grade with 1% of cobbles, angular to subrounded flint again predominates; some of this is patinated. Subangular to rounded pebbles of chalk form 12 per cent overall, though there are several examples in which they are absent. Many lithologies are present as accessory constituents (Table 2); these include sandstone, argillaceous rocks, septarian nodules, limestone, quartz, quartzite, ironstone, well rounded flint and fossil debris. Traces of igneous and metamorphic rocks and pyrite are occasionally present, the pyrite being associated with the limestone.

The sand fraction, while mostly of medium grade, includes substantial proportions of both fine and coarse material. The composition varies from borehole to borehole, but is generally dominated by chalk and by flint shards, which give the deposit a sharp texture. Quartz is a significant component in most places, particularly in the fine grades; at some sites ironstone is a conspicuous constituent. The fines fraction usually comprises disseminated silt and clay, though it is also found in seams, as seen at borehole NE 22, and as a matrix to the sand and gravel, as at borehole SE 13. Ground chalk predominates in places (e.g. in borehole NE 18).

River Terrace Deposits and Alluvium Potentially workable sand and gravel within these deposits is virtually restricted to the Stour valley. Both deposits proved to be of uniform grading; the River Terrace Deposits mostly grade as 'very clayey' sandy gravel with a mean grading of fines 20%, sand 43% and gravel 37%. The Alluvium has a mean grading of fines 4%, sand 40% and gravel 56%, and is almost invariably gravel: borehole NE 29 proved 'clayey' gravel at the margin of the deposit in a tributary valley.

The gravel fraction, which is mostly both fine and coarse, includes 1% of cobbles in the River Terrace Deposits and is composed largely of angular to subangular flint, some of which is patinated, together with a small proportion of well rounded flint. Chalk is of secondary importance, forming 7% of the River Terrace Deposits and 10% of the Alluvium. Many other lithologies occur in small percentages only (Table 2), and include septarian nodules, limestone and igneous rocks.

The sand of the River Terrace Deposits is composed fairly equally of all three grades, but fine sand forms only 17% of the total sand in the Alluvium. It is composed mainly of flint, quartz and chalk, especially in the coarse fraction, with quartz the predominant constituent, particularly in the fine and medium grades; fossil debris forms a minor component. Except at borehole SW 27 in the Alluvium and SW 44 in the River Terrace Deposits, where seams of sandy silt occur, the fines fraction consists of disseminated silt and clay.

## THE MAP

The sand and gravel resource map is folded into the pocket at the end of this report. The base map is the Ordnance Survey 1:25 000 Outline Edition in grey, on which the geological data are shown in black and the mineral resource information in shades of red.

Geological data The geological boundary lines, symbols, etc., shown are taken from the geological map of this area, which was surveyed recently at the scale of 1:10 560. This information was obtained by detailed application of field mapping techniques by the field staff in the Institute's East Anglia and South-East England Unit.

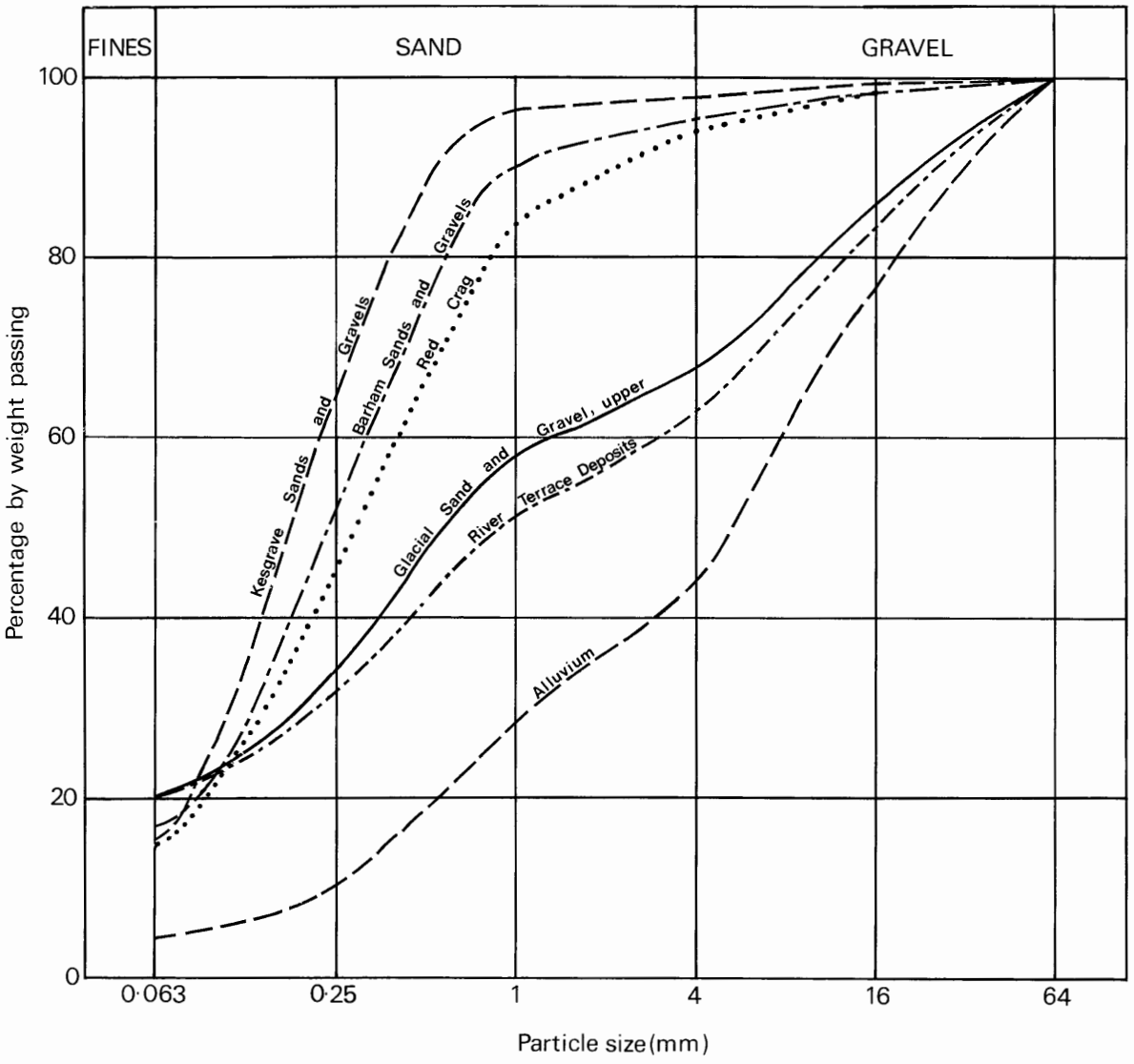
The geological boundaries are the best interpretation of the information available at the time of survey. However, it is inevitable that local irregularities and discrepancies will be revealed as new evidence from boreholes and excavations becomes available.

Borehole data, which include the stratigraphic relations, thicknesses and mean particle size distribution of the sand and gravel samples collected during the assessment survey, are also shown on the map.

Mineral resource information The mineral-bearing ground is divided into resource blocks (see Appendix A). Within a resource block the mineral is subdivided into areas where it is exposed, that is where the overburden averages less than 1 m in thickness, and areas where it is present in continuous spreads beneath overburden. The mineral is identified as 'exposed' where the overburden, commonly consisting only of soil and subsoil, averages less than 1.0 m in thickness. Beneath overburden the mineral may be continuous (or almost continuous) or discontinuous. The recognition of these categories is dependent upon the importance attached to the proportion of boreholes which did not find potentially workable

**Table 3** Assessment of resources: summary of statistical results.

| Block | Area | | Mean thickness | | Volume of mineral | | | Mean grading percentages | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Block | Mineral | Overburden | Mineral | | Limits at the 95% confidence level | | Fines | Sand | Gravel |
| | km² | km² | m | m | Million m³ | ± % | ± Million m³ | −1/16 mm | +1/16–4 mm | +4 mm |
| A | 16.9 | 6.8 | 1.9 | 2.8 | 19 | 36 | 7 | 14 | 42 | 44 |
| B | 45.2 | 7.2 | 6.3 | 8.1 | 58 | 46 | 27 | 18 | 69 | 13 |
| C | 37.9 | 9.5 | 7.1 | 6.1 | 58 | 35 | 20 | 17 | 64 | 19 |
| Total (A-C) | 100.0 | 23.5 | 5.0 | 5.4 | 127 | 25 | 32 | 17 | 61 | 22 |

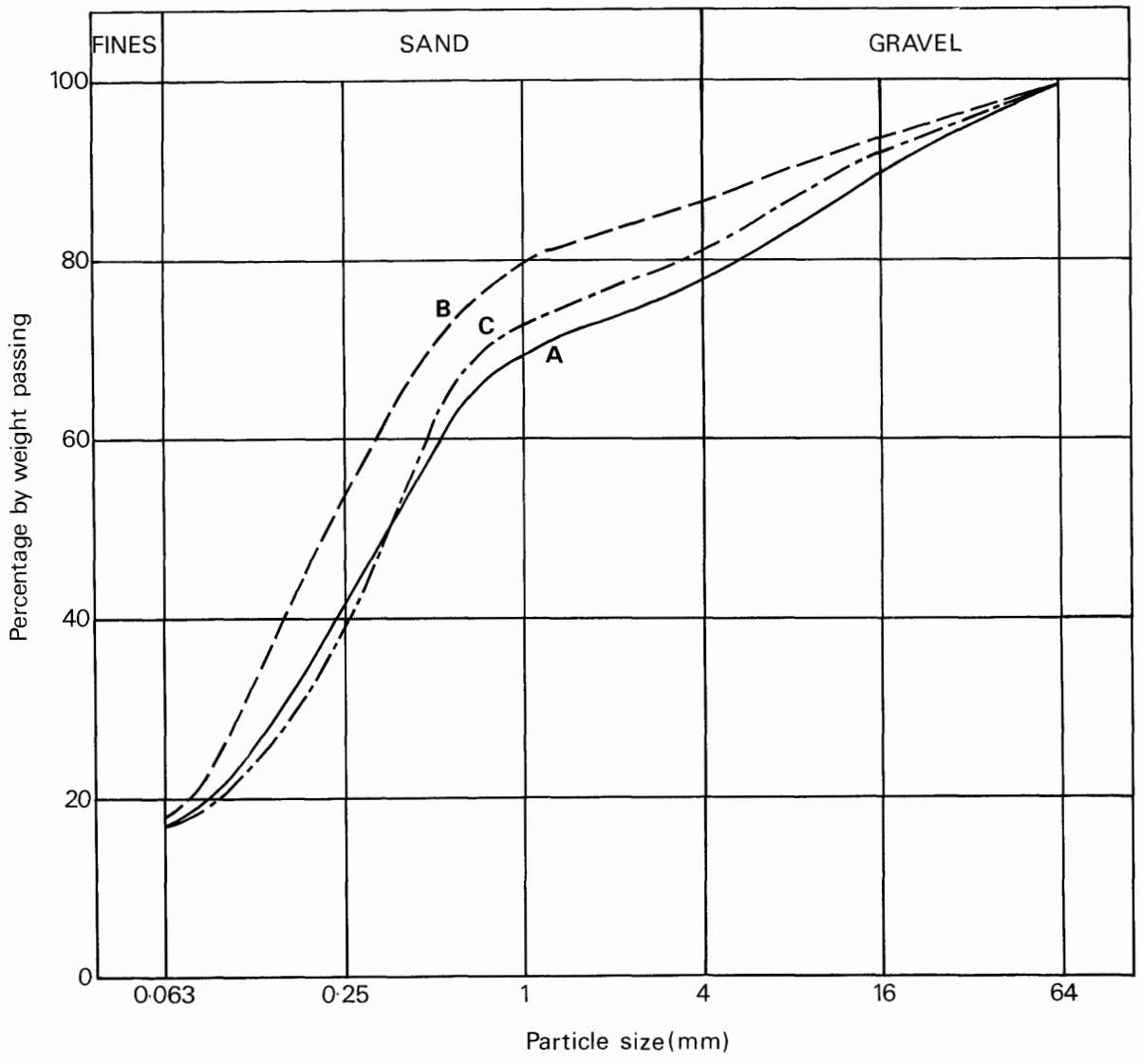



| Deposit | Percentage by weight passing | | | | | |
|---|---|---|---|---|---|---|
| | $\frac{1}{16}$ mm | $\frac{1}{4}$ mm | 1 mm | 4 mm | 16 mm | 64 mm |
| Alluvium | 4 | 11 | 28 | 44 | 77 | 100 |
| River Terrace Deposits | 20 | 32 | 51 | 63 | 83 | 99 |
| Glacial Sand and Gravel, upper | 20 | 34 | 58 | 68 | 85 | 99 |
| Barham Sands and Gravels | 16 | 51 | 90 | 95 | 98 | 100 |
| Kesgrave Sands and Gravels | 15 | 64 | 95 | 97 | 99 | 100 |
| Red Crag | 14 | 45 | 83 | 94 | 98 | 100 |

**Figure 5** Mean particle-size distribution of the mineral-bearing deposits.

sand and gravel and the distribution of barren boreholes within a block. The mineral is described as 'almost continuous' if it is present in 75 per cent or more of the boreholes in a resource block. The 'discontinuous' category is used where the number of mineral boreholes falls between 50 and 75 per cent.

Areas where bedrock crops out, where boreholes indicate absence of sand and gravel beneath cover and where sand and gravel beneath cover is interpreted to be not potentially workable, are uncoloured on the map; where appropriate, the relevant criterion is noted. In such cases it has been assumed that mineral is absent




| Resource block | Percentage by weight passing | | | | | |
|---|---|---|---|---|---|---|
| | $\frac{1}{16}$ mm | $\frac{1}{4}$ mm | 1 mm | 4 mm | 16 mm | 64 mm |
| A | 17 | 42 | 69 | 78 | 90 | 99 |
| B | 18 | 54 | 80 | 87 | 93 | 99 |
| C | 17 | 39 | 73 | 81 | 92 | 99 |

**Figure 6** Mean particle-size distribution for the assessed thickness of sand and gravel in the resource blocks.

except in infrequent and relatively minor patches that can neither be outlined nor assessed quantitatively in the context of this survey. Areas of unassessed sand and gravel, for example in built-up areas, are indicated by a red stipple.

The area of the mineral-bearing ground is measured, where possible, from the mapped geological boundary lines. the whole of this area is considered as mineral-bearing, even though it may include small areas where sand and gravel is not present or is not potentially workable. Inferred boundaries have been inserted to delimit areas where sand and gravel beneath cover is interpreted to be not potentially workable or absent. Such boundaries (for which a distinctive zigzag symbol is used) are drawn primarily for the purpose of volume estimation. The symbol is intended to indicate an approximate location within a likely zone of occurrence rather than to represent the breadth of the zone, its size being determined only by cartographic considerations. For the purpose of measuring areas the centre line of the symbol is used.

RESULTS

The statistical results are summarised in Table 3. Fuller grading particulars are shown in Figures 5 and 6 and Tables 4 to 6.

Accuracy of results For each of the resource blocks, the accuracy of the results at the 95 per cent probability level (that is, on average nineteen out of every twenty sets of limits constructed in this way contain the true value for the volume of mineral) varies between 35 per

**Table 4** Block A: data from IMAU boreholes.

| Borehole | Recorded thickness (m) | | Mean grading percentage | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mineral | Overburden | Fines $-\frac{1}{16}$ mm | Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm | Medium sand $+\frac{1}{4}-1$ mm | Coarse sand +1 -4 mm | Fine gravel +4 -16 mm | Coarse gravel +16 mm |
| NW 14 | 2.0 | 3.1 | 15 | 7 | 13 | 17 | 30 | 18 |
| NW 16 | 5.1 | 1.9 | 15 | 9 | 19 | 18 | 26 | 13 |
| NW 18 | 2.7 | 3.3 | 22 | 12 | 19 | 15 | 24 | 8 |
| NE 29 | 1.0 | 3.7 | 17 | 4 | 5 | 3 | 24 | 47 |
| NE 31 | 2.9 | 4.3 | 3 | 6 | 24 | 11 | 36 | 20 |
| NE 35 | 4.4 | 0.2 | 19 | 10 | 17 | 13 | 19 | 22 |
| SW 27 | 9.1 | 4.1 | 3 | 5 | 16 | 20 | 35 | 21 |
| SW 30 | 3.8 | 1.2 | 13 | 9 | 13 | 13 | 25 | 27 |
| SW 37 | 3.3 | 0.7 | 25 | 12 | 20 | 13 | 18 | 12 |
| SW 40 | 1.1 | 1.0 | 28 | 10 | 22 | 10 | 18 | 12 |
| SW 44 | 3.1 | 0.7 | 27 | 20 | 22 | 8 | 17 | 6 |
| SW 47 | 2.3 | 2.4 | 21 | 19 | 21 | 9 | 19 | 11 |
| SW 48 | 2.3 | 1.3 | 5 | 12 | 16 | 17 | 28 | 22 |
| SW 49 | 1.1 | 5.4 | 6 | 8 | 18 | 10 | 22 | 36 |
| SE 14 | 3.6 | 0.4 | 16 | 13 | 21 | 12 | 23 | 15 |

**Table 5** Block B: data from IMAU boreholes.

| Borehole | Recorded thickness (m) | | Mean grading percentage | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mineral | Overburden | Fines $-\frac{1}{16}$ mm | Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm | Medium sand $+\frac{1}{4}-1$ mm | Coarse sand +1 -4 mm | Fine gravel +4 -16 mm | Coarse gravel +16 mm |
| NW 26 | 2.6 | 5.9 | 13 | 59 | 21 | 3 | 1 | 3 |
| NE 17 | 2.5 | 5.5 | 9 | 7 | 17 | 11 | 22 | 34 |
| NE 18 | 15.5+ | 9.5* | 25 | 22 | 20 | 8 | 13 | 12 |
| NE 20 | 6.3+ | 13.2 | 23 | 51 | 22 | 2 | 2 | 0 |
| NE 22 | 3.8 | 4.9* | 19 | 33 | 36 | 2 | 2 | 8 |
| NE 25 | 3.0 | 5.0 | 16 | 13 | 19 | 13 | 22 | 17 |
| NE 30 | 1.2 | 1.0 | 14 | 6 | 9 | 13 | 19 | 39 |
| NE 37 | 17.2 | 7.8 | 17 | 55 | 27 | 1 | 0 | 0 |
| SW 36 | 2.5 | 0.9 | 20 | 14 | 21 | 9 | 15 | 21 |
| SW 39 | 10.5 | 11.2* | 19 | 23 | 21 | 10 | 11 | 16 |
| SW 42 | 8.8 | 14.3 | 10 | 36 | 36 | 11 | 4 | 3 |
| SW 43 | 3.9 | 14.3 | 13 | 37 | 45 | 3 | 2 | 0 |
| SW 46 | 15.6 | 3.2 | 17 | 41 | 29 | 9 | 2 | 1 |

* Includes waste partings, where present.

\+ The mineral was not bottomed.

**Table 6** Block C: data from IMAU boreholes.

| Borehole | Recorded thickness (m) | | Mean grading percentage | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mineral | Overburden | Fines $-\frac{1}{16}$ mm | Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm | Medium sand $+\frac{1}{4}-1$ mm | Coarse sand +1 -4 mm | Fine gravel +4 -16 mm | Coarse gravel +16 mm |
| NE 41 | 17.0 | 8.0 | 13 | 27 | 42 | 7 | 7 | 4 |
| SW 32 | 5.8 | 0.3 | 29 | 11 | 13 | 11 | 22 | 14 |
| SW 33 | 14.0 | 5.6 | 5 | 37 | 46 | 7 | 3 | 2 |
| SW 38 | 4.6 | 2.1 | 16 | 6 | 8 | 14 | 33 | 23 |
| SW 45 | 2.9 | 0.5 | 28 | 12 | 14 | 10 | 16 | 20 |
| SW 50 | 3.0 | 1.2 | 22 | 7 | 12 | 11 | 16 | 32 |
| SE 15 | 6.8 | 13.6 | 24 | 25 | 45 | 4 | 2 | 0 |
| SE 16 | 5.4+ | 16.2 | 10 | 26 | 39 | 6 | 12 | 7 |
| SE 18 | 6.4 | 16.2 | 30 | 22 | 27 | 10 | 9 | 2 |
| SE 21 | 6.0 | 8.3 | 20 | 13 | 24 | 11 | 19 | 13 |
| SE 23 | 2.1 | 2.5 | 25 | 10 | 19 | 10 | 17 | 19 |
| SE 25 | 8.5 | 14.0 | 24 | 24 | 39 | 7 | 5 | 1 |
| SE 29 | 5.9 | 9.3 | 5 | 19 | 53 | 6 | 10 | 7 |

\+ The mineral was not bottomed.

cent and 46 per cent (Appendix B). However, the true volumes are more likely to be nearer the figure estimated than either of the limits. Moreover, it is probable that roughly the same percentage limits would apply for the statistical estimate of mineral volume within a very much smaller parcel of ground (say 100 hectares) containing similar sand and gravel deposits, if the results from the same number of sample points (as provided by, say, ten boreholes) were used in the calculation. Thus, if closer limits are needed for quotation of reserves, data from more sample points would be required, even if the area were quite small. This point can be illustrated by considering the whole of the potentially workable sand and gravel in Blocks A to C. The total volume (127 million $m^3$) can be estimated to limits of $\pm$ 25 per cent at the 95 per cent probability level by a calculation based on the data from the 85 sample points spread across the three resource blocks. However, it must be emphasised that the quoted volume of mineral has no simple relationship with the amount that could be extracted in practice, as no allowance has been made in the calculations for any restraints (such as existing buildings and roads) on the use of the land for mineral working.

