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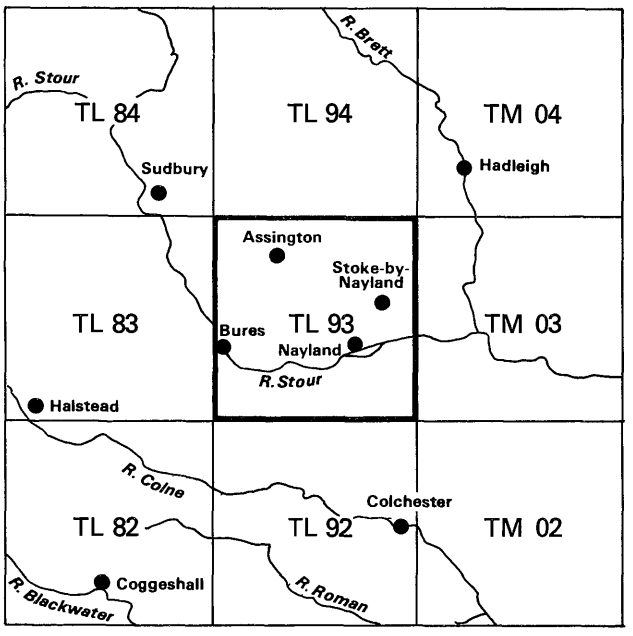


# The sand and gravel resources of the country around Nayland, Suffolk

## Description of 1:25 000 resource sheet TL 93

P. M. Hopson



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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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## 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 resources of the sand and gravel of the country around Nayland, Suffolk, shown on the accompanying 1:25 000 resource map. The survey was conducted by Mr P. M. Hopson, Mr D. W. Lewis and Mr R. W. Gatliff; Mr Hopson compiled the report. The work is based on six-inch scale geological surveys in 1974-1975 by Mr R. A. Ellison and Mr S. R. Mills. The original one-inch geological surveys of the district (see the resource map for details) were published in 1881-83.

Mr J. W. Gardner, CBE, was responsible for negotiating access to land for drilling. The ready co-operation of landowners and tenants in this work is gratefully acknowledged.

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**SUMMARY**

The geological maps of the Institute of Geological Sciences, pre-existing borehole information, and 111 boreholes drilled for the Industrial Minerals Assessment Unit form the basis of the assessment of the sand and gravel resources of the country around Nayland, 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 8 resource blocks, containing between 3.2 and and 14.5 $km^2$ 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 alphanumeric descriptor (e.g. TL 93 NW 37). 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. NW 37).

All National Grid references in this publication lie within the 100-km square TL93 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**

HOPSON, P. M. 1981. The sand and gravel resources of the country around Nayland, Suffolk. **Miner. Assess. Rep. Inst. Geol. Sci.**, No. 85.

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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).