## NOTES ON THE RESOURCE BLOCKS

The district has been divided into three resource blocks (Figure 2), the boundaries of which have been drawn primarily to separate, where feasible, the various deposits of sand and gravel. Blocks B and C enclose areas of potentially workable Red Crag, Kesgrave Sands and Gravels and Glacial Sand and Gravel, upper. Mineral-bearing Barham Sands and Gravels are also present in Block B. The fluvial deposits of the Stour are in Block A, which also includes some potentially workable Glacial Sand and Gravel, upper.

As the Red Crag, Kesgrave Sands and Gravels and Barham Sands and Gravels typically overlie one another and are not readily separable at outcrop, they are dealt with as one mineral unit in this section. Except in the north-west, where these deposits are generally absent, the extent of the area classified as mineral-bearing ground is largely dependent on the thickness of Boulder Clay overburden. This is excessive (>18 m, see page 1) on the plateau, so that the mineral-bearing areas are confined to the interfluves betwen the Stour and other valleys.

### Block A (Table 4)

This block contains the potentially workable fluvial deposits of the Stour. Between Kedington and Wixoe it also includes the surrounding area with potentially workable Glacial Sand and Gravel, upper, which underlies the mineral-bearing Alluvium in places. The block has a total area of 16.9 $km^2$, of which 6.8 $km^2$ is mineral-bearing (Table 3); River Terrace Deposits are considered as exposed mineral. Though borehole SW 30 proved overburden 1.2 m thick, this thickness is considered to be atypical of the surrounding outcrop; the overburden probably represents waste from the adjacent pit, which has since been backfilled. Borehole SW 47 shows overburden 2.4 m thick, but this is largely composed of railway embankment material. Most of the larger outcrops of River Terrace Deposits have been sampled and all proved to be mineral-bearing sequences.

The potentially workable Alluvium of the Stour includes that of the tributary at Clare as well as that of two western tributaries at Wixoe. This alluvial mineral has been catogorised as 'discontinuous spreads of mineral beneath overburden' in view of the high proportion and the random distribution of non-mineral boreholes. There are a total of 11 data points in the Alluvium, of which six prove mineral, and three prove sand and gravel which either is overlain by excessive overburden or is less than 1 m thick. In the two remaining boreholes the sand and gravel sequence is absent. Borehole SW 27 proved a thick sequence of alluvial gravels which probably represent, in part, reworked Glacial Sand and Gravel, upper, from the Kedington area. Outcrops of Glacial Sand and Gravel, upper, between Wixoe and Barnardiston are considered as exposed mineral by analogy with other occurrences of this deposit in Block C. Around Kedington the borehole data suggest a continuous or almost continuous 'blanket' of potentially workable Glacial Sand and Gravel, upper, underlying Boulder Clay, Head or Alluvium. An inferred boundary has been used to delimit this resource, which appears to be related to the Stour tunnel-valley in this area.

In all, 26 data points, of which 17 are IMAU boreholes, are used in this assessment (Table 4). They yield a mean overburden thickness of 1.9 m and a mean mineral thickness of 2.8 m, giving an estimated volume of mineral of 19 million $m^3$ $\pm$36%. The mineral grades as 'clayey' gravel with a mean grading of 14% fines, 42% sand and 44% gravel (Figure 6). Two of the three disused pits in this district have worked gravels of the River Terrace Deposits, which have only minimal overburden and a relatively high proportion of gravel; the deposits include, however, potentially deleterious material (see Table 2) which might restrict their usefulness.

### Block B (Table 5)

This block lies to the north of the Stour valley and extends from Hundon in the north to Stoke-by-Clare in the south, and into the parish of Cavendish to the east. It has an area of 45.2 $km^2$, of which only 7.2 $km^2$ is mineral-bearing (Table 3). The mineral is present in the Red Crag, Kesgrave Sands and Gravels and Barham Sands and Gravels. These form a unit of continuous or almost continuous mineral underlying the Boulder Clay on the northern slopes of the Stour valley between Baythorn End and Canham's Farm [745 454]. This unit of mineral probably forms three outcrops of undivided sand and gravel to the west and east of Chapel Street Farm [730 434] and a further three outcrops west of Halfway House Farm [751 446]. The Kesgrave Sands and Gravels also proved to be mineral at Poslingford and Robb's Farm [796 483]. Most of the boundaries of this mineral unit are inferred and coincide with the limits beyond which the overburden becomes excessive. Deposits of Glacial Sand and Gravel, upper, also proved to be mineral both beneath overburden and as numerous small outcrops on the upper valley slopes and plateau. However, due to the 1-km sampling interval of the survey, most of these have not been sampled; where they have been sampled, for example at borehole SW 36 and 39, they have proved to be mineral. Elsewhere, outcrops have been related to mineral deposits proved at depth, for example in borehole SW 39. These mineral areas are considered as continuous or almost continuous spreads of mineral where they occur beneath overburden, and they are outlined using an inferred boundary line. Such areas are found to the north, west and east of Clare. However, due to the highly variable nature of these mineral-bearing seams, the position of their boundary is dubious. Their variable nature is also demonstrated by the development in places of two beds of mineral of this deposit within the Boulder Clay, as proved for example in boreholes NW 22, 33 and SW 39. Between Baythorn End and Canham's Farm the tripartite mineral unit is overlain by potentially workable Glacial Sand and Gravel, upper, with intercalated seams of waste, as proved in boreholes NE 18 and SW 39.

Data from 14 boreholes in all, of which 13 were drilled for this survey (Table 5), have been used to assess the potentially workable sand and gravel in Block B. They yield a mean mineral thickness of 8.1 m and a mean overburden thickness of 6.3 m. Overall, the deposit comprises 'clayey' pebbly sand with a mean grading of fines 18%, sand 69% and gravel 13% and an estimated volume of 58 million $m^3$ $\pm$46%. The wide confidence limits reflect both the highly variable nature of these deposits, particularly the Glacial Sand and Gravel, upper,

and also, more particularly, the presence of two beds of mineral that in places overlie one another, resulting in records of highly variable thicknesses of mineral, ranging from 1 to 11 m.

Block C (Table 6)
This block covers 37.9 $km^2$ to the south of the Stour valley, and extends from Birdbrook in the west to Belchamp St Paul in the east. Potentially workable sand and gravel is limited to 9.5 $km^2$ (Table 3), and is mostly confined to the valleys; it belongs mainly to the Glacial Sand and Gravel, upper, although potentially workable Red Crag and Kesgrave Sands and Gravels were proved in borehole NE 41, north of Paine's Manor [798 444], and in borehole SW 33, south of Birdbrook. The Glacial Sand and Gravel, upper, forms both exposed and concealed mineral; boreholes SW 50 and SE 23 proved 1.2 and 2.5 m of overburden respectively. Borehole SE 27 proved the deposit to be non-mineral, though this occurrence may be misidentified Head, as its lithology and its position in the base of the valley would suggest. An inferred boundary has been used to delimit continuous or almost continuous spreads of potentially workable Glacial Sand and Gravel, upper, which are present at depth in the headwater valleys of the Colne and Belchamp Brook, as well as in an area to the south of the Stour valley between Ovington and Paine's Manor and to the north of Birdbrook. As in Block B, this deposit has a highly variable form, so that the position assigned to its inferred boundary is somewhat subjective. The variable nature of the deposit is also demonstrated here by the high level of the chalk outcrop adjacent to these areas south of Clare and at Baythorn End.

Of the 21 boreholes used in the assessment, 13 were drilled for this survey (Table 6). They yielded a mean grading of fines 17%, sand 64% and gravel 19% ('clayey' pebbly sand). The mineral has a mean recorded thickness of 6.1 m and an estimated volume of 58 million $m^3$ $\pm$35%; the overburden has a mean recorded thickness of 7.1 m.

LIST OF WORKINGS
In 1980 there were no active pits in the district. A list of disused workings is given below.

| Location of pit | Grid reference | Deposit worked |
|---|---|---|
| Stoke Road | 763 444 | River Terrace Deposits |
| Wixoe | 709 432 | River Terrace Deposits |
| Chilton Street | 746 468 | Glacial Sand and Gravel, upper |

## REFERENCES


ALLEN, V. T. 1936. Terminology of medium-grained sediments. **Rep. Natl. Res. Counc., Washington, 1935–1936, App. 1, Rep. Comm. Sediment.**, 18-47.

ARCHER, A. A. 1969. Background and problems of an assessment of sand and gravel resources in the United Kingdom. **Proc. 9th Commonw. Min. & Metall. Congr., 1969**, Vol. 2: Mining and petroleum geology, 495-508.

— 1970a. Standardisation of the size classification of naturally occurring particles. **Geotechnique**, Vol. 20, 103-107.

— 1970b. Making the most of metrication. **Quarry Managers' J.**, Vol. 54, No. 6, 223-227.

ATTERBERG, A. 1905. Die rationelle Klassifikation der Sande und Kiese. **Chem. Z.**, Vol. 29, 195-198.

BOSWELL, P. G. H. 1929. The geology of the country around Sudbury (Suffolk). **Mem. Geol. Surv. G. B.**

BRITISH STANDARDS INSTITUTION. 1967. **B.S.1377: Methods of testing soils for civil engineering purposes.** (London: British Standards Institution.)

BUREAU OF MINES AND GEOLOGICAL SURVEY. 1948. **Pp. 14-17** in **Mineral resources of the United States.** (Washington, DC: Public Affairs Press.)

HARRIS, P. M., THURRELL, R. G., HEALING, R. A., and ARCHER, A. A. 1974. Aggregates in Britain. **Proc. R. Soc.**, Ser. A, Vol. 339, 329-353.

HULL, J. H. 1981. Methods of calculating the volume of resources of sand and gravel. **Appendix** (pp. 192-193) to **THURRELL, R. G.** 1981. Quarry resources and reserves: the identification of bulk mineral resources: the contribution of the Institute of Geological Sciences. **Quarry Management**, for March 1981, 181-193.

LANE, E. W., and others. 1947. Report of the sub-committee on sediment terminology. **Trans. Am. Geophys. Union**, Vol. 28, 936-938.

MILLWARD, D. 1980. Geology of the country around Wixoe and Clare. Explanation of 1:10 560 geological sheet TL 74 NW, NE, SW and SE. **Open-file Rep. Inst. Geol. Sci.**, No. 1980/5.

PETTIJOHN, F. J. 1957. **Sedimentary rocks.** 2nd edition. (London: Harper and Row.)

ROSE, J. and ALLEN, P. 1977. Middle Pleistocene stratigraphy in south-east Suffolk. **J. Geol. Soc. London**, Vol. 133, 83-102.

THURRELL, R. G. 1971. The assessment of mineral resources with particular reference to sand and gravel. **Quarry Managers' J.**, Vol. 55, 19-25.

— 1981. Quarry resources and reserves: the identification of bulk mineral resources: the contribution of the Institute of Geological Sciences. **Quarry Management**, for March 1981, 181-193.

TWENHOFEL, W. H. 1937. Terminology of the fine-grained mechanical sediments. **Rep. Natl. Res. Counc., Washington, 1936-37**, App. 1, Rep. Comm. Sediment., 81-104.

UDDEN, J. A. 1914. Mechanical composition of clastic sediments. **Bull. Geol. Soc. Am.**, Vol. 25, 655-744.

WENTWORTH, C. K. 1922. A scale of grade and class terms for clastic sediments. **J. Geol.**, Vol. 30, 377-392.

— 1935. The terminology of coarse sediments. **Bull. Natl. Res. Counc. Washington**, No. 98, 225-246.

WILLMAN, H. B. 1942. Geology and mineral resources of the Marseilles, Ottawa and Streator quadrangles. **Bull. Illinois State Geol. Surv.**, No. 66, 343-344.

WOODLAND, A. W. 1970. The buried tunnel- valleys of East Anglia. **Proc. Yorkshire Geol. Soc.**, Vol. 37, 521-578.

## APPENDIX A

### FIELD AND LABORATORY PROCEDURES

Trial and error during initial studies of the complex and variable glacial deposits of East Anglia and Essex showed that an absolute minimum of five sample points evenly distributed across the sand and gravel are needed to provide a worthwhile statistical assessment, but that, where possible, there should be not less than ten. Sample points are any points for which adequate information exists about the nature and thickness of the deposit and may include boreholes other than those drilled during the survey and exposures. In particular, the cooperation of sand and gravel operators ensures that boreholes are not drilled where reliable information is already available; although this may be used in the calculations, it is held confidentially by the Institute and cannot be disclosed.

The mineral shown on each 1:25 000 sheet is divided into resource blocks. The arbitrary size selected is a compromise to meet the aims of the survey by providing sufficient sample points in each block. As far as possible the block boundaries are determined by geological boundaries so that, for example, glacial and river terrace gravels are separated. Otherwise division is by arbitrary lines, which may bear no relationship to the geology. The blocks are drawn provisionally before drilling begins.

A reconnaissance of the ground is carried out to record any exposures and inquiries are made to ascertain what borehole information is available. Borehole sites are then selected to provide an even pattern of sample points at a density of approximately one per square kilometre. However, because broad trends are independently overlain by smaller-scale characteristically random variations, it is unnecessary to adhere to a square grid pattern. Thus such factors as ease of access and the need to minimise disturbance to land and the public are taken into account in siting the holes; at the same time it is necessary to guard against the possibility that ease of access (that is, the positions of roads and farms) may reflect particular geological conditions, which may bias the drilling results.

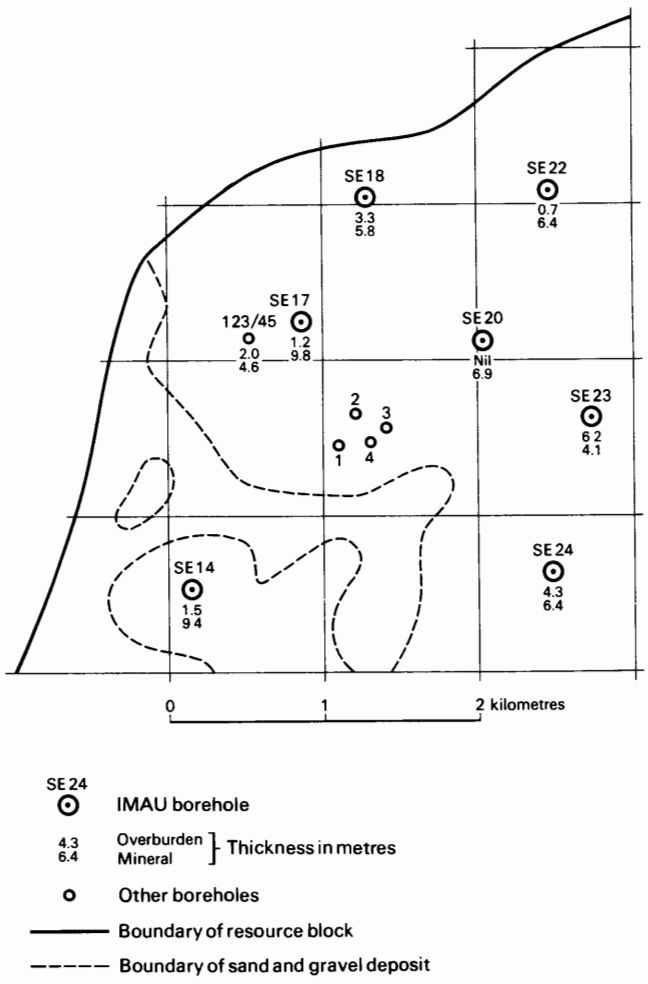
The drilling machine employed should be capable of providing a continuous sample representative of all unconsolidated deposits, so that the in-situ grading can be determined, if necessary, to a depth of 30 m (100 ft) at a diameter of about 200 mm (8 in), beneath different types of overburden. It should be reliable, quiet, mobile and relatively small (so that it can be moved to sites of difficult access). Shell and auger rigs have proved to be almost ideal.

The rigs are modified to enable deposits above the water table to be drilled 'dry', instead of with water added to facilitate the drilling, to minimise the amount of material drawn in from outside the limits of the hole. The samples thus obtained are representative of the in-situ grading, and satisfy one of the most important aims of the survey. Below the water table the rigs are used conventionally, although this may result in the loss of some of the fines fraction and the pumping action of the bailer tends to draw unwanted material into the hole from the sides or the bottom.

A continuous series of bulk samples is taken throughout the sand and gravel. Ideally samples are composed exclusively of the whole of the material encountered in the borehole between stated depths. However, care is taken to discard, as far as possible, material which has caved or has been pumped from the bottom of the hole. A new sample is commenced whenever there is an appreciable lithological change within the sand and gravel, or at every 1 m (3.3 ft) depth. The samples, each weighing between 25 and 45 kg (55 and 100 lb), are despatched in heavy-duty polythene bags to a laboratory for grading. The grading procedure is based on B.S. 1337 (British Standards Institution, 1967). Random checks of the accuracy of the grading are made in the Institute's laboratories.

All data, including mean grading analysis figures calculated for the total thickness of the mineral, are entered on standard record sheets, abbreviated copies of which are reproduced in Appendix E.

Detailed records may be consulted at the appropriate offices of the Institute, upon application to the Head, Industrial Minerals Assessment Unit.




Example of resource block assessment: map of a fictitious block

## APPENDIX B

## STATISTICAL PROCEDURE

### Statistical assessment

1 A statistical assessment is made of an area of mineral greater than 2 km$^2$, if there are at least five evenly spaced boreholes in the resource block (for smaller areas, see Paragraph 12 below).

2 The simple methods used in the calculations are consistent with the amount of data provided by the survey (Hull, 1981). Conventional symmetrical confidence limits are calculated for the 95 per cent probability level, that is, on average nineteen out of every twenty sets of limits constructed in this way contain the true value for the volume of mineral.

3 The volume estimate ($V$) for the mineral in a given block is the product of two variables, the sampled areas ($A$) and the mean thickness ($\bar{l}_m$) calculated from the individual thicknesses at the sample points. The standard deviations for these variables are related such that

$$S_V = \sqrt{(S_A^2 + S_{\bar{l}_m}^2)} \qquad [1]$$

4 The above relationship may be transposed such that

$$S_V = S_{\bar{l}_m} \sqrt{(1 + S_A^2 / S_{\bar{l}_m}^2)} \qquad [2]$$

From this it can be seen that as $S_A^2 / S_{\bar{l}_m}^2$ tends to 0, $S_V$ tends to $S_{\bar{l}_m}$.

If, therefore, the standard deviation for area is small with respect to that for thickness, the standard deviation for volume approximates to that for mean thickness.

5 Given that the number of approximately evenly spaced sample points in the sampled area is $n$ with mineral thickness measurements $l_{m_1}, l_{m_2}, \ldots l_{m_n}$, then the best estimate of mean thickness, $\bar{l}_m$, is given by

$$\Sigma\ (l_{m_1} + l_{m_2} \ldots l_{m_n}) / n .$$

For groups of closely spaced boreholes a discretionary weighting factor may be applied to avoid bias (see note on weighting below). The standard deviation for mean thickness $S_{\bar{l}_m}$, expressed as a proportion of the mean thickness, is given by

$$S_{\bar{l}_m} = (1/\bar{l}_m) \sqrt{\ [\Sigma (l_m - \bar{l}_m)^2/(n-1)]}$$

where $l_m$ is any value in the series $l_{m_1}$ to $l_{m_n}$.

6 The sampled area in each resource block is coloured pink on the map. Wherever possible, calculations relate to the mineral within mapped geological boundaries (which may not necessarily correspond to the limits of a deposit). Where the area is not defined by a mapped boundary, that is, where the boundary is inferred, a distinctive symbol is used. Experience suggests that the errors in determining area are small relative to those in thickness. The relationship $S_A / S_{\bar{l}_m} \leq 0.\dot{3}$ is assumed in all cases. It follows from Equation [2] that

$$S_{\bar{l}_m} \leq S_V \leq 1.05\ S_{\bar{l}_m} \qquad [3]$$

7 The limits on the estimate of mean thickness of mineral, $L_{\bar{l}_m}$, may be expressed in absolute units

$\pm (t/\sqrt{n}) \times S_{\bar{l}_m}$ or as a percentage

$\pm (t/\sqrt{n}) \times S_{\bar{l}_m} \times (100/\bar{l}_m)$ per cent, where t is Student's t at the 95 per cent probability level for $(n-1)$ degrees of freedom, evaluated by reference to statistical tables. (In applying Student's t it is assumed that the measurements are distributed normally).

8 Values of t at the 95 per cent probability level for values of $n$ up to 20 are as follows:

| $n$ | t | $n$ | t |
|---|---|---|---|
| 1 | infinity | 11 | 2.228 |
| 2 | 12.706 | 12 | 2.201 |
| 3 | 4.303 | 13 | 2.179 |
| 4 | 3.182 | 14 | 2.160 |
| 5 | 2.776 | 15 | 2.145 |
| 6 | 2.571 | 16 | 2.131 |
| 7 | 2.447 | 17 | 2.120 |
| 8 | 2.365 | 18 | 2.110 |
| 9 | 2.306 | 19 | 2.101 |
| 10 | 2.262 | 20 | 2.093 |

(from Table 12 in *Biometrika Tables for Statisticians*, Volume 1, Second Edition, Cambridge University Press, 1962). When $n$ is greater than 20, 1.96 is used (the value of t when n is infinity).