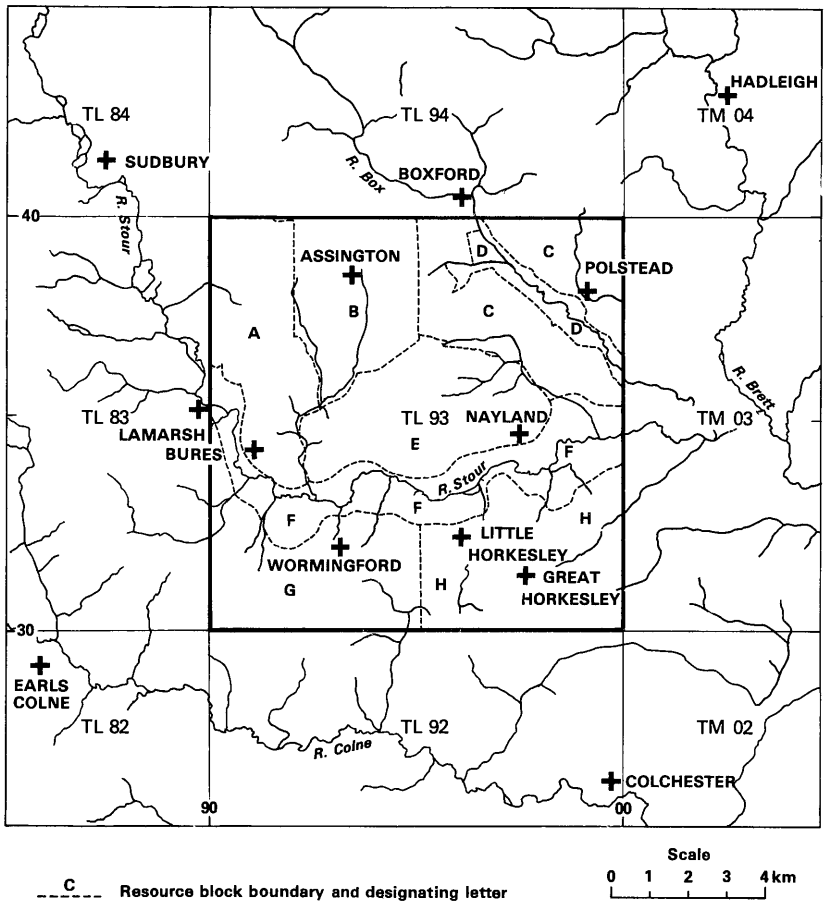



**Figure 1** Sketch map showing the location of sheet TL 93, with the position of the resource block boundaries.

The volume and other characteristics are assessed within resource blocks, each of which, ideally, contains 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 resource sheet covers 100 km$^2$ of ground, of which 86.3 km$^2$ is mineral-bearing (Figure 1); its principal centre of population is Nayland [975 343], a village lying 10 km north of Colchester on the A134, and 27 km west-south-west of Ipswich. The main industry in the area is mixed farming (in which arable predominates over pastoral), together with forestry and market gardening. Fruit is grown around Assington [934 383] and Honey Tye [955 357].

## TOPOGRAPHY

The Nayland district forms part of an extensive boulder clay plateau, which, on this sheet area, does not rise above 71 m (233 ft) above OD. It is dissected by the Stour and Box river systems, and, south-west of Little Horkesley [960 320], by a southward-flowing tributary of the Colne (Figure 2).

The Stour, meandering in a broad flat-floored valley, crosses the district from west to east; from Lamarsh [900 353] it flows south-east for 2 km to Bures [905 340], and thence flows eastwards for 9 km, passing south of Nayland [975 343], before leaving the sheet area south-east of Stoke-by-Nayland [988 363]. In its traverse across the district the Stour falls from 21 m (69 ft) above OD to 9 m (30 ft) above OD; it is joined by numerous unnamed streams and brooks on both its banks.

South of the Stour the relief is subdued with a well developed plateau on two levels: in the west the plateau is of Boulder Clay lying between 61 and 71 m (200 and 233 ft) OD, while in the east it is of Glacial Sand and Gravel at around 50 m (164 ft) above OD. North of the Stour the plateau is more deeply dissected; in the north-east the River Box flows south-eastwards from Boxford [965 450] to Polstead [000 363], meandering in an incised valley; in the centre of the district the plateau is drained by the southward-flowing tributaries of the Stour.

## GEOLOGY

The geological deposits found at and near the surface in the district are listed in Table 1.

### Solid

The bedrock formations present at or near the surface in the sheet area comprise the upper part of the Upper Chalk, the Lower London Tertiaries, the London Clay and the Red Crag. The Chalk and the Lower London Tertiaries are not found at the surface but were proved in boreholes. The bedrocks have a low (less than 5°) regional dip to the south-south-east.

Upper Chalk The Upper Chalk is a soft, white, well-bedded and strongly jointed limestone with beds of nodular and thin tabular flint. The formation is not exposed in the area of the resource sheet but was proved in IMAU boreholes to subcrop beneath Pleistocene and Recent deposits in the valley of the Box at Mill Street [988 375] and in the Stour valley from Lamarsh to 1 km south-east of Bures.