9 In calculating confidence limits for volume, $L_V$, the following inequality, corresponding to Equation [3], is applied:

$$L_{\bar{l}_m} \leq L_V \leq 1.05\, L_{\bar{l}_m}.$$

10 In summary, for values of $n$ between 5 and 20, $L_V$ is calculated as

$$[(1.05 \times t)/\bar{l}_m] \times [\sqrt{\Sigma (l_m - \bar{l}_m)^2}/n\ (n-1)] \times 100$$

per cent,

and when $n$ is greater than 20, as

$$[(1.05 \times 1.96)/\bar{l}_m] \times [\sqrt{\Sigma (l_m - \bar{l}_m)^2}/n\ (n-1)] \times 100$$

per cent.

11 The application of this procedure to a fictitious area is illustrated in the accompanying Figure and example of a block calculation.

### Inferred assessment

12 If the sampled area of mineral in a resource block is between 0.25 km$^2$ and 2 km$^2$, an assessment is inferred on the basis of geological and topographical information, usually supported by the data from one or two boreholes. The volume of mineral is calculated as the product of the area, measured from field data, and the estimated thickness. Confidence limits are not calculated.

13 In some cases a resource block may include an area left uncoloured on the map, within which mineral (as defined) is interpreted to be generally absent. If there is reason to believe that some mineral may be present, an inferred assessment may be made.

14 No assessment is attempted for an isolated area of mineral less than 0.25 km$^2$.

15 Note on weighting The thickness of a deposit at any point may be governed solely by the position of the point in relation to a broad trend. However, most sand and gravel deposits also exhibit a random pattern of local, and sometimes considerable, variation in thickness. Thus the distribution of sample points needs to be only approximately regular and in estimating the mean thickness only simple weighting is necessary. In practice, equal weighting can often be applied to thicknesses at all sample points. If, however, there is a distinctly unequal distribution of points, bias is avoided by dividing the sampled area into broad zones, to each of which a value roughly proportional to its area is assigned. This value is then shared between the data points with the zone as the weighting factor.

**Block calculation**

Scale: 1:25 000
Block: Fictitious

Area
Block: 11.08 km²
Mineral: 8.32 km²

Mean thickness
Overburden: 2.5 m
Mineral: 6.5 m

Volume
Overburden: 21 million m³
Mineral: 54 million m³

Confidence limits of the estimate of mineral volume at the 95 per cent probability level: ± 20 per cent
That is, the volume of mineral (with 95 per cent probability): 54 ± 11 million m³

Thickness estimate (measurements in metres)
$l_o$= overburden thickness $l_m$ = mineral thickness

| Sample point | Weighting $w$ | Overburden $l_o$ | Overburden $wl_o$ | Mineral $l_m$ | Mineral $wl_m$ | Remarks |
|---|---|---|---|---|---|---|
| SE 14 | 1 | 1.5 | 1.5 | 9.4 | 9.4 | IMAU boreholes |
| SE 18 | 1 | 3.3 | 3.3 | 5.8 | 5.8 | |
| SE 20 | 1 | nil | - | 6.9 | 6.9 | |
| SE 22 | 1 | 0.7 | 0.7 | 6.4 | 6.4 | |
| SE 23 | 1 | 6.2 | 6.2 | 4.1 | 4.1 | |
| SE 24 | 1 | 4.3 | 4.3 | 6.4 | 6.4 | |
| SE 17 | ½ | 1.2 | 1.6 | 9.8 | 7.2 | |
| 123/45 | ½ | 2.0 | | 4.6 | | Hydrogeology Unit record |
| 1 | ¼ | 2.7 | 2.6 | 7.3 | 5.8 | Close group of four boreholes (commercial) |
| 2 | ¼ | 4.5 | | 3.2 | | |
| 3 | ¼ | 0.4 | | 6.8 | | |
| 4 | ¼ | 2.8 | | 5.9 | | |
| Totals | $\Sigma w = 8$ | $\Sigma wl_o = 20.2$ | | $\Sigma wl_m = 52.0$ | | |
| Means | | $\overline{wl}_o = 2.5$ | | $\overline{wl}_m = 6.5$ | | |

Calculation of confidence limits

| $wl_m$ | $\lvert(wl_m - \overline{wl}_m)\rvert$ | $(wl_m - \overline{wl}_m)^2$ |
|---|---|---|
| 9.4 | 2.9 | 8.41 |
| 5.8 | 0.7 | 0.49 |
| 6.9 | 0.4 | 0.16 |
| 6.4 | 0.1 | 0.01 |
| 4.1 | 2.4 | 5.76 |
| 6.4 | 0.1 | 0.01 |
| 7.2 | 0.7 | 0.49 |
| 5.8 | 0.7 | 0.49 |

$\Sigma(wl_m - \overline{wl}_m)^2 = 15.82$

$n = 8$

$t = 2.365$

$L_V$ is calculated as

$1.05\,(t/\overline{wl}_m)\sqrt{[\Sigma(wl_m - \overline{wl}_m)^2/\,n(n-1)]} \times 100$

$= 1.05 \times (2.365/6.5)\sqrt{[15.82/(8 \times 7)]} \times 100$

$= 20.3$

$\simeq 20$ per cent.

## APPENDIX C

## CLASSIFICATION AND DESCRIPTION OF SAND AND GRAVEL

For the purposes of assessing resources of sand and gravel a classification should take account of economically important characteristics of the deposit, in particular the absolute content of fines and the ratio of sand to gravel.

The terminology commonly used by geologists when describing sedimentary rocks (Wentworth, 1922) is not entirely satisfactory for this purpose. For example, Wentworth proposed that a deposit should be described as a 'gravelly sand' when it contains more sand than gravel and there is at least 10 per cent of gravel, provided that there is less than 10 per cent of material finer than sand (< $\frac{1}{16}$ mm) and coarser than pebbles (> 64 mm in diameter). Because deposits containing more than 10 per cent fines are not embraced by this system, a modified binary classification based on Willman (1942) has been adopted.

When the fines content exceeds 40 per cent the material is considered to be not potentially workable and falls outside the definition of mineral. Deposits which contain 40 per cent fines or less are classified primarily on the ratio of sand to gravel but qualified in the light of the fines content, as follows: less than 10 per cent fines - no qualification; 10 per cent or more but less than 20 per cent fines - 'clayey'; 20 to 40 per cent fines - 'very clayey'.

The term 'clay' (as written, with single quote marks) is used to describe all material passing $\frac{1}{16}$ mm. Thus it has no mineralogical significance and includes particles falling within the size range of silt. The normal meaning applies to the term clay where it does not appear in single quotation marks.

The ratio of sand to gravel defines the boundaries between sand, pebbly sand, sandy gravel and gravel (at 19:1, 3:1 and 1:1).

Thus it is possible to classify the mineral into one of twelve descriptive categories (see the accompanying Figure). The procedure is as follows:

1 Classify according to the ratio of sand to gravel.
2 Describe the fines.

For example, a deposit grading 11 per cent gravel, 70 per cent sand and 19 per cent fines is classified as 'clayey' pebbly sand. This short description is included in the borehole log (see Appendix D)

Many differing proposals have been made for the classification of the grain size of sediments (Atterberg, 1905; Udden, 1914; Wentworth, 1922; Wentworth, 1935; Allen, 1936; Twenhofel, 1937; Lane and others, 1947). As Archer (1970a, b) has emphasised, there is a pressing need for a simple metric scale acceptable to both scientific and engineering interests, for which the class limit sizes correspond closely with certain marked changes in the natural properties of mineral particles. For example, there is an important change in the degree of cohesion between particles at about the $\frac{1}{16}$-mm size, which approximates to the generally accepted boundary between silt and sand. These and other requirements are met by a system based on Udden's geometric scale and a simplified form of Wentworth's terminology (see the accompanying table), which is used in the Report.

The fairly wide intervals in the scale are consistent with the general level of accuracy of the qualitative assessments of the resource blocks. Three sizes of sand are recognised, fine ($+\frac{1}{16}$ -$\frac{1}{4}$ mm), medium ($+\frac{1}{4}$ -1 mm) and coarse (+1 -4 mm). The boundary at 16 mm distinguishes a range of finer gravel (+4 -16 mm), often characterised by abundance of worn tough pebbles of vein quartz, from larger pebbles, often of notably different materials. The boundary at 64 mm distinguishes pebbles from cobbles. The term 'gravel' is used loosely to denote both pebble-sized and cobble-sized material.

The size distribution of borehole samples is determined by sieve analysis, which is presented by the laboratory as logarithmic cumulative curves (see, for example, British Standards Institution, 1967). In this report the grading is tabulated on the borehole record sheets (Appendix E), the intercepts corresponding with the simple geometric scale $\frac{1}{16}$ mm, $\frac{1}{4}$ mm, 1 mm, 4 mm, 16 mm and so on as required. Original sample grading curves are available for reference at the appropriate office of the Institute.

Each bulk sample is described, subjectively, by a geologist at the borehole site. Being based on visual examination, the description of the grading is inexact, the accuracy depending on the experience of the observer. The descriptions recorded are modified, as necessary, when the laboratory results become available.

The relative proportions of the rock types present in the gravel fraction are indicated by the use of the words 'and' or 'with'. For example, 'flint and quartz' indicates roughly equal proportions with neither constituent accounting for less than about 25 per cent of the whole; 'flint with quartz' indicates that flint is dominant and quartz, the principal accessory rock type, comprises 5 to 25 per cent of the whole. Where the accessory material accounts for less than 5 per cent of the whole, but is still readily apparent, the phrase 'with some' has been used. Rare constitutents are referred to as 'trace'.

The terms used in the field to describe the degree of rounding of particles, which is concerned with the sharpness of the edges and corners of a clastic fragment and not the shape (after Pettijohn, 1957), are as follows.

Angular: showing little or no evidence of wear; sharp edges and corners.

Subangular: showing definite effects of wear. Fragments still have their original form but edges and corners begin to be rounded off.

Subrounded: showing considerable wear. The edges and corners are rounded off to smooth curves. Original grain shape is still distinct.

Rounded: original faces almost completely destroyed, but some comparatively flat surfaces may still remain. All original edges and corners have been smoothed off to rather broad curves. Original shape is still apparent.

Well rounded: not original faces, edges or corners left. The entire surface consists of broad curves; flat areas are absent. The original shape is suggested by the present form of the grain.

Classification of gravel, sand and fines

| Size limits | Grain-size description | Qualification | Primary classification |
|---|---|---|---|
| | Cobble | | |
| 64 mm | | | |
| | | Coarse | Gravel |
| 16 mm | Pebble | | |
| | | Fine | |
| 4 mm | | | |
| | | Coarse | |
| 1 mm | | | |
| | Sand | Medium | Sand |
| $\frac{1}{4}$ mm | | | |
| | | Fine | |
| $\frac{1}{16}$ mm | | | |
| | Fines (silt and clay) | | Fines |

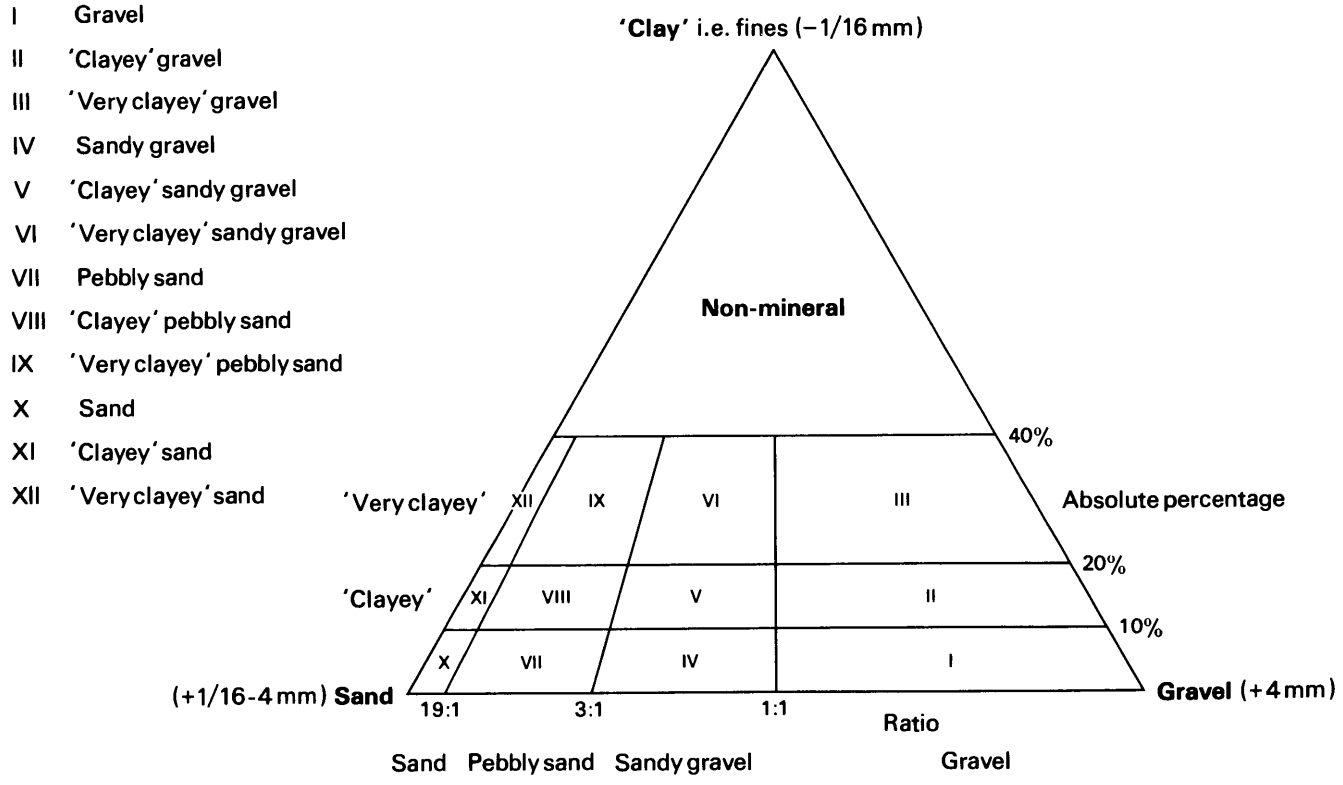



Diagram showing the descriptive categories used in the classification of sand and gravel

## APPENDIX D

## EXPLANATION OF THE BOREHOLE RECORDS

### Annotated example

**TL 74 SW 39** **7247 4395** **Nr. Preston's Farm**[1] **Block B**

Surface level + 81.3 m[2]
Water not struck[3]
October 1979[4]

Overburden[5] 0.7 m[6]
Mineral 2.1 m
Waste 4.8 m
Mineral 4.1 m
Waste 5.7 m
Mineral 4.3 m
Bedrock 1.3 m+

### LOG

| Geological classification[7] | Lithology[8] | Thickness m | Depth m |
|---|---|---|---|
| | Soil and subsoil | 0.7 | 0.7 |
| Glacial Sand and Gravel, upper | **a** 'Very clayey' sandy gravel<br>Gravel: fine and coarse, rounded chalk with angular flint<br>Sand: medium with coarse and fine, quartz, orange-brown<br>Fines: disseminated silt and clay | 2.1 | 2.8 |
| Boulder Clay | Clay, brown becoming grey with chalk and flint pebbles | 4.8 | 7.6 |
| Glacial Sand and Gravel, upper | **b** 'Clayey' gravel<br>Gravel: coarse and fine with cobbles, angular flint with rounded chalk<br>Sand: coarse and medium with fine, quartz with chalk, brown<br>Fines: disseminated silt and clay | 4.1 | 11.7 |
| Boulder Clay | Clay, black with chalk, flint and shale pebbles | 5.7 | 17.4 |
| Kesgrave Sands and Gravels | **c** 'Clayey' sand<br>Gravel: fine<br>Sand: fine with medium and coarse, quartz, orange<br>Fines: disseminated silt and clay with clay seams | 2.0 | 19.4 |
| Red Crag | **d** 'Very clayey' pebbly sand<br>Gravel: fine and coarse, angular and well-rounded flint with rounded quartz and ironstone<br>Sand: fine and medium with coarse, quartz, reddish brown<br>Fines: disseminated silt and clay | 2.3 | 21.7 |
| Upper Chalk | Chalk, soft | 1.3+ | 23.0 |

### GRADING

| | Mean for deposit[11] percentages | | | Depth below surface (m)[9] | percentages[10] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| **a** | 29 | 51 | 20 | 0.7-2.8 | 29 | 7 | 34 | 10 | 13 | 7 | 0 |
| **b** | 17 | 30 | 53 | 7.6-8.8 | 17 | 6 | 13 | 10 | 20 | 27 | 7 |
| | | | | 8.8-10.8 | 17 | 5 | 10 | 13 | 18 | 35 | 2 |
| | | | | 10.8-11.7 | 16 | 4 | 12 | 13 | 18 | 31 | 6 |
| | | | | Mean | 17 | 6 | 12 | 12 | 18 | 30 | 5 |
| **c** | 13 | 86 | 1 | 17.4-18.2 | 16 | 52 | 24 | 6 | 2 | 0 | 0 |
| | | | | 18.2-19.4 | 10 | 71 | 13 | 5 | 1 | 0 | 0 |
| | | | | Mean | 13 | 63 | 18 | 5 | 1 | 0 | 0 |
| **d** | 23 | 71 | 6 | 19.4-21.5 | 24 | 33 | 29 | 11 | 4 | 0 | 0 |
| | | | | 21.5-21.7 | 14 | 33 | 20 | 6 | 5 | 22 | 0 |
| | | | | Mean | 23 | 33 | 28 | 10 | 4 | 2 | 0 |
| **a+b +c+d** | 19 | 54 | 27 | Mean | 19 | 23 | 21 | 0 | 11 | 14 | 2 |

**COMPOSITION**[12]

| | Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | | W R | Ang. | Patin. | | | | | | | | |
| b | 7.6-11.7 | 2 | 82 | 2 | 8 | trace | 2 | 2 | 0 | 1 | 1 | trace |
| d | 19.4-21.7 | 27 | 53 | 2 | 0 | 8 | 4 | 1 | trace | 0 | 5 | trace |

The numbered paragraphs below correspond to the annotations given on the specimen record. All measurements are in metres.

1 Location
The position of the borehole is generally referred to the nearest named locality on the 1:25 000 base map and the resource block in which it lies is stated.

2 Surface level
The surface level at the borehole site is given in metres above Ordnance Datum.

3 Groundwater condititons
If groundwater was present the level at which it was encountered is given in metres above OD.

4 Type of Drill and Date of Drilling.
Unless otherwise stated a conventional Dando shell and auger rig, in conjunction with 152 mm diameter casing, was used in the survey. THe month and year of completion of the borehole are stated.

5 Mineral, waste, bedrock and overburden
Mineral is sand and gravel which, as part of the deposit, falls within the arbitrary difinition of potentially workable material (see p.1). Bedrock is the 'Formation', 'country rock' or 'rock head' below which potentially workable sand and gravel will not be found. Waste is any material other than bedorck or mineral. Where waste occurs between the surface and mineral it is classified as overburden.

6 Thickness
All measurements were made in metres to the nearest 0.1 m. The plus sign (+) indicates that the base of the deposit was not reached during drilling.

7 Geological classification
The geological classification (see Table 1) is given whenever possible.

8 Lithological description
When sand and gravel is recorded a general description based on the mean grading characteristics (for details see Appendix C) is followed by more detailed particulars. The description of other rocks is based on visual examination, in the field. Where more than one mineral deposits is recognised each is designated by a letter, e.g. **a**, **b**, etc.

9 Sampling
A continuous series of bulk samples is taken throughout the thickness of sand and gravel. A new sample is commenced whenever there is an appreciable lithological change within the sand and agravel or at every 1 m of depth. Samples from below the water table are indicated by an asterisk.

10 Grading results
The limites are as follows: gravel +4 mm, sand +⅛-4 mm, fines -⅛ mm.

11 Mean grading for deposit
The grading of each mineral deposit identified in the log is the mean of the individual sample grading weighted by the thicknesses represented. The classification used is described in Appendix C. Due to the size of the borehole (152 mm), gravel greater that 64 mm, which is rarely present in this district, is likely to be unrepresentatively sampled.

Fully representative sampling of sand and gravel is difficult to achieve particularly where groundwater levels are high. Comparison between boreholes and adjacent exposures suggests that in borehole samples the proportion of sand may be higher and the proportions of fines and coarse gravel (+16 mm) may be lower.

12 Composition
Details are given of the composition on a percentage by weight basis of the gravel fraction (+4 mm). 'W R' denotes well rounded, 'Ang.' denotes angular, and 'Patin.' denotes patinated. The 'angular flint' catagory indcludes flint with an angularity from angular to subrounded. 'Trace' indicates an amount less than 1%.

## APPENDIX E

## INDUSTRIAL MINERALS ASSESSMENT UNIT BOREHOLE RECORDS

**TL 74 NW 13** **7086 4885** **Barnardiston** **Block A**

Surface level +71.9 m
Water not struck
November 1979

Waste 10.3 m
Bedrock 0.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Head | Sandy pebbly clay, brown | 0.3 | 0.6 |
| Boulder Clay | Clay, brown becoming grey with chalk and flint pebbles | 9.7 | 10.3 |
| Upper Chalk | Chalk soft | 0.8+ | 11.1 |

**TL 74 NW 14** **7007 4791** **Nr. Kedington** **Block A**

Surface level + 60.6 m
Water struck at + 57.5 m
November 1979

Overburden 3.1 m
Mineral 2.0 m
Bedrock 1.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.5 | 0.5 |
| Head | Silty clay, brown becoming blue-grey with peat | 2.6 | 3.1 |
| Glacial Sand and Gravel, upper | 'Clayey' gravel<br>Gravel: fine and coarse, angular flint with well-rounded chalk<br>Sand: coarse and medium with fine, quartz, flint and chalk, pale grey<br>Fines: disseminated silt | 2.0 | 5.1 |
| Upper Chalk | Chalk | 1.2+ | 6.3 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 15 | 37 | 48 | 3.1-4.3 | 4 | 4 | 10 | 21 | 36 | 25 | 0 |
| | | | 4.3-5.1 | 33 | 12 | 16 | 10 | 22 | 7 | 0 |
| | | | Mean | 15 | 7 | 13 | 17 | 30 | 18 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 3.1-5.1 | trace | 69 | 3 | 8 | 2 | 3 | 2 | trace | 1 | 3 | 9 |

**TL 74 NW 15** **7063 4725** **Hall Farm** **Block A**

Surface level + 69.0 m
Water not struck
November 1979

Waste 10.0 m
Bedrock 2.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.7 | 0.7 |
| Boulder Clay | Clay, brown becoming grey with chalk pebbles | 7.5 | 8.2 |
| | Chalk, matrix with rounded chalk and flint pebbles | 1.8 | 10.0 |
| Upper Chalk | Chalk | 2.3+ | 12.3 |

**TL 74 NW 16** **7029 4690** **Risbridge Home** **Block A**

Surface level + 61.7 m
Water struck at + 56.1 m
November 1979

Overburden 1.9 m
Mineral 5.1 m
Waste 15.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Head | Silty, sandy, clay with pebbles of flint and chalk | 1.6 | 1.9 |
| Glacial Sand and Gravel, upper | 'Clayey' sandy gravel<br>Gravel: fine and coarse with cobbles, angular flint with well rounded chalk<br>Sand: medium and coarse with fine, quartz, flint and chalk<br>Fines: disseminated silt | 5.1 | 7.0 |
| Boulder Clay | Clay, pale grey with chalk and flint pebbles | 15.2+ | 22.2 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | | |
| | | | | -1/16 | +1/16 -1/4 | +1/4 -1 | +1 -4 | +4 -16 | +16 -64 | +64 | mm |
| 15 | 46 | 39 | 1.9-2.9 | 22 | 13 | 25 | 18 | 22 | 0 | 0 | |
| | | | 2.9-3.9 | 18 | 18 | 27 | 15 | 19 | 3 | 0 | |
| | | | 3.9-5.6 | 19 | 10 | 18 | 16 | 25 | 9 | 3 | |
| | | | 5.6-6.6 | 3 | 1 | 8 | 24 | 32 | 32 | 0 | |
| | | | 6.6-7.0 | 4 | 1 | 11 | 18 | 40 | 12 | 14 | |
| | | | Mean | 15 | 9 | 19 | 18 | 26 | 11 | 2 | |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 1.9-7.0 | trace | 84 | trace | 7 | 1 | 3 | 3 | 1 | trace | trace | 1 |

**TL 74 NW 17** **7054 4599** **Sturmer Common** **Block A**

Surface level + 60.0 m
Water not struck
November 1979

Waste 4.1 m
Bedrock 0.9 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.9 | 0.9 |
| Head | Sandy clay, orange-brown | 2.6 | 3.5 |
| Boulder Clay | Clay, pale brown with chalk pebbles | 0.6 | 4.1 |
| Upper Chalk | Chalk | 0.9+ | 5.0 |

**TL 74 NW 18** **7008 4569** **Sturmer Common** **Block A**

Surface level + 83.5 m
Water not struck
November 1979

Overburden 3.3 m
Mineral 2.7 m
Waste 8.6 m
Bedrock 1.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.5 | 0.5 |
| Boulder Clay | Clay, brown with pebbles of chalk and flint | 2.8 | 3.3 |
| Glacial Sand and Gravel, upper | 'Very Clayey' sandy gravel<br>Gravel: fine with coarse, angular flint<br>Sand: medium, coarse and fine, chalk and flint, pale brown<br>Fines: disseminated silt and clay | 2.7 | 6.0 |
| Boulder Clay | Clay, greyish brown with chalk pebbles and seams of sand | 8.6 | 14.6 |
| Upper Chalk | Chalk | 1.2+ | 15.8 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 22 | 46 | 32 | 3.3-4.3 | 26 | 15 | 25 | 12 | 20 | 2 | 0 |
| | | | 4.3-5.3 | 20 | 12 | 15 | 15 | 26 | 12 | 0 |
| | | | 5.3-6.0 | 16 | 10 | 17 | 19 | 28 | 10 | 0 |
| | | | Mean | 22 | 12 | 19 | 15 | 24 | 8 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 3.3-6.0 | 0 | 62 | 29 | 0 | 1 | 2 | 2 | 1 | 1 | 1 | 1 |

**TL 74 NW 19** **7118 4693** **Stonebridge Farm** **Block A**

Surface level + 74.1 m
Water not struck
November 1979

Waste 14.6 m
Bedrock 5.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Clay, brown becoming grey with pebbles of chalk and flint | 14.4 | 14.6 |
| Upper Chalk | Chalk | 5.3+ | 19.9 |

**TL 74 NW 20** **7222 4580** **Way Bank Lane** **Block B**

Surface level + 94.0 m
Water not struck
October 1979

Waste 25.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Clay, brown becoming grey with pebbles of chalk and flint | 24.8+ | 25.0 |

**TL 74 NW 21** **7293 4503** **Burnthouse Grove** **Block B**

Surface level + 79.1 m
Water not struck
October 1979

Waste 20.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.8 | 0.8 |
| Boulder Clay | Clay, brown becoming grey with pebbles of chalk and flint | 19.2+ | 20.0 |

**TL 74 NW 22** **7348 4567** **Hull's Farm** **Block B**

Surface level + 94.1 m
Water not struck
October 1979

Waste 20.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.7 | 0.7 |
| Boulder Clay | Clay, mottled brown and grey becoming grey with abundant chalk pebbles. Thin gravel seam at 11.0 m | 19.3+ | 20.0 |

**TL 74 NW 23** **7429 4829** **Gravelgate Farm** **Block B**

Surface level + 69.7 m
Water not struck
November 1979

Waste 24.6 m
Bedrock 0.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.7 | 0.7 |
| Alluvium | Silty clay, mottled brown and orange-brown | 1.4 | 2.1 |
| | 'Clayey' sandy gravel<br>Gravel: well-rounded chalk and angular flint<br>Sand: chalk and flint<br>Fines: disseminated silt and clay | 0.5 | 2.6 |
| Boulder Clay | Clay brown becoming grey with pebbles of chalk, flint and shale | 21.4 | 24.0 |
| | Sandy, clay, brownish grey with mostly coarse rounded and angular flint pebbles | 0.6 | 24.6 |
| Upper Chalk | Chalk, soft | 0.2+ | 24.8 |

**TL 74 NW 24** **7446 4740** **Wash Farm** **Block B**

Surface level + 65.8 m
Water not struck
November 1979

Waste 19.9 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 1.0 | 1.0 |
| Boulder Clay | Clay, mottled orange-brown and grey becoming grey with abundant chalk pebbles | 18.9+ | 19.9 |

**TL 74 NW 25** **7469 4679** **Chiltern Street** **Block B**

Surface level + 79.7 m
Water not struck
October 1979

Waste 24.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.1 | 0.1 |
| Glacial Sand and Gravel, upper | Pebbly sandy clay, brown | 2.4 | 2.5 |
| Boulder Clay | Clay, brown becoming grey with pebbles of chalk and flint | 21.5+ | 24.0 |

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**TL 74 NW 26** **7449 4545** **Canham's Farm** **Block B**

Surface level + 68.1 m
Water not struck
October 1979

Overburden 5.9 m
Mineral 2.6 m
Bedrock 0.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.7 | 0.7 |
| Head | Clay, brown | 0.8 | 1.5 |
| Boulder Clay | Clay, brown with pebbles of chalk and flint | 3.8 | 5.3 |
| Barham Sands and Gravels | Pebbly sandy clay, brown | 0.6 | 5.9 |
| | **a** 'Clayey' sand<br>Gravel: fine and coarse, angular flint, rounded quartz, well-rounded flint and argillaceous rocks<br>Sand: medium and fine with coarse, quartz and flint<br>Fines: disseminated silt and clay | 1.0 | 6.9 |
| Kesgrave Sands and Gravels | **b** 'Clayey' pebbly sand<br>Gravel: coarse, fine and cobbles, angular and well-rounded flint<br>Sand: fine with medium, quartz and flint, yellowish brown<br>Fines: disseminated silt and clay | 1.6 | 8.5 |
| Upper Chalk | Chalk, soft | 0.5+ | 9.0 |

**GRADING**

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| **a** | 12 | 85 | 3 | 5.9-6.9 | 12 | 37 | 41 | 7 | 2 | 1 | 0 |
| **b** | 13 | 82 | 5 | 6.9-7.9 | 12 | 80 | 7 | 1 | 0 | 0 | 0 |
| | | | | 7.9-8.5 | 14 | 61 | 10 | 2 | 3 | 4 | 6 |
| | | | | Mean | 13 | 73 | 8 | 1 | 1 | 2 | 2 |
| **a+b** | 13 | 83 | 4 | Mean | 13 | 59 | 21 | 3 | 1 | 2 | 1 |

**COMPOSITION**

| | Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | | W R | Ang. | Patin. | | | | | | | | |
| a | 5.9-6.9 | 14 | 36 | 3 | 0 | 27 | 3 | 3 | 8 | 3 | 0 | 3 |
| b | 6.9-8.5 | 30 | 62 | trace | 0 | 2 | 0 | 1 | 4 | trace | 1 | trace |

**TL 74 NE 16** **7580 4898** **Culverton Farm** **Block B**

Surface level + 87.4 m
Water not struck
November 1979

Waste 21.5 m
Bedrock 1.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.1 | 0.1 |
| Boulder Clay | Clay, mottled grey and brown becoming grey with chalk pebbles | 18.1 | 18.2 |
| Glacial Sand and Gravel, upper | 'Clayey' pebbly sand<br>Gravel: coarse with fine, angular flint<br>Sand: fine and medium, quartz, brownish grey<br>Fines: disseminated silt and clay | 1.0 | 19.2 |
| | Pebbly sandy clay | 2.3 | 21.5 |
| Upper Chalk | Chalk, soft | 1.5+ | 23.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}$ $-\frac{1}{4}$ | $+\frac{1}{4}$ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 15 | 76 | 9 | 18.2-19.2 | 15 | 41 | 34 | 1 | 2 | 7 | 0 |

**TL 74 NE 17** **7544 4697** **Chilton Street** **Block B**

Surface level + 61.0 m
Water struck at + 56 m
October 1979

Overburden 5.5 m
Mineral 2.5 m
Waste 12.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.6 | 0.6 |
| Head | Sandy clay, brown | 2.9 | 3.5 |

| | | | |
|---|---|---|---|
| Boulder Clay | Clay, pale brown with pebbles of chalk and flint | 2.0 | 5.5 |
| Glacial Sand and Gravel, upper | Gravel<br>Gravel: coarse and fine, angular with patinated flint<br>Sand: medium and coarse with fine, flint, chalk and quartz | 2.5 | 8.0 |
| Boulder Clay | Clay, grey with chalk pebbles | 12.3+ | 20.3 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 9 | 35 | 56 | 5.5-6.8 | 8 | 7 | 18 | 12 | 25 | 30 | 0 |
| | | | 6.8-8.0 | 10 | 5 | 16 | 10 | 18 | 39 | 2 |
| | | | Mean | 9 | 7 | 17 | 11 | 22 | 34 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 5.5-8.0 | 0 | 64 | 16 | 2 | 1 | 1 | 4 | 3 | 1 | 3 | 5 |

**TL 74 NE 18** **7515 4590** **Leys Farm** **Block B**

Surface level + 78.5 m
Water not struck
November 1979

Overburden 8.9 m
Mineral 10.0 m
Waste 0.6 m
Mineral 5.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil and subsoil | 0.7 | 0.7 |
| Boulder Clay | Sandy silt, orange-brown | 1.3 | 2.0 |
| Glacial Sand and Gravel, upper | 'Very clayey' pebbly sand<br>Gravel: fine rounded chalk and angular flint<br>Sand: fine with coarse, quartz and chalk, brown | 0.6 | 2.6 |
| Boulder Clay | Clay, grey with chalk pebbles | 5.1 | 7.7 |
| Glacial Sand and Gravel, upper | Sandy clay, brown | 1.2 | 8.9 |
| | **a** 'Very clayey' sandy gravel<br>Gravel: fine and coarse, angular flint<br>Sand: medium with coarse and fine, brown<br>Fines; disseminated ground chalk | 10.0 | 18.9 |
| Boulder Clay | Clay, grey with chalk pebbles | 0.6 | 19.5 |
| Barham Sands and Gravels | **b** 'Very clayey' pebbly sand<br>Gravel: fine and coarse, angular flint and ironstone with rounded quartz and argillaceous rocks<br>Sand: medium and fine, quartz, orange-brown<br>Fines: disseminated silt and clay | 1.0 | 20.5 |

| | | | | |
|---|---|---|---|---|
| Kesgrave Sands and Gravels | **c** 'Very clayey' sand<br>Gravel: fine, angular flint<br>Sand: fine with medium, quartz, yellowish brown<br>Fines: disseminated silt and clay | | 2.5 | 23.0 |
| Red Crag | **d** 'Very clayey' sand<br>Sand: medium and fine, quartz, orange<br>Fines: disseminated silt and clay | | 2.0+ | 25.0 |

**GRADING**

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}$ $-\frac{1}{4}$ | $+\frac{1}{4}$ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| **a** | 26 | 37 | 37 | 8.9-10.3 | 32 | 12 | 15 | 9 | 19 | 13 | 0 |
| | | | | 10.3-14.2 | 29 | 10 | 18 | 13 | 18 | 12 | 0 |
| | | | | 14.2-15.2 | 25 | 8 | 22 | 12 | 18 | 15 | 0 |
| | | | | 15.2-16.2 | 26 | 7 | 18 | 12 | 23 | 14 | 0 |
| | | | | 16.2-18.9 | 19 | 8 | 11 | 12 | 21 | 26 | 3 |
| | | | | Mean | 26 | 9 | 16 | 12 | 19 | 17 | 1 |
| **b** | 30 | 64 | 6 | 19.5-20.5 | 30 | 30 | 31 | 3 | 3 | 3 | 0 |
| **c** | 22 | 78 | 0 | 20.5-22.0 | 24 | 60 | 13 | 2 | 1 | 0 | 0 |
| | | | | 22.0-23.0 | 19 | 72 | 8 | 1 | 0 | 0 | 0 |
| | | | | Mean | 22 | 65 | 11 | 1 | 1 | 0 | 0 |
| **d** | 23 | 77 | 0 | 23.0-24.0 | 20 | 40 | 37 | 2 | 1 | 0 | 0 |
| | | | | 24.0-25.0 | 27 | 18 | 54 | 1 | 0 | 0 | 0 |
| | | | | Mean | 23 | 29 | 46 | 2 | 0 | 0 | 0 |
| **a+b+ c+d** | 25 | 50 | 25 | Mean | 25 | 22 | 20 | 8 | 13 | 11 | 1 |

**COMPOSITION**

| | Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | | W R | Ang. | Patin. | | | | | | | | |
| **a** | 8.9-18.9 | 0 | 47 | 36 | 2 | 2 | 4 | 3 | 3 | 2 | trace | 1 |
| **b** | 19.5-20.5 | 3 | 48 | 3 | 4 | 9 | 0 | 0 | 6 | 0 | 27 | 0 |
| **c** | 20.5-23.0 | 2 | 83 | 4 | 0 | 1 | 1 | 2 | 5 | trace | 1 | 1 |

**TL 74 NE 19** **7555 4531** **Bench Barn** **Block B**

Surface level + 60.9 m
Water struck at + 49.9 m
November 1979

Waste 13.1 m
Bedrock 0.9 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.5 | 0.5 |
| Head | Sandy clay, brown with some flint pebbles | 0.8 | 1.3 |
| Boulder Clay | Clay, brown becoming grey with pebbles of chalk, flint and shale | 9.7 | 11.0 |

| | | | |
|---|---|---|---|
| Glacial Sand and Gravel, upper | 'Clayey' gravel<br>Gravel: coarse and fine angular flint with argillaceous rocks<br>Sand: medium and coarse with fine, chalk and flint<br>Fines: disseminated silt and clay | 2.1 | 13.1 |
| Upper Chalk | Chalk, soft | 0.9+ | 14.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 18 | 35 | 47 | 11.0-12.5 | 20 | 9 | 18 | 12 | 20 | 21 | 0 |
| | | | 12.5-13.1 | 14 | 4 | 9 | 11 | 24 | 38 | 0 |
| | | | Mean | 18 | 7 | 16 | 12 | 21 | 26 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 11.0-13.1 | 0 | 72 | 7 | 1 | 1 | 3 | 1 | 13 | trace | trace | 2 |

**TL 74 NE 20** **7692 4825** **Poslingford** **Block B**

Surface level + 72.8 m
Water not struck
October 1979

Overburden 13.2 m
Mineral 6.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.4 | 0.4 |
| Head | Silt, brown with some flint pebbles | 0.4 | 0.8 |
| Boulder Clay | Clay, brown becoming grey with pebbles of chalk and flint | 12.4 | 13.2 |
| Kesgrave Sands and Gravels | 'Very Clayey' sand<br>Gravel: fine, angular flint with quartz, argillaceous rocks, quartzite and well-rounded flint<br>Sand: fine and medium, quartz with flint and mica, yellow<br>Fines: disseminated silt and clay above 18.0 m with clay matrix and thin silt seams below | 6.3+ | 19.5 |

Borehole terminated due to technical difficulties

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}$ $-\frac{1}{4}$ | $+\frac{1}{4}$ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 23 | 75 | 2 | 13.2-13.8 | 29 | 42 | 12 | 4 | 11 | 2 | 0 |
| | | | 13.8-14.8 | 20 | 78 | 1 | 1 | 0 | 0 | 0 |
| | | | 14.8-15.6 | 24 | 61 | 11 | 1 | 2 | 1 | 0 |
| | | | 15.6-16.6 | 16 | 43 | 36 | 3 | 2 | 0 | 0 |
| | | | 16.6-18.0 | 19 | 33 | 46 | 2 | 0 | 0 | 0 |
| | | | 18.0-19.5 | 31 | 53 | 13 | 1 | 2 | 0 | 0 |
| | | | Mean | 23 | 51 | 72 | 2 | 2 | 0 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 13.2-19.5 | 7 | 47 | 1 | 0 | 17 | 9 | 2 | 15 | 0 | 0 | 2 |

**TL 74 NE 21** **7651 4806** **Poslingford** **Block B**

Surface level + 91.2 m
Water not struck
October 1979

Waste 25.0 m+

**.LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Boulder Clay | Clay, brown becoming grey with chalk and flint pebbles | 24.7+ | 25.0 |

**TL 74 NE 22** **7641 4678** **Wentford** **Block B**

Surface level + 53.0 m
Water struck at + 49.1 m
October 1979

| | |
|---|---|
| Overburden | 3.9 m |
| Mineral | 2.0 m |
| Waste | 1.0 m |
| Mineral | 1.8 m |
| Bedrock | 0.8 m+ |

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Head | Clay, brown with some flint pebbles | 1.1 | 1.4 |
| Boulder Clay | Clay, brown with chalk and flint pebbles | 2.5 | 3.9 |
| Glacial Sand and Gravel, upper | **a** 'Very Clayey' pebbly sand<br>Gravel: coarse and fine, angular flint<br>Sand: fine and medium, quartz and flint<br>Fines: disseminated silt and clay with silt seams | 2.0 | 5.9 |
| | Pebbly sandy clay | 1.0 | 6.9 |
| | **b** 'Clayey' pebbly sand<br>Gravel: coarse with fine, angular flint<br>Sand: medium and fine, quartz and flint<br>Fines: disseminated slit and clay with silt seams | 1.8 | 8.7 |
| Upper Chalk | Chalk, soft | 0.8+ | 9.5 |

**GRADING**

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}$ $-\frac{1}{4}$ | $+\frac{1}{4}$ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| **a** | 21 | 72 | 7 | 3.9-4.9 | 25 | 43 | 19 | 2 | 2 | 9 | 0 |
| | | | | 4.9-5.9 | 17 | 35 | 43 | 2 | 1 | 2 | 0 |
| | | | | Mean | 21 | 39 | 31 | 2 | 2 | 5 | 0 |
| **b** | 17 | 70 | 13 | 6.9-7.9 | 15 | 21 | 42 | 1 | 3 | 18 | 0 |
| | | | | 7.9-8.7 | 21 | 34 | 40 | 2 | 1 | 2 | 0 |
| | | | | Mean | 17 | 27 | 41 | 2 | 2 | 11 | 0 |
| **a+b** | 19 | 71 | 10 | Mean | 19 | 33 | 36 | 2 | 2 | 8 | 0 |