**Table 1** List of geological deposits

| | Maximum thickness recorded in IMAU boreholes |
|---|---|
| DRIFT | |
| **Recent and Pleistocene** | |
| Peat | 1.5[a] |
| Alluvium | 7.2[b] |
| Terrace deposits of the Box and Stour rivers | |
| First to Third Terrace[c] | 15.0 |
| Undifferentiated Terrace Deposits | 1.6 |
| Head | 6.1 |
| Glacial Silts | 15.3+[d] |
| Boulder Clay | 11.5 |
| Glacial Sand and Gravel | 9.8 |
| Kesgrave Sands and Gravels | 15.0 |
| SOLID | |
| **Pleistocene** | |
| Red Crag | 7.3 |
| **Eocene and Palaeocene** | |
| London Clay | 44.1[e] |
| Lower London Tertiaries | 24.5[e] |
| **Upper Cretaceous** | |
| Upper Chalk | 101.4[f] |

a Estimated thickness; no borehole data available.
b Thickness includes underlying terrace gravel.
c Where possible these deposits have been differentiated on the resource map. The maximum thickness quoted represents the combined thickness of the terrace deposits and underlying fluvial deposits that infill a buried channel.
d Base not reached.
e Data from Hydrogeology Unit record of borehole TL 93 SE 11.
f Data from Hydrogeology Unit record of borehole TL 93 SE 7.

Lower London Tertiaries The micaceous 'clayey' sands (for usage of the term 'clayey', see Appendix C) and sands with some clay that underlie the Pleistocene and Recent deposits along much of the course of the valleys of the Stour and Box are assigned to the Thanet Beds and the Woolwich and Reading Beds. At the base of the Lower London Tertiaries, where they rest disconformably upon the eroded surface of the Chalk, is a layer of dark olive-green fine- to medium-grained glauconitic sand with flint pebbles (see, for example, the log of borehole NE 54).

London Clay
When fresh, the London Clay is a dark grey or bluish grey fine-sandy or silty clay with sporadic pyrite nodules, mica flakes, comminuted shell debris and some carbonaceous material. On exposure it weathers to an ochreous brown or orange-brown colour, caused essentially by the oxidation of iron compounds. In the weathered clay the calcareous shell material is altered to selenite by interaction with sulphate ions derived from the oxidation of pyrite.

The London Clay forms most of the bedrock outcrops and, except in limited areas of the floors of the valleys of the Box and the Stour, where it has been removed by erosion, is present at depth throughout the district; along the sides of the valleys of the Stour and the Box the clay crops out between the fluvial and solifluxion deposits of the valley floors and the glacial deposits that mantle the plateau.

Red Crag The Red Crag, which was proved in 55 IMAU boreholes, is a greenish brown fine and medium sand of shallow-marine origin which weathers by oxidation to red or orange-brown colours. A pebble bed up to 1 m thick and containing rolled phosphatic nodules with sporadic ferruginous concretions ('boxstones') is often present at its base. The lower part of the formation is shelly, whereas its upper part is non-shelly. The lower, shelly Red Crag was proved in only 9 IMAU boreholes, all sited north of the River Stour, but the upper, non-shelly Red Crag was present in all but one borehole (NW 23). Its base was not reached in borehole NE 49, so it is not known whether shelly Red Crag is present there at depth. Overlying the non-shelly Red Crag in borehole NW 17 are seams of silty fine sand alternating with silty, fine-sandy clay, both containing oxidised pyrite nodules; these beds are tentatively assigned to the Chillesford Beds of Chillesford (Allender and Hollyer, 1972).

**Drift**
The contour map (Figure 3) of the bedrock surface upon which the Drift deposits lie shows the almost level profile of the bedrock plateau and the configuration of the deep buried valleys of the Box and Stour rivers.

Kesgrave Sands and Gravels The oldest Drift deposit mapped in the district is the Kesgrave Sands and Gravels. They consist, in the north-west, of yellow to orange-brown sands with mica flakes and some thin pale greenish brown clayey silt beds. These sands interfinger with (around Little Horkesley and Assington) and pass laterally south-eastwards into pebbly sands, sandy gravels and gravels. The pebbles are predominantly rounded and consist mainly of flint with about 30 per cent of white quartz and brown, purple and bleached quartzite; other rock types, such as chert, sandstone, and igneous and metamorphic rocks, form 1 to 4 per cent of the gravel fraction. The beds are characteristically cross-bedded and were laid down as outwash deposits in a braided river system.

The Kesgrave Sands and Gravels were found to be underlain by Red Crag in 54 IMAU boreholes and by London Clay in 23; they crop out on the middle and upper flanks of the valleys and in some places obscure the outcrop of the Red Crag as a result of down-slope creep (solifluxion).

Glacial Sand and Gravel The variable lithology of the Glacial Sand and Gravel reflects its mode of deposition by reworking of morainic material by torrents of meltwater associated with the ice sheet that deposited the Boulder Clay. It ranges from a pebbly silty sandy clay, not unlike a decalcified boulder clay (for example, in the more clayey beds penetrated by borehole NW 37), to sand and gravel low in fines. However, it most commonly consists of brown or reddish brown variably pebbly clayey sand. Its pebbles are mainly of nodular and angular to rounded flints, with some quartz, quartzite, sandstone, Jurassic limestones and fossils, and chalk. Interbeds of clay, very clayey sand and silt are fairly common (as, for example, in boreholes NW 24 and NW 32). The formation is almost always underlain by the Kesgrave Sands and Gravels.

A mixed sequence of Glacial Sand and Gravel, Boulder Clay and Glacial Silt forms the fill of a presumed glacial tunnel valley (Woodland, 1970) beneath the present-day Box valley. The deposits are thought to have been laid down by a stream flowing in a tunnel that ran beneath the stagnant ice that occupied the area.