**COMPOSITION**

| | Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | | W R | Ang. | Patin. | | | | | | | | |
| **a+b** | 3.9-8.7 | 0 | 90 | 3 | 1 | 3 | trace | 1 | 1 | trace | 0 | 1 |

**TL 74 NE 23** **7683 4666** **Wentford** **Block B**

Surface level + 50.4 m
Water struck at + 39.4 m
October 1979

Waste 16.8 m
Bedrock 1.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Head | Clay, brown with some chalk and flint pebbles | 1.5 | 1.8 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 9.2 | 11.0 |
| | Silt, grey | 1.8 | 12.8 |
| | Clay, grey with chalk and flint pebbles | 1.7 | 14.5 |
| Glacial Sand and Gravel, upper | Gravel: fine and coarse chalk with flints | 0.5 | 15.0 |
| Boulder Clay | Clay, grey with pebbles of chalk and flint | 1.8 | 16.8 |
| Upper Chalk | Chalk, hard | 1.2+ | 18.0 |

**TL 74 NE 24** **7643 4588** **Upper Common** **Block B**

Surface level + 72.1 m
Water not struck
October 1979

Waste 20.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 19.8+ | 20.0 |

**TL 74 NE 25** **7666 4512** **Cliftons** **Block B**

Surface level + 52.1 m
Water struck at + 38.9 m
November 1979

Overburden 5.0 m
Mineral 3.0 m
Waste 14.1 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Head | Pebbly sandy clay | 4.8 | 5.0 |

| | | | |
|---|---|---|---|
| Glacial Sand and Gravel, upper | **a** 'Clayey' sandy gravel<br>Gravel: fine and coarse, angular flint with subrounded quartzite<br>Sand: medium, fine and coarse, quartz and flint, orange<br>Fines: disseminated silt and clay | 3.0 | 8.0 |
| Boulder Clay | Clay, brown becoming grey with pebbles of chalk, flint and shale | 5.2 | 13.2 |
| Glacial Sand and Gravel, upper | **b** 'Clayey' gravel<br>Gravel: coarse and fine with cobbles, angular flint with sandstone and argillaceous rocks<br>Sand: coarse and medium with fine, quartz and flint, grey<br>Fines: disseminated silt and clay | 0.9 | 14.1 |
| Boulder Clay | Clay, grey with pebbles of chalk and flint | 8.0+ | 22.1 |

**GRADING**

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| **a** | 18 | 47 | 35 | 5.0-6.0 | 20 | 16 | 24 | 8 | 22 | 10 | 0 |
| | | | | 6.0-7.0 | 9 | 17 | 20 | 15 | 23 | 16 | 0 |
| | | | | 7.0-8.0 | 24 | 13 | 16 | 15 | 23 | 9 | 0 |
| | | | | Mean | 18 | 15 | 20 | 12 | 23 | 12 | 0 |
| **b** | 10 | 34 | 56 | 13.2-14.1 | 10 | 5 | 13 | 16 | 23 | 29 | 4 |
| **a+b** | 16 | 45 | 39 | Mean | 16 | 13 | 19 | 13 | 22 | 16 | 1 |

**COMPOSITION**

| | Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | | W R | Ang. | Patin. | | | | | | | | |
| **a** | 5.0-8.0 | 0 | 71 | 16 | 0 | 1 | 7 | 2 | 2 | 1 | trace | 0 |
| **b** | 13.2-14.1 | 0 | 50 | 25 | trace | 1 | 2 | 10 | 9 | trace | trace | 3 |

**TL 74 NE 26** **7781 4824** **New House Farm** **Block B**

Surface level +99.0 m
Water not struck
October 1979

Waste 20.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.6 | 0.6 |
| Boulder Clay | Clay, brown, becoming grey with abundant chalk and flint pebbles | 19.4+ | 20.0 |

**TL 74 NE 27** **7735 4699** **Wentford** **Block B**

Surface level + 72.1 m
Water not struck
October 1979

Waste 20.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 19.8+ | 20.0 |

**TL 74 NE 28** **7780 4636** **Hermitage Farm** **Block B**

Surface level + 76.2 m
Water not struck
October 1979

Waste 20.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.1 | 0.1 |
| Boulder Clay | Clay, brown becoming grey with abundant pebbles of chalk and flint | 19.9+ | 20.0 |

**TL 74 NE 29** **7718 4619** **Snow Hill** **Block A**

Surface level + 46.7 m
Water struck at + 43.0 m
October 1979

Overburden 3.7 m
Mineral 1.0 m
Bedrock 1.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Alluvium | Silty, clay mottled brown and grey | 1.4 | 1.7 |
| | Sandy silty clay, grey with chalk pebbles | 2.0 | 3.7 |
| | 'Clayey' gravel<br>Gravel: coarse and fine, angular flint<br>Sand: medium, fine and coarse, quartz and flint<br>Fines: disseminated silt and clay | 1.0 | 4.7 |
| Upper Chalk | Chalk, soft | 1.3+ | 6.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 17 | 12 | 71 | 3.7-4.7 | 17 | 4 | 5 | 3 | 24 | 47 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 3.7-4.7 | 0 | 92 | 3 | 0 | 1 | 2 | 2 | trace | trace | trace | trace |

**TL 74 NE 30** **7798 4551** **Clare Hill Farm** **Block B**

Surface level +51.6 m
Water struck at 40.0 m
November 1979

Overburden 1.0 m
Mineral 1.2 m
Waste 17.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.5 | 0.5 |
| Boulder Clay | Sandy, silty clay, brown with flint pebbles | 0.5 | 1.0 |
| Glacial Sand and Gravel, upper | **a** 'Very clayey' gravel<br>Gravel: coarse with fine and cobbles, angular flint with subrounded quartzite<br>Sand: fine, medium and coarse<br>Fines: disseminated silt and clay | 1.2 | 2.2 |
| Boulder Clay | Clay, brown becoming grey with chalk pebbles | 9.4 | 11.6 |
| Glacial Sand and Gravel, upper | **b** Gravel<br>Gravel: coarse and fine, angular flint with argillaceous rocks<br>Sand: coarse and medium with fine, flint and chalk, grey | | 0.9 |
| Boulder Clay | Clay, grey with pebbles of chalk, flint and shale | 6.7+ | 19.2 |

**GRADING**

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| **a** | 20 | 25 | 55 | 1.0-2.2 | 20 | 9 | 9 | 7 | 14 | 30 | 11 |
| **b** | 6 | 33 | 61 | 11.6-12.5 | 6 | 2 | 10 | 21 | 25 | 36 | 0 |
| **a+b** | 14 | 28 | 58 | Mean | 14 | 6 | 9 | 13 | 19 | 33 | 6 |

**COMPOSITION**

| | Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | | W R | Ang. | Patin. | | | | | | | | |
| a | 1.0-2.2 | 0 | 83 | 4 | 0 | 1 | 10 | 1 | 1 | 0 | trace | trace |
| b | 11.6-12.5 | 0 | 75 | 12 | trace | 2 | 3 | 1 | 5 | trace | 0 | 2 |

**TL 74 NE 31** **7741 4503** **Clare** **Block A**

Surface level + 42.6 m
Water struck at + 38.3 m
October 1979

Overburden 4.3 m
Mineral 2.9 m
Waste 16.9 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil and subsoil | 0.9 | 0.9 |
| Alluvium | Silty sandy clay, brown | 1.4 | 2.3 |
| | Silt, grey | 1.1 | 3.4 |
| | Peat with sand and chalk pebbles | 0.9 | 4.3 |
| | Gravel<br>Gravel: fine and coarse, angular flint<br>Sand: medium and coarse with fine, flint with chalk rock | 2.9 | 7.2 |
| Glacial Silt | Silt, grey, laminated with rounded chalk pebbles | 16.9+ | 24.1 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 3 | 41 | 56 | 4.3-5.3 | 1 | 6 | 17 | 8 | 36 | 32 | 0 |
| | | | 5.3-6.3 | 5 | 6 | 25 | 13 | 39 | 12 | 0 |
| | | | 6.3-7.2 | 3 | 7 | 30 | 14 | 30 | 16 | 0 |
| | | | Mean | 3 | 6 | 24 | 11 | 36 | 20 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 4.3-7.2 | 0 | 71 | 18 | 1 | 1 | trace | 3 | 2 | 2 | trace | 2 |

**TL 74 NE 32** **7883 4943** **King's Wood** **Block B**

Surface level + 99.5 m
Water not struck
October 1979

Waste 20.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Silt, brown | 0.6 | 0.8 |
| | Clay, brown becoming grey with abundant pebbles of chalk and flint | 19.2+ | 20.0 |

**TL 74 NE 33** **7858 4727** **Nr. Houghton Hall** **Block B**

Surface level + 84.5 m
Water struck at + 74.4 m
October 1979

Waste 10.1 m
Bedrock 1.9 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 9.8 | 10.1 |
| Upper Chalk | Chalk, hard | 1.9+ | 12.0 |

**TL 74 NE 34** **7865 4637** **Houghton Hall** **Block B**

Surface level + 75.1 m
Water not struck
October 1979

Waste 20.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Clay brown becoming grey with abundant chalk and flint pebbles | 19.8+ | 20.0 |

**TL 74 NE 35** **7854 4526** **Nr. Hickford Hill** **Block A**

Surface level + 43.1 m
Water not struck
November 1979

Overburden 0.2 m
Mineral 4.4 m
Waste 15.4 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.2 | 0.2 |
| First Terrace | 'Clayey' gravel<br>Gravel: coarse and fine, angular flint, subrounded quartzite and argillaceous rocks<br>Sand: medium, coarse and fine, quartz and flint<br>Fines: disseminated silt and clay | 4.4 | 4.6 |
| Boulder Clay | Clay, grey with abundant chalk and flint pebbles | 15.4+ | 20.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 19 | 40 | 41 | 0.2-1.2 | 20 | 11 | 15 | 13 | 23 | 18 | 0 |
| | | | 1.2-2.2 | 19 | 11 | 17 | 13 | 18 | 22 | 0 |
| | | | 2.2-3.2 | 18 | 9 | 16 | 13 | 19 | 25 | 0 |
| | | | 3.2-4.6 | 19 | 9 | 18 | 11 | 17 | 26 | 0 |
| | | | Mean | 19 | 10 | 17 | 13 | 19 | 22 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartzite | Sandstone | Argillaceous rocks | Fossil debris | Ironstone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 0.2-4.6 | 0 | 79 | 4 | trace | 1 | 6 | 4 | 5 | trace | 1 | trace |

**TL 74 NE 36** **7961 4902** **Wales Farm** **Block B**

Surface level + 93.8 m
Water struck at + 79.3 m
November 1979

Waste 21.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.1 | 0.1 |
| Boulder Clay | Clay, mottled brown and light grey becoming grey with pebbles of chalk, flint and shale | 14.4 | 14.5 |
| Glacial Sand and Gravel, upper | 'Clayey' gravel<br>Gravel: coarse and fine, angular flint, argillaceous rocks and rounded chalk<br>Sand: medium, coarse and fine, flint and chalk<br>Fines: disseminated silt and clay | 2.5 | 17.0 |
| Boulder Clay | Clay, grey with pebbles of chalk and shale | 4.8+ | 21.8 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 10 | 44 | 46 | 14.5-15.5 | 8 | 6 | 17 | 15 | 39 | 15 | 0 |
| | | | 15.5-17.0 | 11 | 16 | 19 | 13 | 26 | 15 | 0 |
| | | | Mean | 10 | 12 | 18 | 14 | 31 | 15 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 14.5-17.0 | 1 | 31 | 43 | 8 | 1 | 1 | 2 | 11 | trace | trace | 2 |

**TL 74 NE 37** **7962 4839** **Rob's Farm** **Block B**

Surface level + 74.2 m
Water not struck
October 1979

Overburden 7.8 m
Mineral 17.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.6 | 0.6 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 7.2 | 7.8 |
| Kesgrave Sands and Gravels | 'Clayey' sand<br>Gravel: fine, angular flint and quartz with sandstone<br>Sand: fine and medium, quartz, yellow<br>Fines: disseminated silt and clay | 17.2+ | 25.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}$ $-\frac{1}{4}$ | $+\frac{1}{4}$ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 17 | 83 | 0 | 7.8-8.8 | 20 | 77 | 3 | 0 | 0 | 0 | 0 |
| | | | 8.8-9.8 | No grading results | | | | | | |
| | | | 9.8-10.8 | 23 | 75 | 2 | 0 | 0 | 0 | 0 |
| | | | 10.8-11.8 | 8 | 53 | 39 | 0 | 0 | 0 | 0 |
| | | | 11.8-12.8 | 24 | 41 | 35 | 0 | 0 | 0 | 0 |
| | | | 12.8-13.8 | 18 | 78 | 4 | 0 | 0 | 0 | 0 |
| | | | 13.8-14.8 | 19 | 79 | 2 | 0 | 0 | 0 | 0 |
| | | | 14.8-15.8 | 22 | 33 | 43 | 2 | 0 | 0 | 0 |
| | | | 15.8-16.8 | 18 | 45 | 34 | 3 | 0 | 0 | 0 |
| | | | 16.8-17.8 | 12 | 42 | 44 | 2 | 0 | 0 | 0 |
| | | | 17.8-18.8 | 12 | 56 | 32 | 0 | 0 | 0 | 0 |
| | | | 18.8-19.8 | 33 | 44 | 23 | 0 | 0 | 0 | 0 |
| | | | 19.8-20.8 | 17 | 45 | 36 | 1 | 1 | 0 | 0 |
| | | | 20.8-21.8 | 17 | 42 | 40 | 1 | 0 | 0 | 0 |
| | | | 21.8-22.8 | 14 | 69 | 17 | 0 | 0 | 0 | 0 |
| | | | 22.8-23.8 | 10 | 55 | 35 | 0 | 0 | 0 | 0 |
| | | | 23.8-25.0 | 10 | 47 | 43 | 0 | 0 | 0 | 0 |
| | | | Mean | 17 | 55 | 27 | 1 | 0 | 0 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 7.8-25.0 | 0 | 43 | 11 | 0 | 32 | 4 | 5 | 4 | 1 | 0 | 0 |

**TL 74 NE 38** **7953 4708** **Ark Farm** **Block B**

Surface level + 84.6 m
Water not struck
October 1979

Waste 20.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 19.8+ | 20.0 |

**TL 74 NE 39** **7978 4606** **King's Farm** **Block B**

Surface level + 44.9 m
Water struck at + 37.7 m
October 1979

Waste 7.2 m
Bedrock 2.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Boulder Clay | Clay, brown with abundant chalk and flint pebbles | 1.8 | 2.1 |
| | Pebbly sandy clay | 1.8 | 3.9 |
| | Clay, grey with chalk and flint pebbles | 3.3 | 7.2 |
| Upper Chalk | Chalk, hard | 2.3+ | 9.5 |

**TL 74 NE 40** **7915 4526** **Nr. Simpson's Farm** **Block A**

Surface level + 38.7 m
Water struck at + 35.2 m
October 1979

Waste 25.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Alluvium | Clay, brown with shell debris and peaty seams, thin gravel seam at base | 3.7 | 4.0 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 21.0+ | 25.0 |

**TL 74 NE 41** **7980 4512** **Nr. Paine's Manor** **Block C**

Surface level + 57.8 m
Water not struck
October 1979

Overburden 8.0 m
Mineral 17.2 m
Bedrock 0.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| Boulder Clay | Clay, brown with abundant chalk and flint pebbles | 8.0 | 8.0 |
| Kesgrave Sands and Gravels | **a** 'Clayey' pebbly sand<br>Gravel: fine and coarse, angular flint with rounded quartz<br>Sand: medium and fine with coarse, quartz and flint, brown<br>Fines: disseminated silt and clay | 7.8 | 15.8 |
| Red Crag | **b** 'Clayey' pebbly sand<br>Gravel: fine and coarse, angular flints with ironstone and well-rounded flints<br>Sand: medium and fine with coarse, iron-stained quartz<br>Fines: disseminated silt and clay | 9.4 | 25.2 |
| Upper Chalk | Chalk, soft | 0.8+ | 26.0 |

**GRADING**

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | -1/16 | +1/16 -1/4 | +1/4 -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| a | 11 | 72 | 17 | 8.0-9.0 | 7 | 8 | 65 | 9 | 8 | 3 | 0 |
| | | | | 9.0-10.0 | 6 | 10 | 69 | 5 | 5 | 2 | 3 |
| | | | | 10.0-11.0 | 8 | 9 | 44 | 6 | 16 | 17 | 0 |
| | | | | 11.0-11.6 | 10 | 15 | 59 | 5 | 6 | 5 | 0 |
| | | | | 11.6-13.7 | 13 | 8 | 36 | 8 | 21 | 14 | 0 |
| | | | | 13.7-14.7 | 15 | 63 | 17 | 4 | 1 | 0 | 0 |
| | | | | 14.7-15.5 | 13 | 48 | 32 | 7 | 0 | 0 | 0 |
| | | | | 15.5-15.8 | 13 | 77 | 9 | 1 | 0 | 0 | 0 |
| | | | | Mean | 11 | 22 | 43 | 7 | 10 | 7 | 0 |
| b | 16 | 79 | 5 | 15.8-16.8 | 25 | 25 | 35 | 11 | 4 | 0 | 0 |
| | | | | 16.8-17.8 | 5 | 47 | 33 | 10 | 5 | 0 | 0 |
| | | | | 17.8-19.1 | No grading results | | | | | | |
| | | | | 19.1-20.1 | 15 | 27 | 53 | 4 | 1 | 0 | 0 |
| | | | | 20.1-21.1 | 26 | 38 | 30 | 5 | 1 | 0 | 0 |
| | | | | 21.1-22.1 | 19 | 35 | 36 | 6 | 4 | 0 | 0 |
| | | | | 22.1-23.1 | 11 | 24 | 38 | 5 | 6 | 12 | 4 |
| | | | | 23.1-24.1 | 12 | 31 | 49 | 5 | 3 | 0 | 0 |
| | | | | 24.1-25.2 | 12 | 28 | 53 | 5 | 2 | 0 | 0 |
| | | | | Mean | 16 | 32 | 41 | 6 | 3 | 2 | 0 |
| a+b | 13 | 76 | 11 | Mean | 13 | 27 | 42 | 7 | 7 | 4 | 0 |

**COMPOSITION**

| | Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | | W R | Ang. | Patin. | | | | | | | | |
| a | 8.0-15.8 | 3 | 73 | 5 | 0 | 16 | trace | 0 | 2 | 0 | trace | 1 |
| b | 15.8-25.2 | 5 | 63 | 3 | 0 | 4 | trace | 0 | 1 | 0 | 23 | 1 |

**TL 74 SW 27** **7085 4497** **Cotton Hall** **Block A**

Surface level + 55.2 m
Water struck at + 51.1 m
November 1979

Overburden 4.1 m
Mineral 9.1 m
Bedrock 0.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.4 | 0.4 |
| Alluvium | Silty clay, brown | 0.9 | 1.3 |
| | Silt with peat, blue-grey with fine chalk pebbles | 1.2 | 2.5 |
| | Silty peat with remains of grass, twigs, gastropod and lamellibranch shells, and seams of black angular flints | 1.6 | 4.1 |
| | Gravel with a seam of sandy silt between 5.2 m and 5.5 m<br>Gravel: fine and coarse, angular flint with rounded chalk and quartzite<br>Sand: coarse and medium with fine, flint with chalk and quartzite | 9.1 | 13.2 |
| Upper Chalk | Chalk, soft | 0.8+ | 14.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 3 | 41 | 56 | 4.1-5.2 | 5 | 4 | 5 | 9 | 36 | 41 | 0 |
| | | | 5.2-5.5 | Sandy silt with peat | | | | | | |
| | | | 5.5-6.5 | 4 | 5 | 10 | 19 | 45 | 17 | 0 |
| | | | 6.5-7.5 | 3 | 5 | 17 | 18 | 33 | 24 | 0 |
| | | | 7.5-8.7 | 3 | 4 | 20 | 20 | 33 | 20 | 0 |
| | | | 8.7-9.7 | 2 | 8 | 20 | 23 | 34 | 13 | 0 |
| | | | 9.7-10.7 | 3 | 8 | 21 | 22 | 27 | 19 | 0 |
| | | | 10.7-11.7 | 0 | 2 | 13 | 20 | 43 | 22 | 0 |
| | | | 11.7-13.2 | 6 | 5 | 19 | 26 | 35 | 5 | 4 |
| | | | Mean | 3 | 5 | 16 | 20 | 35 | 20 | 1 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 4.1-13.2 | 0 | 65 | 2 | 22 | trace | 5 | 2 | 2 | 1 | trace | 1 |

**TL 74 SW 28** **7029 4442** **Nr. Bull's Farm** **Block A**

Surface level + 72.0 m
Water not struck
October 1979

Waste 7.9 m
Bedrock 2.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Clay, brown becoming grey with chalk and flint pebbles | 7.7 | 7.9 |
| Upper Chalk | Chalk, soft | 2.0+ | 9.9 |