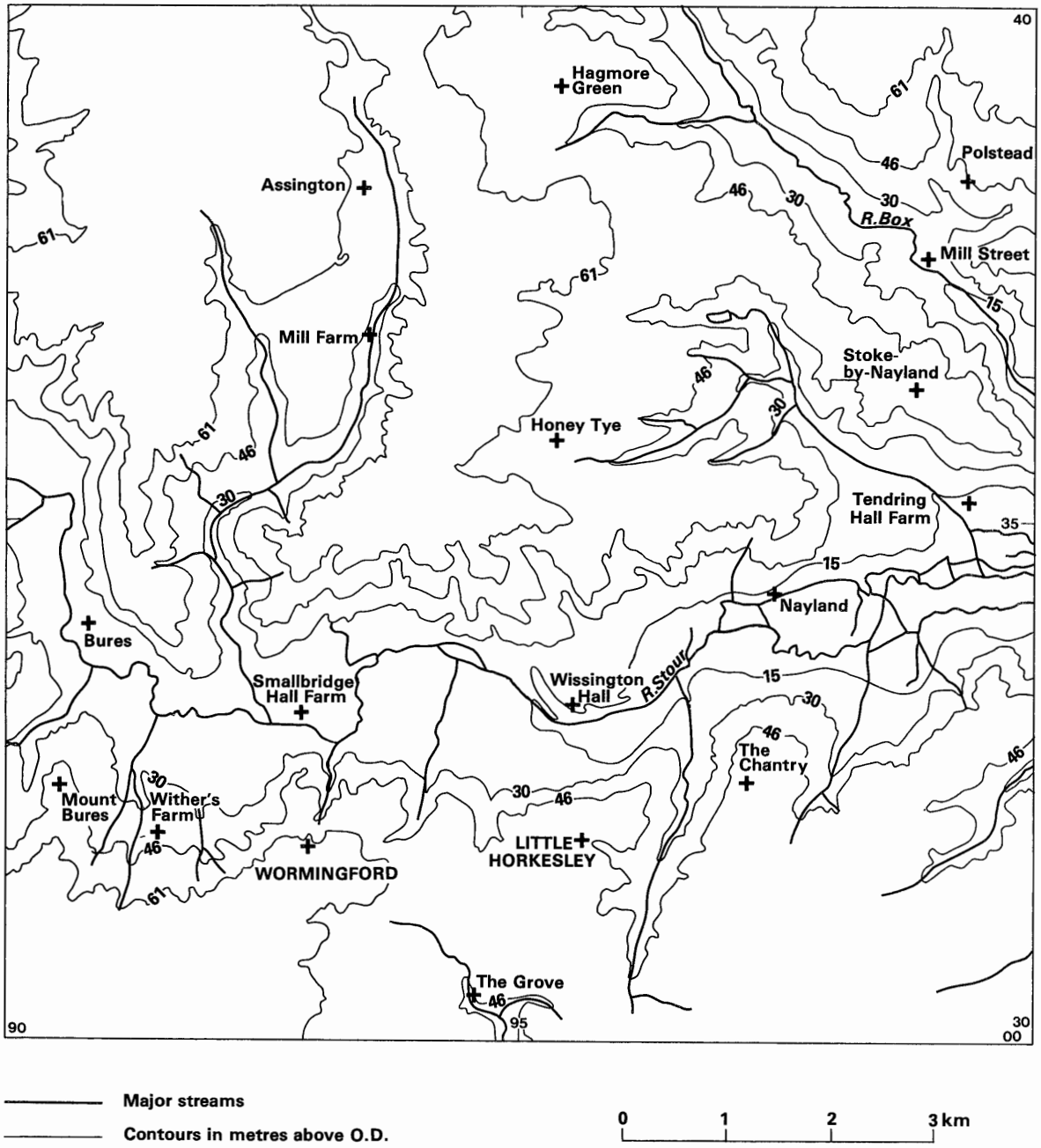



**Figure 2** The topography of the area of sheet TL 93, with the locations of places mentioned in the text.

Boulder Clay The Boulder Clay, when unweathered, is usually grey to bluish grey, stiff, silty, rarely sandy, clay containing many pebbles, predominantly of rounded chalk and rounded to angular flint, with some rounded quartz and quartzite and a trace of schist, limestone, mudstone and sandstone of varying angularity and shape, as well as fossil fragments. However, in the valley of the River Box, the Boulder Clay consists of soft grey clayey silt with sand-grade chalk fragments and some flint, as, for example in borehole NE 39. On weathering, the upper part of the Boulder Clay becomes ochreous brown, but the original grey colour persists around unleached chalk pebbles. Near its base the Boulder Clay tends to incorporate material derived from the underlying deposits, so that it becomes very sandy and pebbly where it rests upon Glacial Sand and Gravel and sandy where it overlies the Kesgrave Sands and Gravels.

North of the Stour, with rare exceptions, the Boulder Clay overlies Glacial Sand and Gravel, but south of the river, around Little Horkesley, the Glacial Sand and Gravel is absent and the Boulder Clay rests directly upon the Kesgrave Sands and Gravels.

The Boulder Clay appears to be thickest on the interfluves, but the IMAU borehole data also indicate a general trend of thickening to the west. It is considered to have been deposited by the ice sheet that occupied the district during the Anglian glaciation.

Glacial Silts These deposits are found only in the valley of the River Box where they form small inliers surrounded by the younger Head deposits. They form part of the mixed sequence that contitutes the fill of the presumed glacial tunnel valley mentioned above. They are generally finely laminated grey or greyish green silts and clays with some pale yellow sand seams, some of which contain fine to medium sand-sized chalk material, and rare thin peat layers; one of the latter, between 7.0 and 7.7 m depth in borehole NE 39, yielded a $^{14}C$ date of >45 250 years BP.

Head Solifluxion deposits are widespread in the Stour and Box valleys; they are mainly silty clays, but are characteristically variable in composition, becoming very sandy where overlying sandy glacial deposits or Red