**TL 74 SW 29** **7075 4386** **Water Hall** **Block A**

Surface level + 52.3 m
Water struck at + 50.4 m
November 1979

Waste 5.5 m
Bedrock 1.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.4 | 0.4 |
| Alluvium | Clay, brown | 1.5 | 1.9 |
| | Silty clay, grey | 1.3 | 3.2 |
| | Peat, brown | 2.3 | 5.5 |
| Upper Chalk | Chalk, soft | 1.5+ | 7.0 |

**TL 74 SW 30** **7097 4320** **Ains Ford** **Block A**

Surface level + 54.8 m
Water struck at + 50.6 m
October 1979

Overburden 1.2 m
Mineral 3.8 m
Waste 1.6 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil and subsoil | 1.2 | 1.2 |
| First Terrace | 'Clayey' gravel<br>Gravel: fine and coarse with cobbles, angular flint with rounded chalk<br>Sand: coarse, medium and fine, quartz, flint and chalk,brownish grey<br>Fines: disseminated silt and clay | 3.8 | 5.0 |
| Boulder Clay | Clay, grey with pebbles of chalk and flint | 1.6+ | 6.6 |

Borehole terminated due to adequate local data at depth

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | -1/16 | +1/16 -1/4 | +1/4 -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 13 | 35 | 52 | 1.2-2.4 | 13 | 9 | 12 | 12 | 24 | 30 | 0 |
| | | | 2.4-3.4 | 19 | 9 | 13 | 9 | 25 | 21 | 4 |
| | | | 3.4-4.2 | 12 | 14 | 15 | 13 | 24 | 16 | 6 |
| | | | 4.2-5.0 | 5 | 4 | 12 | 17 | 30 | 28 | 4 |
| | | | Mean | 13 | 9 | 13 | 13 | 25 | 24 | 3 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 1.2-5.0 | 1 | 77 | 7 | 5 | 2 | 4 | 2 | trace | trace | 1 | 1 |

**TL 74 SW 31** **7028 4303** **Watsoe Bridge** **Block A**

Surface level + 66.4 m
Water not struck
November 1979

Waste 25.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.5 | 0.5 |
| Glacial Sand and Gravel, upper | Silty clay, brown | 0.9 | 1.4 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 23.6+ | 25.0 |

**TL 74 SW 32** **7059 4233** **Chadwells** **Block C**

Surface level + 59.7 m
Water struck at + 48.4 m
October 1979

Overburden 0.3 m
Mineral 5.8 m
Waste 14.1 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Glacial Sand and Gravel, upper | **a** 'Very clayey' sandy gravel<br>Gravel: fine with coarse, angular flint and rounded chalk<br>Sand: medium, fine and coarse, quartz and chalk, brown<br>Fines: disseminated silt and clay | 5.8 | 6.1 |
| Boulder Clay | Clay, grey with chalk, shale and flint pebbles | 5.2 | 11.3 |
| Glacial Sand and Gravel, upper | **b** Gravel<br>Gravel: coarse and fine, chalk with limestone, septarian nodules, angular flint, sandstone and argillaceous rocks<br>Sand: medium and coarse with fine, quartz, flint and chalk | 1.3 | 12.6 |
| Boulder Clay | Clay, grey with chalk, flint and shale pebbles | 7.6+ | 20.2 |

**GRADING**

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}$ $-\frac{1}{4}$ | $+\frac{1}{4}$ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| **a** | 34 | 36 | 30 | 0.3-4.6 | 35 | 13 | 14 | 12 | 23 | 3 | 0 |
| | | | | 4.6-6.1 | 29 | 10 | 12 | 9 | 22 | 18 | 0 |
| | | | | Mean | 34 | 12 | 13 | 11 | 23 | 7 | 0 |
| **b** | 8 | 31 | 61 | 11.3-12.6 | 8 | 7 | 13 | 11 | 19 | 42 | 0 |
| **a+b** | 29 | 35 | 36 | Mean | 29 | 11 | 13 | 11 | 22 | 14 | 0 |

**COMPOSITION**

| | Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | | | Chalk | Quartz | Quartzite | Sandstone | Argillaceous rocks | Fossil debris | Ironstone | Others |
| | | W R | Ang. | Patin. | | | | | | | | |
| a | 0.3-6.1 | trace | 45 | 10 | 35 | 1 | 2 | 3 | trace | 2 | 1 | 1 |
| b | 11.3-12.6 | 1 | 11 | 2 | 42 | 1 | 3 | 6 | 5 | 3 | 1 | 25* |

* includes 24% limestone and septarian nodules

**TL 74 SW 33** **7053 4060** **Wash Bridge** **Block C**

Surface level + 80.2 m
Water struck at + 65.2 m
November 1979

Overburden 5.6 m
Mineral 14.0 m
Bedrock 2.4 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Boulder Clay | Clay, brown | 1.1 | 1.4 |
| | Clay, brown becoming grey with abundant chalk and flint pebbles | 4.7 | 5.6 |
| Kesgrave Sands and Gravels | **a** Sand, with clayey seams<br>Sand: medium and fine, quartz, yellow | 9.8 | 15.4 |
| Red Crag | **b** Pebbly sand<br>Gravel: fine and coarse, angular and well-rounded flint, with quartzite<br>Sand: medium and coarse with fine, quartz with flint, orange becoming iron-stained | 4.2 | 19.6 |
| Upper Chalk | Chalk, soft | 2.4+ | 22.0 |

**GRADING**

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| a | 6 | 94 | 0 | 5.6-6.6 | 5 | 7 | 82 | 5 | 1 | 0 | 0 |
| | | | | 6.6-7.6 | 5 | 28 | 64 | 2 | 1 | 0 | 0 |
| | | | | 7.6-8.6 | 12 | 85 | 3 | 0 | 0 | 0 | 0 |
| | | | | 8.6-9.6 | 11 | 88 | 1 | 0 | 0 | 0 | 0 |
| | | | | 9.6-10.6 | 9 | 46 | 42 | 3 | 0 | 0 | 0 |
| | | | | 10.6-11.6 | 1 | 28 | 70 | 1 | 0 | 0 | 0 |
| | | | | 11.6-12.6 | 4 | 45 | 50 | 1 | 0 | 0 | 0 |
| | | | | 12.6-14.0 | 4 | 33 | 62 | 1 | 0 | 0 | 0 |
| | | | | 14.0-15.4 | 4 | 49 | 42 | 2 | 2 | 1 | 0 |
| | | | | Mean | 6 | 45 | 47 | 2 | 0 | 0 | 0 |
| b | 3 | 78 | 19 | 15.4-16.4 | 5 | 19 | 36 | 17 | 13 | 10 | 0 |
| | | | | 16.4-17.4 | No grading results | | | | | | |
| | | | | 17.4-18.4 | 2 | 8 | 46 | 32 | 11 | 1 | 0 |
| | | | | 18.4-19.6 | 3 | 12 | 43 | 20 | 9 | 13 | 0 |
| | | | | Mean | 3 | 13 | 42 | 23 | 11 | 8 | 0 |
| a+b | 5 | 90 | 5 | Mean | 5 | 37 | 46 | 7 | 3 | 2 | 0 |

**COMPOSITION**

| | Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | | W R | Ang. | Patin. | | | | | | | | |
| b | 15.4-19.6 | 32 | 50 | 5 | 0 | 4 | 6 | trace | trace | 0 | 3 | 0 |

**TL 74 SW 34** **7134 4497** **Nr. Boyton End House** **Block A**

Surface level + 80.5 m
Water not struck
November 1979

Waste 19.7 m
Bedrock 1.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.5 | 0.5 |
| Boulder Clay | Clay, brown becoming grey with chalk, flint and shale pebbles | 17.2 | 17.7 |
| Glacial Sand and Gravel, upper | Pebbly sandy clay, orange becoming grey | 2.0 | 19.7 |
| Upper Chalk | Chalk, soft | 1.0+ | 20.7 |

**TL 74 SW 35** **7188 4477** **Boyton End House** **Block B**

Surface level + 79.4 m
Water not struck
October 1979

Waste 14.6 m
Bedrock 0.9 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil and subsoil | 0.6 | 0.6 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 14.0 | 14.6 |
| Upper Chalk | Chalk, soft | 0.9+ | 15.5 |

**TL 74 SW 36** **7187 4344** **Floriston Hall** **Block B**

Surface level + 76.7 m
Water not struck
October 1979

Overburden 0.9 m
Mineral 2.5 m
Waste 17.1 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Glacial Sand and Gravel, upper | Pebbly sandy clay, orange-brown | 0.7 | 0.9 |
| | 'Very clayey' sandy gravel<br>Gravel: coarse and fine, angular flint with sandstone and ironstone<br>Sand: medium and fine with coarse, quartz, orange-brown<br>Fines: disseminated silt and clay | 2.5 | 3.4 |
| Boulder Clay | Clay, brown becoming grey, with pebbles of chalk, flint and shale | 17.1+ | 20.5 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 20 | 44 | 36 | 0.9-1.9 | No grading results | | | | | | |
| | | | 1.9-3.4 | 20 | 14 | 21 | 9 | 15 | 21 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 1.9-3.4 | 0 | 76 | 3 | 0 | 3 | 2 | 8 | 1 | 0 | 6 | 1 |

**TL 74 SW 37** **7120 4264** **New England** **Block A**

Surface level +53.1 m
Water not struck
November 1979

Overburden 0.7 m
Mineral 3.3 m
Waste 23.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| First Terrace | Pebbly silt, brown | 0.4 | 0.7 |
| | 'Very clayey' sandy gravel<br>Gravel: fine and coarse, angular flint with chalk<br>Sand: medium coarse and fine, quartz and flint<br>Fines: disseminated silt and clay | 3.3 | 4.0 |
| Boulder Clay | Clay, grey with abundant chalk and flint pebbles | 23.0+ | 27.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 25 | 45 | 30 | 0.7-1.7 | 29 | 11 | 25 | 12 | 18 | 5 | 0 |
| | | | 1.7-2.7 | 26 | 14 | 22 | 17 | 14 | 7 | 0 |
| | | | 2.7-4.0 | 21 | 10 | 16 | 11 | 21 | 18 | 3 |
| | | | Mean | 25 | 12 | 20 | 13 | 18 | 11 | 1 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 0.7-4.0 | 1 | 79 | 3 | 7 | 2 | 1 | 3 | 1 | 1 | trace | 2 |

**TL 74 SW 38** **7153 4186** **Woolpit Cottages** **Block C**

Surface level + 75.2 m
Water struck at + 71.4 m
October 1979

Overburden 2.1 m
Mineral 4.6 m
Waste 15.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Boulder Clay | Clay, brown with chalk and flint pebbles | 0.5 | 0.8 |

| | | | |
|---|---|---|---|
| Glacial Sand and Gravel, upper | Pebbly sandy clay, orange-brown | 1.3 | 2.1 |
| | 'Clayey' gravel<br>Gravel: fine and coarse, rounded chalk and angular flint<br>Sand: coarse and medium with fine quartz with chalk from 3.8 m, orange-brown<br>Fines: disseminated silt and clay | 4.6 | 6.7 |
| Boulder Clay | Clay, grey with chalk pebbles | 15.0+ | 21.7 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}$ $-\frac{1}{4}$ | $+\frac{1}{4}$ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 16 | 28 | 56 | 2.1-3.8 | 21 | 10 | 10 | 8 | 23 | 28 | 0 |
| | | | 3.8-6.7 | 13 | 3 | 7 | 18 | 39 | 20 | 0 |
| | | | Mean | 16 | 6 | 8 | 14 | 33 | 23 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 2.1-6.7 | 0 | 37 | 9 | 44 | 1 | 1 | 2 | trace | 1 | 1 | 4 |

**TL 74 SW 39** **7247 4395** **Nr. Preston's Farm** **Block B**

Surface level + 81.3 m
Water not struck
October 1979

| | |
|---|---|
| Overburden | 0.7 m |
| Mineral | 2.1 m |
| Waste | 4.8 m |
| Mineral | 4.1 m |
| Waste | 5.7 m |
| Mineral | 4.3 m |
| Bedrock | 1.3 m+ |

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil and subsoil | 0.7 | 0.7 |
| Glacial Sand and Gravel, upper | **a** 'Very clayey' sandy gravel<br>Gravel: fine and coarse, rounded chalk with angular flint<br>Sand: medium with coarse and fine, quartz, orange-brown<br>Fines: disseminated silt and clay | 2.1 | 2.8 |
| Boulder Clay | Clay, brown becoming grey with chalk and flint pebbles | 4.8 | 7.6 |
| Glacial Sand and Gravel, upper | **b** 'Clayey' gravel<br>Gravel: coarse and fine with cobbles, angular flint with rounded chalk<br>Sand: coarse and medium with fine, quartz with chalk, brown<br>Fines: disseminated silt and clay | 4.1 | 11.7 |
| Boulder Clay | Clay, black with chalk, flint and shale pebbles | 5.7 | 17.4 |

| | | | | |
|---|---|---|---|---|
| Kesgrave Sands and Gravels | **c** 'Clayey' sand<br>Gravel: fine<br>Sand: fine with medium and coarse, quartz, orange<br>Fines: disseminated silt and clay with clay seams | | 2.0 | 19.4 |
| Red Crag | **d** 'Very clayey' pebbly sand<br>Gravel: fine and coarse, angular and well-rounded flint with rounded quartz and ironstone<br>Sand: fine and medium with coarse, quartz, reddish brown<br>Fines: disseminated silt and clay | | 2.3 | 21.7 |
| Upper Chalk | Chalk, soft | | 1.3+ | 23.0 |

**GRADING**

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| **a** | 29 | 51 | 20 | 0.7-2.8 | 29 | 7 | 34 | 10 | 13 | 7 | 0 |
| **b** | 17 | 30 | 53 | 7.6-8.8 | 17 | 6 | 13 | 10 | 20 | 27 | 7 |
| | | | | 8.8-10.8 | 17 | 5 | 10 | 13 | 18 | 35 | 2 |
| | | | | 10.8-11.7 | 16 | 4 | 12 | 13 | 18 | 31 | 6 |
| | | | | Mean | 17 | 6 | 12 | 12 | 18 | 30 | 5 |
| **c** | 13 | 86 | 1 | 17.4-18.2 | 16 | 52 | 24 | 6 | 2 | 0 | 0 |
| | | | | 18.2-19.4 | 10 | 71 | 13 | 5 | 1 | 0 | 0 |
| | | | | Mean | 13 | 63 | 18 | 5 | 1 | 0 | 0 |
| **d** | 23 | 71 | 6 | 19.4-21.5 | 24 | 33 | 29 | 11 | 4 | 0 | 0 |
| | | | | 21.5-21.7 | 14 | 33 | 20 | 6 | 5 | 22 | 0 |
| | | | | Mean | 23 | 33 | 28 | 10 | 4 | 2 | 0 |
| **a+b +c+d** | 19 | 54 | 27 | Mean | 19 | 23 | 21 | 0 | 11 | 14 | 2 |

**COMPOSITION**

| | Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | | W R | Ang. | Patin. | | | | | | | | |
| **b** | 7.6-11.7 | 2 | 82 | 2 | 8 | trace | 2 | 2 | 0 | 1 | 1 | trace |
| **d** | 19.4-21.7 | 27 | 53 | 2 | 0 | 8 | 4 | 1 | trace | 0 | 5 | trace |

**TL 74 SW 40** **7244 4288** **Baythorne End** **Block A**

Surface level + 51.6 m
Water not struck
November 1979

| | |
|---|---|
| Overburden | 1.0 m |
| Mineral | 1.1 m |
| Waste | 15.9 m |
| Bedrock | 2.0 m+ |

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.5 | 0.5 |

| | | | |
|---|---|---|---|
| First Terrace | Pebbly silt, brown | 0.5 | 1.0 |
| | 'Very clayey' sandy gravel<br>Gravel: fine and coarse, angular flint with chalk, limestone, and septarian nodules<br>Sand: medium with coarse and fine, quartz and flint<br>Fines: disseminated silt and clay | 1.1 | 2.1 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 15.9 | 18.0 |
| Upper Chalk | Chalk, soft | 2.0+ | 20.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | | |
| | | | | -$\frac{1}{16}$ | +$\frac{1}{16}$ -$\frac{1}{4}$ | +$\frac{1}{4}$ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm | |
| 28 | 42 | 30 | 1.0-2.1 | 28 | 10 | 22 | 10 | 18 | 12 | 0 | |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 1.0-2.1 | 0 | 72 | 0 | 9 | 1 | 2 | trace | 1 | 4 | 3 | 8* |

* includes 8% limestone and septarian nodules

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**TL 74 SW 41** **7203 4097** **Whitleys** **Block C**

Surface level + 83.0 m
Water struck at + 69.0 m
November 1979

Waste 20.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 13.8 | 14.0 |
| Glacial Sand and Gravel, upper | Gravel<br>Gravel: coarse and fine, rounded chalk with angular flint, limestone, septarian nodules, and argillaceous rocks<br>Sand: medium and coarse with fine, quartz and flint | 1.1 | 15.1 |
| Boulder Clay | Clay, grey with pebbles of chalk and flint | 4.9+ | 20.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | | |
| | | | | -$\frac{1}{16}$ | +$\frac{1}{16}$ -$\frac{1}{4}$ | +$\frac{1}{4}$ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm | |
| 9 | 25 | 66 | 14.0-15.1 | 9 | 4 | 13 | 8 | 30 | 36 | 0 | |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 14.0-15.1 | trace | 21 | 2 | 44 | 1 | 1 | 3 | 10 | 2 | trace | 16* |

* includes 16% limestone and septarian nodules

**TL 74 SW 42** **7353 4454** **Farmer's Farm** **Block B**

Surface level + 81.2 m
Water struck at + 66.9 m
October 1979

Overburden 14.3 m
Mineral 8.8 m
Bedrock 0.9 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 13.0 | 13.2 |
| Barham Sands and Gravels | Pebbly silt, brown | 1.1 | 14.3 |
| | **a** 'Clayey' pebbly sand<br>Gravel: coarse and fine, angular flint and rounded chalk with quartz<br>Sand: medium with fine and coarse, quartz and flint<br>Fines: disseminated silt and clay | 2.0 | 16.3 |
| Red Crag | **b** 'Clayey' pebbly sand<br>Gravel: fine and coarse, angular flint with rounded quartz, well-rounded flint and argillaceous rocks<br>Sand: fine and medium with coarse, quartz and mica<br>Fines: disseminated silt and clay | 6.8 | 23.1 |
| Upper Chalk | Chalk, soft | 0.9+ | 24.0 |

**GRADING**

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}$ $-\frac{1}{4}$ | $+\frac{1}{4}$ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| **a** | 6 | 81 | 13 | 14.3-15.3 | 6 | 13 | 45 | 15 | 9 | 12 | 0 |
| | | | | 15.3-16.3 | 6 | 14 | 64 | 12 | 3 | 1 | 0 |
| | | | | Mean | 6 | 14 | 54 | 13 | 6 | 7 | 0 |
| **b** | 11 | 84 | 5 | 16.3-17.3 | 13 | 35 | 39 | 10 | 3 | 0 | 0 |
| | | | | 17.3-18.3 | 13 | 69 | 13 | 3 | 2 | 0 | 0 |
| | | | | 18-3-19.3 | 10 | 28 | 53 | 7 | 1 | 1 | 0 |
| | | | | 19.3-20.3 | 9 | 51 | 23 | 15 | 2 | 0 | 0 |
| | | | | 20.3-21.3 | 12 | 43 | 29 | 12 | 4 | 0 | 0 |
| | | | | 21.3-23.1 | 12 | 36 | 29 | 10 | 6 | 7 | 0 |
| | | | | Mean | 11 | 43 | 31 | 10 | 3 | 2 | 0 |
| **a+b** | 10 | 83 | 7 | Mean | 10 | 36 | 36 | 11 | 4 | 3 | 0 |

**COMPOSITION**

| | Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | | W R | Ang. | Patin. | | | | | | | | |
| a | 14.3-16.3 | 0 | 45 | 0 | 33 | 6 | 4 | 3 | 3 | trace | 4 | 2 |
| b | 16.3-23.1 | 8 | 65 | 0 | 0 | 15 | 3 | 3 | 5 | 0 | 1 | trace |

**TL 74 SW 43** **7366 4375** **Stoke by Clare** **Block B**

Surface level + 70.4 m
Water not struck
October 1979

Overburden 14.3 m
Mineral* 3.9 m
Bedrock 1.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 14.1 | 14.3 |
| Barhams Sands and Gravels | 'Clayey' sand<br>Gravel: fine, angular flint with rounded quartz and rounded chalk<br>Sand: medium and fine, quartz and flint, yellowish-brown<br>Fines: disseminated silt and clay | 3.9 | 18.2 |
| Upper Chalk | Chalk, soft | 1.3+ | 19.5 |

* grades as mineral, but underlies excessive overburden

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 13 | 85 | 2 | 14.3-15.3 | 17 | 33 | 48 | 1 | 1 | 0 | 0 |
| | | | 15.3-16.0 | 10 | 33 | 48 | 4 | 4 | 1 | 0 |
| | | | 16.0-17.0 | 11 | 45 | 39 | 3 | 2 | 0 | 0 |
| | | | 17.0-18.2 | 12 | 36 | 47 | 3 | 1 | 1 | 0 |
| | | | Mean | 13 | 37 | 45 | 3 | 2 | 0 | 0 |

**COMPOSITION**

| | Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | | W R | Ang. | Patin. | | | | | | | | |
| | 14.3-18.2 | 0 | 46 | 26 | 10 | 13 | 2 | 3 | trace | 0 | 0 | trace |

**TL 74 SW 44** **7310 4310** **Chapel Street Farm** **Block A**

Surface level + 51.1 m
Water not struck
October 1979

Overburden 0.7 m
Mineral 3.1 m
Waste 17.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil and subsoil | 0.7 | 0.7 |
| First-Second Terrace | 'Very clayey' sandy gravel, with orange-brown sandy silt between 2.8 m and 3.0 m<br>Gravel: fine and coarse, angular flint with rounded chalk<br>Sand: medium and fine with coarse, quartz with chalk, orange-brown<br>Fines: disseminated silt and clay | 3.1 | 3.8 |
| Glacial Silt | Silt, laminated, brown becoming grey with clay laminae from 12.0 m | 17.2+ | 21.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | -1/16 | +1/16 -1/4 | +1/4 -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 27 | 50 | 23 | 0.7-1.2 | 30 | 24 | 24 | 5 | 15 | 2 | |
| | | | 1.2-2.8 | 27 | 18 | 21 | 9 | 18 | 7 | |
| | | | 2.8-3.0 | Sandy silt | | | | | | |
| | | | 3.0-3.8 | No grading data | | | | | | |
| | | | Mean | 27 | 20 | 22 | 8 | 17 | 6 | |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 0.7-3.8 | 0 | 61 | 23 | 7 | 1 | trace | 2 | 2 | trace | 1 | 3 |

**TL 74 SW 45** **7313 4228** **Baythorne Park** **Block C**

Surface level + 76.7 m
Water not struck
November 1979

Overburden 0.5 m
Mineral 2.9 m
Waste 6.8 m
Bedrock 1.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.5 | 0.5 |
| Glacial Sand and Gravel, upper | 'Very clayey' gravel<br>Gravel: coarse and fine, angular flint with rounded chalk, sandstone and quartzite<br>Sand: medium, fine and coarse, quartz and flint, brown<br>Fines: disseminated silt and clay | 2.9 | 3.4 |

| | | | |
|---|---|---|---|
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 5.8 | 9.2 |
| | Silt, mottled brown and grey | 1.0 | 10.2 |
| Upper Chalk | Chalk, soft | 1.8+ | 12.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}$ $-\frac{1}{4}$ | $+\frac{1}{4}$ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm | |
| 28 | 36 | 36 | 0.5-1.5 | 22 | 17 | 19 | 6 | 11 | 25 | 0 | |
| | | | 1.5-2.5 | 29 | 10 | 13 | 12 | 19 | 17 | 0 | |
| | | | 2.5-3.4 | 33 | 8 | 11 | 10 | 19 | 18 | 0 | |
| | | | Mean | 28 | 12 | 14 | 10 | 16 | 20 | 0 | |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 0.5-3.4 | 0 | 58 | 4 | 23 | 1 | 5 | 6 | 1 | trace | 1 | 1 |

**TL 74 SW 46** **7428 4462** **Twelve Acre Plantation** **Block B**

Surface level + 69.0 m
Water not struck
October 1979

Overburden 3.2 m
Mineral 15.6 m
Bedrock 1.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Boulder Clay | Clay, brown with abundant chalk and flint pebbles | 2.9 | 3.2 |
| Barham Sands and Gravels | **a** 'Very clayey' pebbly sand<br>Gravel: fine with coarse, angular flint and rounded quartz with quartzite<br>Sand: fine with medium, quartz, quartzite and some flint<br>Fines: disseminated silt and clay | 2.0 | 5.2 |
| Kesgrave Sands and Gravels | **b** 'Very clayey' sand<br>Sand: fine, quartz with flint<br>Fines: disseminated silt and clay | 3.2 | 8.4 |
| Red Crag | **c** 'Clayey' pebbly sand<br>Gravel: fine and coarse, angular flint and ironstone with rounded quartz<br>Sand: medium and fine with coarse, quartz iron-stained<br>Fines: disseminated silt and clay | 10.4 | 18.8 |
| Upper Chalk | Chalk, soft | 1.2+ | 20.0 |

**GRADING**

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| a | 25 | 70 | 5 | 3.2-4.2 | 25 | 59 | 13 | 1 | 1 | 1 | 0 |
| | | | | 4.2-5.2 | 26 | 45 | 19 | 3 | 5 | 2 | 0 |
| | | | | Mean | 25 | 52 | 16 | 2 | 4 | 1 | 0 |
| b | 20 | 80 | 0 | 5.2-6.2 | 20 | 72 | 6 | 1 | 1 | 0 | 0 |
| | | | | 6.2-6.9 | 23 | 74 | 3 | 0 | 0 | 0 | 0 |
| | | | | 6.9-8.4 | 19 | 78 | 2 | 1 | 0 | 0 | 0 |
| | | | | Mean | 20 | 75 | 4 | 1 | 0 | 0 | 0 |
| c | 14 | 81 | 5 | 8.4-9.4 | 16 | 32 | 44 | 6 | 2 | 0 | 0 |
| | | | | 9.4-10.4 | 30 | 24 | 32 | 4 | 6 | 4 | 0 |
| | | | | 10.4-11.4 | 12 | 37 | 38 | 9 | 2 | 2 | 0 |
| | | | | 11.4-12.4 | 7 | 28 | 46 | 16 | 3 | 0 | 0 |
| | | | | 12.4-13.4 | 11 | 29 | 43 | 15 | 1 | 1 | 0 |
| | | | | 13.4-14.4 | 12 | 34 | 37 | 14 | 2 | 1 | 0 |
| | | | | 14.4-15.4 | 17 | 23 | 43 | 15 | 1 | 1 | 0 |
| | | | | 15.4-16.4 | 10 | 32 | 39 | 14 | 3 | 2 | 0 |
| | | | | 16.4-17.4 | 11 | 27 | 38 | 14 | 2 | 4 | 4 |
| | | | | 17.4-18.8 | 16 | 26 | 38 | 14 | 2 | 4 | 0 |
| | | | | Mean | 14 | 29 | 40 | 12 | 3 | 2 | 0 |
| a+b+c | 17 | 80 | 3 | Mean | 17 | 41 | 29 | 9 | 2 | 1 | 0 |

**COMPOSITION**

| | Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | | W R | Ang. | Patin. | | | | | | | | |
| a | 3.2-5.2 | 0 | 52 | 4 | 0 | 26 | 13 | 2 | 2 | 0 | 1 | trace |
| c | 8.4-18.1 | 2 | 19 | 32 | 0 | 10 | 1 | 2 | trace | 0 | 34 | 0 |

**TL 74 SW 47** **7498 4424** **Moor Hall** **Block A**

Surface level + 49.1 m
Water not struck
November 1979

Overburden 2.4 m
Mineral 2.3 m
Waste 21.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Railway embankment | 2.2 | 2.2 |
| First Terrace | Pebbly sandy silt | 0.2 | 2.4 |
| | 'Very clayey' sandy gravel<br>Gravel: fine and coarse, angular flint with rounded chalk<br>Sand: medium and fine with coarse, quartz and flint<br>Fines: disseminated silt and clay | 2.3 | 4.7 |
| Boulder Clay | Clay, grey with abundant chalk and flint pebbles | 21.3+ | 26.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | -1/16 | +1/16 -1/4 | +1/4 -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 21 | 49 | 30 | 2.4-3.4 | 20 | 21 | 21 | 8 | 20 | 10 | 0 |
| | | | 3.4-4.7 | 21 | 18 | 20 | 10 | 18 | 13 | 0 |
| | | | Mean | 21 | 19 | 21 | 9 | 19 | 11 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 2.4-4.7 | 0 | 68 | 7 | 16 | 1 | 2 | 1 | 1 | 1 | 2 | 1 |

**TL 74 SW 48** **7475 4368** **Stoke by Clare** **Block A**

Surface level + 46.6 m
Water struck at + 45.3 m
November 1979

Overburden 1.3 m
Mineral 2.3 m
Waste 21.4 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil and subsoil | 0.7 | 0.7 |
| Alluvium | Pebbly sandy clay, brown | 0.6 | 1.3 |
| | Gravel<br>Gravel: fine and coarse, angular flint with chalk and quartzite<br>Sand: coarse, medium and fine, flint and chalk | 2.3 | 3.6 |
| Boulder Clay | Clay, grey with chalk, flint and shale pebbles | 21.4+ | 25.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | -1/16 | +1/16 -1/4 | +1/4 -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 5 | 45 | 50 | 1.3-2.3 | 8 | 13 | 20 | 14 | 28 | 17 | 0 |
| | | | 2.3-3.6 | 2 | 11 | 13 | 21 | 28 | 25 | 0 |
| | | | Mean | 5 | 12 | 16 | 17 | 28 | 22 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 1.3-3.6 | 0 | 70 | 3 | 11 | 3 | 6 | 2 | trace | 1 | trace | 4 |

**TL 74 SW 49** **7428 4299** **Stoke Bridge** **Block A**

Surface level + 47.1 m
Water struck at + 44.5 m
November 1979

Overburden 5.4 m
Mineral* 1.1 m
Waste 17.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil and subsoil | 0.6 | 0.6 |
| Alluvium | Silty clay, brown | 2.0 | 2.6 |
| | Sandy silt, grey | 1.3 | 3.9 |
| | Silt with peat, brown | 0.7 | 4.6 |
| | Silt | 0.8 | 5.4 |
| | Gravel<br>Gravel: coarse and fine, angular flint with chalk, limestone, septarian nodules and sandstone<br>Sand: medium and coarse with fine, chalk, septarian nodules, flint and quartz, grey | 1.1 | 6.5 |
| Boulder Clay | Clay, grey with pebbles of chalk, flint and shale | 17.5+ | 24.0 |

* grades as mineral, but is overlain by excessive overburden

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 6 | 36 | 58 | 5.4-6.5 | 6 | 8 | 18 | 10 | 22 | 36 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 5.4-6.5 | 1 | 50 | 3 | 16 | 1 | 2 | 5 | 1 | 3 | 1 | 17* |

* includes 14% limestone and septarian nodules

**TL 74 SW 50** **7420 4215** **Ashen** **Block C**

Surface level + 86.0 m
Water not struck
October 1979

Overburden 1.2 m
Mineral 3.0 m
Waste 21.4 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.4 | 0.4 |

| | | | |
|---|---|---|---|
| Glacial Sand and Gravel, upper | Pebbly sandy clay, orange-brown | 0.8 | 1.2 |
| | 'Very clayey' gravel<br>Gravel: coarse and fine, angular flint<br>Sand: medium and coarse with fine, flint and quartz, orange-brown<br>Fines: disseminated silt and clay | 3.0 | 4.2 |
| Boulder Clay | Clay, grey with pebbles of chalk and shale | 21.4+ | 25.6 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | -1/16 | +1/16 -1/4 | +1/4 -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 22 | 30 | 48 | 1.2-4.2 | 22 | 7 | 12 | 11 | 16 | 23 | 9 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 1.2-4.2 | trace | 85 | 10 | 0 | 1 | 1 | trace | 1 | 0 | 2 | 0 |

**TL 74 SW 51** **7455 4069** **Tilbury Green** **Block C**

Surface level + 75.0 m
Water not struck
October 1979

Waste 21.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil and subsoil | 0.8 | 0.8 |
| Boulder Clay | Clay, brown, becoming grey with abundant chalk and flint pebbles | 20.5+ | 21.3 |

**TL 74 SE 10** **7575 4418** **Mill Farm** **Block C**

Surface level + 53.5 m
Water not struck
October 1979

Waste 17.3 m
Bedrock 1.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.5 | 0.5 |
| Boulder Clay | Clay, brown becoming grey with pebbles of chalk and shale | 16.8 | 17.3 |
| Upper Chalk | Chalk, soft | 1.0+ | 18.3 |

**TL 74 SE 11** **7556 4350** **Stours** **Block C**

Surface level + 53.1 m
Water struck at + 38.8 m
October 1979

Waste 14.4 m
Bedrock 0.6 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.6 | 0.6 |
| Head | Silty sandy clay, brown with some flint pebbles | 1.4 | 2.0 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 12.4 | 14.4 |
| Upper Chalk | Chalk, soft | 0.6+ | 15.0 |

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**TL 74 SE 12** **7516 4629** **Ashen Hall** **Block C**

Surface level + 74.3 m
Water not struck
November 1979

Waste 25.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 24.8+ | 25.0 |

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**TL 74 SE 13** **7549 4019** **Tilbury Hall** **Block C**

Surface level + 69.4 m
Water struck at + 59.6 m
November 1979

Waste 25.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.4 | 0.4 |
| Boulder Clay | Clay brown becoming grey with abundant chalk and flint pebbles | 8.4 | 8.8 |
| Glacial Sand and Gravel, upper | 'Very clayey' sandy gravel<br>Gravel: fine and coarse, angular flint and argillaceous rocks<br>Sand: medium and fine with coarse, quartz and flint, brown<br>Fines: matrix of clay | 1.9 | 10.7 |
| Boulder Clay | Clay, grey with abundant chalk and flint pebbles | 14.3+ | 25.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}$ $-\frac{1}{4}$ | $+\frac{1}{4}$ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 27 | 42 | 31 | 8.8-10.7 | 27 | 12 | 22 | 8 | 20 | 11 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 8.8-10.7 | 0 | 45 | 35 | 1 | trace | 1 | 3 | 6 | 2 | 4 | 3 |

**TL 74 SE 14** **7628 4441** **Mill Farm** **Block A**

Surface level + 45.0 m
Water struck at + 42.8 m
November 1979

Overburden 0.4 m
Mineral 3.6 m
Waste 17.5 m*

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.4 | 0.4 |
| First Terrace | 'Clayey' sandy gravel<br>Gravel: fine and coarse, angular with well-rounded flint and rounded chalk<br>Sand: medium with fine and coarse, quartz flint and chalk, brown<br>Fines: disseminated silt and clay | 3.6 | 4.0 |
| Boulder Clay | Clay, grey with abundant chalk and flint pebbles | 17.5+ | 21.5 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}$ $-\frac{1}{4}$ | $+\frac{1}{4}$ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 16 | 46 | 38 | 0.4-2.2 | 21 | 17 | 20 | 8 | 22 | 12 | 0 |
| | | | 2.2-4.0 | 11 | 8 | 22 | 17 | 23 | 19 | 0 |
| | | | Mean | 16 | 13 | 21 | 12 | 23 | 15 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 0.4-4.0 | 11 | 50 | 23 | 5 | 2 | 1 | 4 | 1 | trace | 1 | 2 |

**TL 74 SE 15** **7673 4398** **Claret Hall** **Block C**

Surface level + 67.1 m
Water not struck
October 1979

Overburden 13.6 m
Mineral 6.8 m
Bedrock 1.4 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.5 | 0.5 |
| Boulder Clay | Clay, brown with chalk and flint pebbles | 2.3 | 2.8 |
| | Sandy clay, orange-brown | 1.3 | 4.1 |
| | Clay, grey with abundant chalk pebbles | 9.5 | 13.6 |
| Glacial Sand and Gravel, upper | 'Very clayey' sand<br>Gravel: fine, angular flint with ironstone, quartz, limestone, and septarian nodules<br>Sand: medium and fine with coarse<br>Fines: disseminated silt and clay | 6.8 | 20.4 |
| Upper Chalk | Chalk, soft | 1.4+ | 21.8 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 24 | 74 | 2 | 13.6-15.5 | 22 | 13 | 55 | 7 | 3 | 0 | 0 |
| | | | 15.5-16.5 | 19 | 22 | 57 | 2 | 0 | 0 | 0 |
| | | | 16.5-18.1 | 28 | 40 | 27 | 3 | 2 | 0 | 0 |
| | | | 18.1-19.1 | 24 | 28 | 40 | 4 | 3 | 1 | 0 |
| | | | 19.1-20.4 | No grading data | | | | | | |
| | | | Mean | 24 | 25 | 45 | 4 | 2 | 0 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 13.6-20.4 | 0 | 66 | 6 | 2 | 9 | 0 | 0 | 2 | 0 | 10 | 5 |

**TL 74 SE 16** **7662 4322** **Nr. Claret Hall** **Block C**

Surface level + 67.0 m
Water struck at + 60.6 m
October 1979

Overburden 6.4 m
Mineral 1.6 m
Waste 9.8 m
Mineral 3.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.4 | 0.4 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 6.0 | 6.4 |

| | | | | |
|---|---|---|---|---|
| Glacial Sand and Gravel, upper | **a** Gravel<br>Gravel: fine and coarse angular flint and rounded chalk with limestone and septarian nodules<br>Sand: medium and coarse with fine, quartz and flint | 1.6 | 8.0 |
| Boulder Clay | Clay, grey with abundant chalk and flint pebbles | 9.8 | 17.8 |
| Kesgrave Sands and Gravels | **b** 'Clayey' sand<br>Gravel: fine with coarse at the base, angular flint<br>Sand: medium and fine, quartz, yellow<br>Fines: disseminated silt and clay | 3.8+ | 21.6 |

Borehole terminated due to technical difficulties

**GRADING**

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ mm |
| **a** | 2 | 39 | 59 | 6.4-8.0 | 2 | 3 | 19 | 17 | 36 | 23 | 0 |
| **b** | 14 | 84 | 2 | 17.8-18.8 | 16 | 48 | 36 | 0 | 0 | 0 | 0 |
| | | | | 18.8-19.8 | 20 | 46 | 33 | 1 | 0 | 0 | 0 |
| | | | | 19.8-21.6 | 9 | 23 | 62 | 1 | 4 | 1 | 0 |
| | | | | Mean | 14 | 35 | 48 | 1 | 2 | 0 | 0 |
| **a+b** | 10 | 71 | 19 | Mean | 10 | 26 | 39 | 6 | 12 | 7 | 0 |

**COMPOSITION**

| | Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | | W R | Ang. | Patin. | | | | | | | | |
| **a** | 6.4-8.0 | 4 | 33 | 17 | 33 | 2 | 1 | 1 | 1 | 3 | trace | 5 |

**TL 74 SE 17** **7678 4037** **Red Barn** **Block C**

Surface level + 78.0 m
Water not struck
November 1979

Waste 25.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 24.7+ | 25.0 |

**TL 74 SE 18** **7738 4369** **Bradleyhill Farm** **Block C**

Surface level + 79.3 m
Water not struck
October 1979

Overburden 16.2 m
Mineral 6.4 m
Waste 2.4 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Boulder Clay | Clay, brown becoming grey with chalk and flint pebbles | 15.9 | 16.2 |
| Glacial Sand and Gravel, upper | 'Very clayey' pebbly sand<br>Gravel: fine with coarse, angular and well-rounded flint with rounded chalk rock and sandstone<br>Sand: medium and fine with coarse, quartz chalk and flint, orange<br>Fines: disseminated silt and clay with silt seams | 6.4 | 22.6 |
| Boulder Clay | Clay, grey with pebbles of chalk and flint | 2.4+ | 25.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 30 | 59 | 11 | 16.2-18.2 | 33 | 30 | 20 | 9 | 6 | 2 | 0 |
| | | | 18.2-19.2 | 21 | 14 | 38 | 13 | 13 | 1 | 0 |
| | | | 19.2-20.2 | 23 | 16 | 43 | 13 | 5 | 0 | 0 |
| | | | 20.2-21.2 | 40 | 10 | 30 | 9 | 10 | 1 | 0 |
| | | | 21.2-22.6 | 29 | 32 | 16 | 8 | 12 | 3 | 0 |
| | | | Mean | 30 | 22 | 27 | 10 | 9 | 2 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 16.2-22.6 | 25 | 34 | 21 | 2 | 1 | 2 | 6 | 3 | 1 | 1 | 4 |

**TL 74 SE 19** **7758 4264** **Cutbush Farm** **Block C**

Surface level + 70.5 m
Water not struck
November 1979

Waste 25.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil and subsoil | 0.7 | 0.7 |
| Boulder Clay | Silt, brown | 1.3 | 2.0 |
| | Clay, brown becoming grey with abundant chalk and flint pebbles, chalk gravel between 10.5 m and 10.7 m | 23.0+ | 25.0 |

**TL 74 SE 20** **7738 4142** **Wakeshill Farm** **Block C**

Surface level + 84.0 m
Water not struck
October 1979

Waste 19.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.6 | 0.6 |
| Glacial Sand and Gravel, upper | Sandy clay, orange-brown with flint pebbles | 0.6 | 1.2 |
| Boulder Clay | Clay, brown becoming grey with chalk and flint pebbles | 17.6+ | 19.8 |

**TL 74 SE 21** **7835 4451** **Hickford Hill** **Block C**

Surface level + 74.7 m
Water struck at + 61.7 m
October 1979

Overburden 8.3 m
Mineral 6.0 m
Waste 11.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil and subsoil | 0.6 | 0.6 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk pebbles | 7.7 | 8.3 |
| Glacial Sand and Gravel, upper | 'Very clayey' sandy gravel<br>Gravel: fine and coarse, rounded chalk angular flint, limestone, and septarian nodules<br>Sand: medium and fine with coarse, quartz with chalk<br>Fines: disseminated silt and clay | 6.0 | 14.3 |
| Boulder Clay | Clay, grey becoming brown with chalk pebbles | 10.1 | 24.4 |
| Kesgrave Sands and Gravels | Sand<br>Gravel: fine with coarse subangular flint<br>Sand: medium, coarse and fine, quartz, orange | 0.9+ | 25.3 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}$ $-\frac{1}{4}$ | $+\frac{1}{4}$ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 20 | 48 | 32 | 8.3-9.3 | 20 | 23 | 38 | 8 | 8 | 3 | 0 |
| | | | 9.3-10.3 | 20 | 10 | 20 | 9 | 23 | 18 | 0 |
| | | | 10.3-11.5 | 16 | 7 | 21 | 14 | 24 | 18 | 0 |
| | | | 11.5-12.5 | 18 | 10 | 34 | 11 | 16 | 11 | 0 |
| | | | 12.5-14.3 | 22 | 15 | 16 | 13 | 21 | 11 | 2 |
| | | | Mean | 20 | 13 | 24 | 11 | 19 | 12 | 1 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 8.3-14.3 | 0 | 39 | 5 | 44 | 1 | 2 | 1 | 1 | 1 | trace | 6* |

* includes 6% limestone and septarian nodules

**TL 74 SE 22** **7845 4315** **Nr. Loveland's Farm** **Block C**

Surface level + 83.0 m
Water not struck
November 1979

Waste 21.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.4 | 0.4 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 20.6+ | 21.0 |

**TL 74 SE 23** **7872 4169** **Gage's Farm** **Block C**

Surface level + 76.4 m
Water not struck
October 1979

Overburden 2.5 m
Mineral 2.1 m
Waste 18.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil and subsoil | 0.6 | 0.6 |
| Glacial Sand and Gravel, upper | Pebbly sandy clay, orange-brown | 1.9 | 2.5 |
| | 'Very clayey' sandy gravel<br>Gravel: coarse and fine, angular flint with sandstone and ironstone<br>Sand: medium, coarse and fine, quartz, orange-brown<br>Fines: disseminated silt and clay | 2.1 | 4.6 |
| Boulder Clay | Clay, brown becoming grey with pebbles of chalk, flint and shale | 18.2+ | 22.8 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ mm |
| 25 | 39 | 36 | 2.5-3.5 | 21 | 11 | 22 | 10 | 15 | 21 | 0 |
| | | | 3.5-4.6 | 28 | 9 | 17 | 10 | 17 | 19 | 0 |
| | | | Mean | 25 | 10 | 19 | 10 | 17 | 19 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 2.5-4.6 | 0 | 55 | 14 | 0 | 3 | 2 | 16 | 2 | 0 | 8 | 0 |

**TL 74 SE 24** **7832 4032** **Twelve Acre Wood** **Block C**

Surface level +71.8 m
Water not struck
November 1979

Waste 25.0+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 24.8+ | 25.0 |

**TL 74 SE 25** **7988 4431** **Paine's Manor** **Block C**

Surface level + 74.3 m
Water not struck
November 1979

Overburden 14.0 m
Mineral 8.5 m
Waste 2.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 12.8 | 13.0 |
| | Pebbly sand, brown | 0.2 | 13.2 |
| | Clay, brown with pebbles of chalk and flint | 0.8 | 14.0 |
| Glacial Sand and Gravel, upper | 'Very clayey' pebbly sand, with a silt seam between 17.0 m and 17.5 m<br>Gravel: fine with coarse, angular flint<br>Sand: medium and fine with coarse, quartz, flint and chalk<br>Fines: disseminated silt and clay | 8.5 | 22.5 |
| Boulder Clay | Clay, brown with pebbles of chalk and flint | 2.0 | 24.5 |
| Glacial Sand and Gravel, upper | 'Clayey' sand<br>Gravel: fine and coarse quartz and chalk<br>Sand: medium, quartz and flint, yellowish brown | 0.5+ | 25.0 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 24 | 70 | 6 | 14.0-14.9 | 2 | 32 | 56 | 7 | 3 | 0 | 0 |
| | | | 14.9-15.9 | 33 | 23 | 41 | 2 | 1 | 0 | 0 |
| | | | 15.9-16.5 | 23 | 35 | 36 | 2 | 3 | 1 | 0 |
| | | | 16.5-17.0 | 28 | 15 | 32 | 9 | 13 | 3 | 0 |
| | | | 17.0-17.5 | Silt | | | | | | |
| | | | 17.5-18.2 | 38 | 23 | 32 | 3 | 4 | 0 | 0 |
| | | | 18.2-19.2 | 26 | 23 | 31 | 12 | 6 | 2 | 0 |
| | | | 19.2-20.2 | 22 | 20 | 39 | 11 | 8 | 0 | 0 |
| | | | 20.2-22.5 | No grading data | | | | | | |
| | | | Mean | 24 | 24 | 39 | 7 | 5 | 1 | 0 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 14.0-20.2 | 0 | 59 | 27 | 0 | 2 | 2 | 4 | 3 | trace | 1 | 2 |

**TL 74 SE 26 7993 4339** **Church Street** **Block C**

Surface level + 69.0 m
Water not struck
November 1979

Waste 25.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Silt, brown with some pebbles of flint and chalk | 3.5 | 3.7 |
| Glacial Sand and Gravel, upper | Pebbly sandy clay, brown | 0.8 | 4.5 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 20.5+ | 25.0 |

**TL 74 SE 27 7943 4245** **Belchamp St. Paul** **Block C**

Surface level + 74.3 m
Water struck at + 56.9 m
October 1979

Waste 25.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.4 | 0.4 |
| Glacial Sand and Gravel, upper | Pebbly sandy clay, orange-brown | 1.3 | 1.7 |
| Boulder Clay | Clay, brown becoming grey with chalk pebbles | 14.8 | 16.5 |
| Glacial Sand and Gravel, upper | 'Clayey' pebbly sand<br>Gravel: fine and coarse with cobbles at the base, rounded chalk and angular flint with sandstone<br>Sand: medium with fine and coarse, quartz with chalk, brown<br>Fines: disseminated silt and clay | 4.3 | 20.8 |
| Boulder Clay | Clay sandy, black with chalk, flint and shale pebbles | 4.5+ | 25.3 |

**GRADING**

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 15 | 67 | 18 | 16.5-17.5 | 18 | 15 | 59 | 5 | 3 | 0 | 0 |
| | | | 17.5-18.5 | 15 | 16 | 52 | 11 | 6 | 0 | 0 |
| | | | 18.5-19.5 | 18 | 15 | 50 | 8 | 7 | 2 | 0 |
| | | | 19.5-20.8 | 11 | 12 | 21 | 10 | 19 | 24 | 3 |
| | | | Mean | 15 | 15 | 44 | 8 | 9 | 8 | 1 |

**COMPOSITION**

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 16.5-20.8 | 0 | 31 | 15 | 40 | 2 | 1 | 5 | 1 | 1 | 1 | 3 |

**TL 74 SE 28** **7983 4167** **Manor Farm** **Block C**

Surface level + 73.8 m
Water not struck
November 1979

Waste 25.0+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.2 | 0.2 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 24.8+ | 25.0 |

**TL 74 SE 29** **7947 4063** **Fowe's Farm** **Block C**

Surface level + 52.4 m
Water struck at + 43.1 m
November 1979

Overburden 9.3 m
Mineral 5.9 m
Bedrock 1.3 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil | 0.3 | 0.3 |
| Head | Clay, brown | 1.2 | 1.5 |
| | Pebbly sand<br>Gravel: fine and coarse, flint and chalk<br>Sand: medium, quartz and flint | 0.2 | 1.7 |
| Boulder Clay | Clay, brown becoming grey with abundant chalk and flint pebbles | 7.6 | 9.3 |
| Glacial Sand and Gravel, upper | Pebbly sand<br>Gravel: fine and coarse, angular flint with chalk rock<br>Sand: medium and fine with coarse, quartz and flint | 5.9 | 15.2 |
| Upper Chalk | Chalk, soft | 1.3+ | 16.5 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| 5 | 78 | 17 | 9.3-10.3 | 10 | 13 | 67 | 6 | 4 | 0 | 0 |
| | | | 10.3-11.3 | 9 | 21 | 62 | 4 | 4 | 0 | 0 |
| | | | 11.3-12.3 | 3 | 10 | 54 | 6 | 11 | 16 | 0 |
| | | | 12.3-13.3 | 2 | 31 | 30 | 7 | 20 | 10 | 0 |
| | | | 13.3-14.3 | 1 | 20 | 54 | 7 | 11 | 7 | 0 |
| | | | 14.3-15.2 | 2 | 20 | 51 | 5 | 13 | 9 | 0 |
| | | | Mean | 5 | 19 | 53 | 6 | 10 | 7 | 0 |

## COMPOSITION

| Depth below surface (m) | Percentage by weight in the +16 -32 mm fraction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flint | | | Chalk | Quartz | Quartz-ite | Sand-stone | Argillac-eous rocks | Fossil debris | Iron-stone | Others |
| | W R | Ang. | Patin. | | | | | | | | |
| 9.3-16.5 | 1 | 50 | 47 | trace | 2 | trace | 0 | trace | trace | trace | trace |

## OTHER BOREHOLES

Other boreholes used in the assessment are tabulated below with their grid references.

| Borehole number* | Grid reference† | Borehole number* | Grid reference† |
|---|---|---|---|
| NW 3 | 7408 4965 | SW 8 | 7080 4118 |
| NW 4 | 7333 4877 | SW 11 | 7104 4117 |
| NW 5 | 7232 4821 | SW 12 | 7042 4357 |
| NW 6 | 7135 4904 | SW 13 | 7187 4306 |
| NW 8 | 7007 4674 | SW 15 | 7344 4478 |
| NW 9 | 7095 4688 | SW 16 | 7062 4307 |
| NW 10 | 7493 4518 | SW 17 | 7164 4143 |
| NE 2 | 7698 4627 | SW 18 | 7484 4275 |
| NE 4 | 7696 4828 | SW 19 | 7328 4079 |
| NE 5 | 7623 4585 | SW 20 | 7073 4325 |
| NE 6 | 7806 4862 | SW 23 | 7102 4329 |
| NE 8 | 7937 4599 | SW 57 | 7247 4298 |
| NE 9 | 7965 4826 | SW 58 | 7245 4301 |
| NE 10 | 7688 4810 | SW 59 | 7181 4248 |
| NE 11 | 7506 4583 | SW 60 | 7460 4437 |
| NE 15 | 7838 4537 | SW 61 | 7461 4422 |
| SW 1 | 7078 4302 | SE 1 | 7654 4224 |
| SW 4 | 7090 4298 | SE 5 | 7525 4100 |
| SW 5 | 7371 4381 | SE 7 | 7983 4448 |
| SW 7 | 7064 4005 | SE 8 | 7683 4386 |
| | | SE 9 | 7822 4123 |
| | | SE 31 | 7779 4473 |
| | | SE 32 | 7621 4423 |
| | | SE 33 | 7622 4420 |
| | | SE 34 | 7559 4351 |

* By sheet quadrant.

† All fall within 10-km square TL 74.

The following reports of the Institute relate particularly to bulk mineral resources

**Reports of the Institute of Geological Sciences**

*Assessment of British Sand and Gravel Resources*

1 The sand and gravel resources of the country south-east of Norwich, Norfolk: Resource sheet TG 20.
E. F. P. Nickless.
Report 71/20 ISBN 0 11 880216 X £1.15

2 The sand and gravel resources of the country around Witham, Essex: Resource sheet TL 81. H. J. E. Haggard.
Report 72/6 ISBN 0 11 880588 6 £1.20

3 The sand and gravel resources of the area south and west of Woodbridge, Suffolk: Resource sheet TM 24.
R. Allender and S. E. Hollyer.
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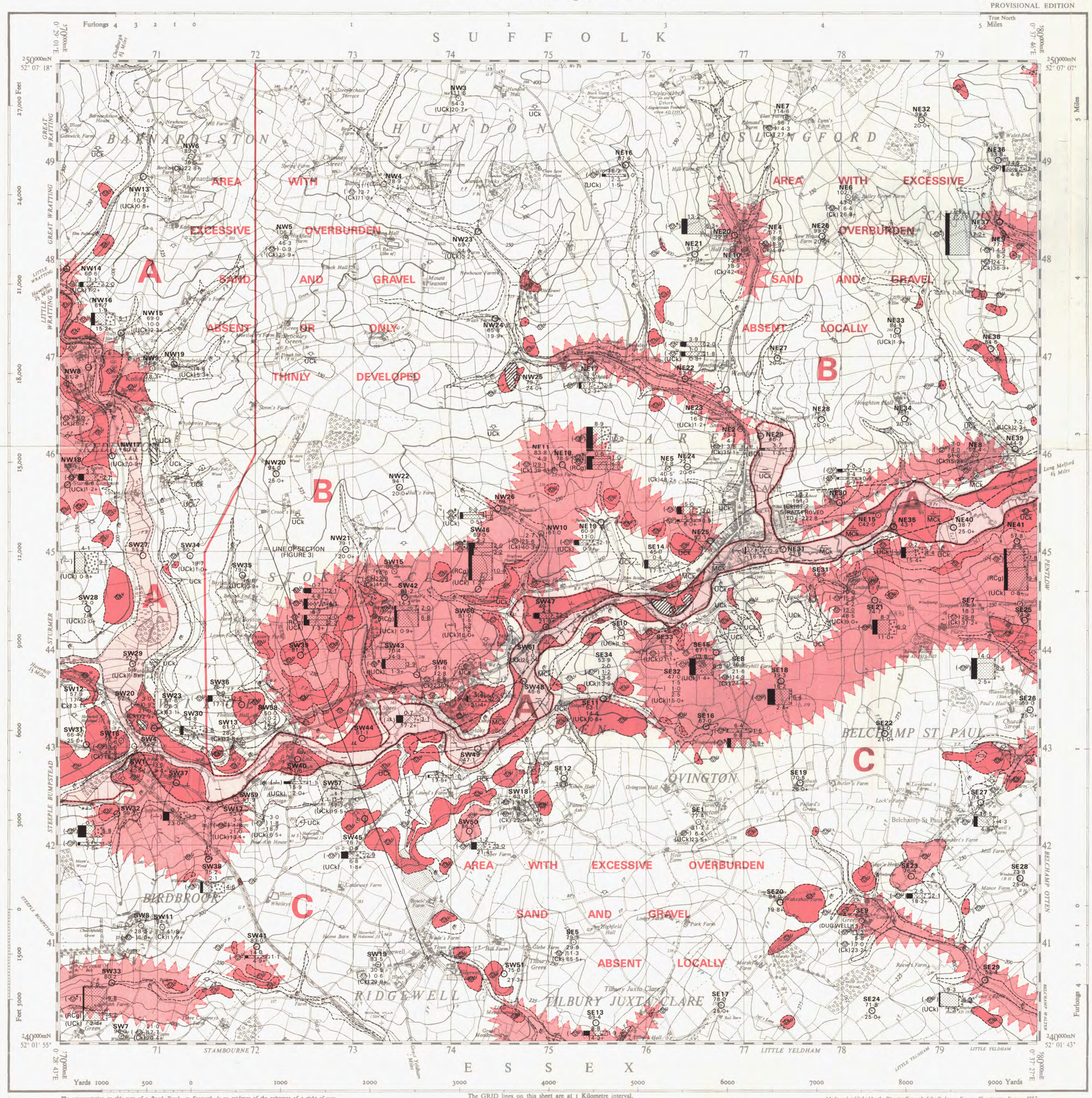
INSTITUTE OF GEOLOGICAL SCIENCES

INDUSTRIAL MINERALS ASSESSMENT UNIT

# THE SAND AND GRAVEL RESOURCES OF SHEET TL 74 (CLARE, ESSEX)

Scale 1:25 000 or about 2½ Inches to 1 Mile

ORDNANCE SURVEY
SHEET TL 74
PROVISIONAL EDITION




*The representation on this map of a Road, Track, or Footpath, is no evidence of the existence of a right of way.*

*Geological lines from a six-inch survey by D. Millward in 1978-79, R. A. Bazley, District Geologist.*

*Sand and gravel survey by R. J. Marks and J. R. Gozzard, supervised by P. I. Manning in 1979, R. G. Thurrell, Head, Industrial Minerals Assessment Unit.*

*1:25,000 Sand and Gravel Resource Sheet published 1981, G. M. Brown, D.Sc., F.R.S., Director, Institute of Geological Sciences.*

The GRID lines on this sheet are at 1 Kilometre interval.
*Heights are in feet above Mean Sea Level at Newlyn. Contour values are in feet.*
*1 square inch on this map represents 99·639 acres on the ground.*

Compiled from 6" sheets last fully revised 1902–24. Other partial systematic revision 1946–54 has been incorporated.

*Made and published by the Director General of the Ordnance Survey, Chessington, Surrey, 1957. Reprinted with minor corrections 1960.*

*Data quoted for an individual borehole refer strictly to that site, reliable conclusions cannot be drawn about the thickness and grading elsewhere in the deposit, particularly in material as variable as sand and gravel. However, estimates of the volume and mean grading of the mineral as a whole in each Resource Block are given in the Report.*



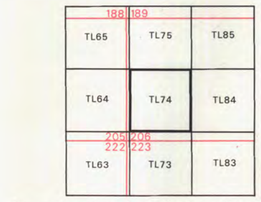



*Diagram showing the relationship of the National Grid 1:25,000 sheets with the One-Inch New Series Geological Sheets, 188, 189, 205, 206 222 and 223.*



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*This map should be read in conjunction with the accompanying Report which contains details of the assessment of resources.*

## EXPLANATION OF SYMBOLS AND ABBREVIATIONS

**DRIFT**

**Alluvium** – silts, clays and peats with basal sand and gravel A-20

**Terrace Deposits of the River Stour** – clayey sandy gravel, largely composed of flint pebbles T-3 T-4

**Head** – poorly sorted pebble sandy clay H-33

**Boulder Clay** – grey, weathered to brown clay with chalk and flint pebbles BC-35

**Glacial Silt** – laminated silt, occasionally with fine chalk pebbles GSI-7

**Glacial Sand and Gravel, upper** – varies from a clayey sandy gravel to a clayey sand, often with chalk GS-65

**Barham Sands and Gravels** – variable, generally poorly sorted orange-brown pebbly sand BSG-3

**Kesgrave Sands and Gravels** – light coloured fine and medium quartz sand K-5

**Upper Glacial Sand and Gravel, Barham Sands and Gravels, Kesgrave Sands and Gravels and Red Crag undivided** - While individual deposits are identified in IMAU borehole records, they are mapped as an undivided unit apart from where a positive identification could be made. GS-66

RECENT AND PLEISTOCENE

**SOLID**

**Red Crag** –iron-stained quartz sand with some flint pebbles RC-6

**Upper Chalk** – pure white limestone with flint

**Middle Chalk** – pure white limestone (proved only in boreholes)

CRETACEOUS

UCk The superposition of symbols indicates the deposit at the surface ( ◇ ) and the solid formation (UCk) beneath the drift, other drift deposits may intervene.

**Made Ground** MG-2

**Worked-out Ground** WO-1

**BOUNDARY LINES**

Geological Boundary, Drift

Geological Boundary, Solid

Inferred boundary between recognised categories of deposits

Resource Block Boundary

**BOREHOLE DATA**

**SITE LOCATIONS**

○ Industrial Minerals Assessment Unit (I.M.A.U.) Boreholes

⊙ Other Boreholes

**I.M.A.U. BOREHOLES**

Borehole Registration Number → SW39
Borehole Site → 81·3 Surface level in metres above O.D. (Newlyn)
Geological Classification → 0·7 Overburden
Grading Diagram → 4·8 / 4·1 Mineral (sand and gravel); 5·7 / 1·2 Waste; 2·3 Bedrock
Thicknesses in metres

Note
(i) Figures underlined denote thicknesses used in the assessment of resources.
(ii) The + sign indicates that the base of the deposit was not reached.
(iii) The Geological Classification is given only for mineral and bedrock.

**Borehole Registration Number**

Each I.M.A.U borehole is identified by a Registration Number, eg. **SW39**. The letters refer to the quarter sheet and the figures to the I.G.S. serial number for that quarter. The unique designation for the borehole **SW39** is **TL 74 SW39**.

**Grading Diagrams**

Each grading diagram shows the mean particle size distribution of a distinct deposit of mineral.

Sand (+ 1/16–4mm) / Fines (– 1/16mm) Gravel (+4mm)

The height of the diagram is proportional to the mineral thickness. The widths of the divisions show the proportions of **Fines Sand** and **Gravel** but small amounts of gravel may be omitted or exaggerated.

**OTHER BOREHOLES**

The layout of information is the same as for I.M.A.U. boreholes although data available may not be as comprehensive.

**CATEGORIES OF DEPOSITS**

**Exposed mineral** CAT-E6

**Continuous or almost continuous spreads of mineral beneath overburden** CAT-C1

**Discontinuous spreads of mineral beneath overburden** CAT-D1

**Sand and gravel absent or not potentially workable** CAT-A4

**RESOURCE BLOCKS**

For the purpose of assessment, the mineral is divided into Resource Blocks. (see Report). Each is designated by a letter.

A Schematic section showing the general relationships of deposits along the line AA' constitutes Figure 3 of the Report.

Detailed records may be consulted on application to the Head, Industrial Minerals Assessment Unit, Institute of Geological Sciences, Keyworth, Nottingham NG12 5GG

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