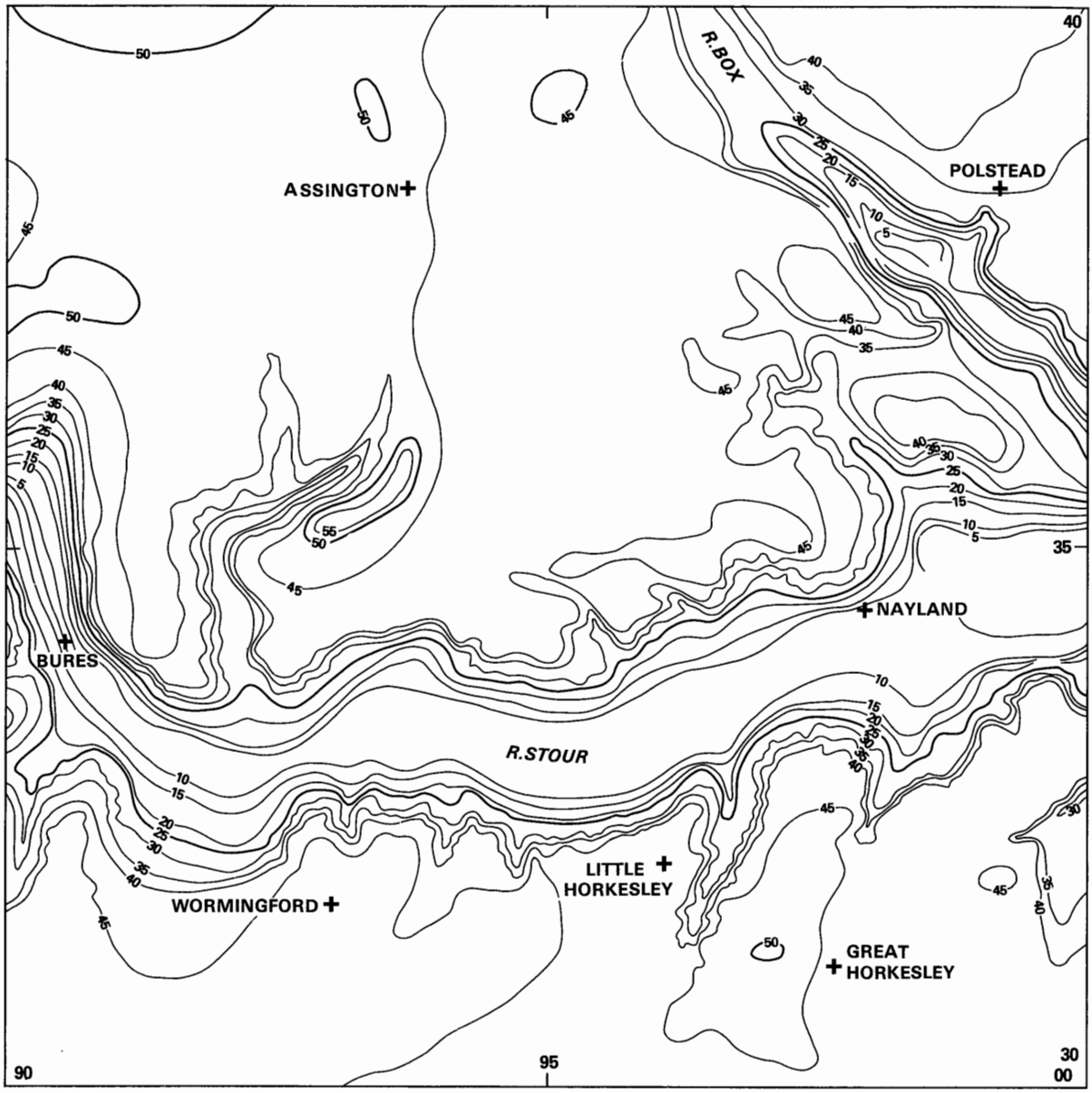



**Figure 3** Contours on the sub-Drift surface.

Crag, and clayey where overlying Boulder Clay or London Clay. Nevertheless, even where it is very sandy the Head itself does not consititute a potentially workable resource. However, it often conceals fluvial terrace gravels in the Stour and Box valleys; such areas are shown on the resource map as containing mineral beneath overburden, although the relationship of the gravels to the Head and their age may be difficult to determine.

River Terrace Deposits The River Terrace Deposits form broad ribbon-like outcrops on either side of the Stour and small patches in the valley of the Box. They are described here under the headings Undifferentiated Terrace and First to Third Terraces. Where possible, the latter have been differentiated on the map on the basis of their height above present river level.

Undifferentiated Terrace Three small patches of Undifferentiated Terrace crop out in the vicinity of Witham Farm [916 320]. The deposits, which rest upon benches cut into the London Clay, were found in borehole SW 27 to be composed of grey and brown mottled sandy silty clay with pebbles of flint and quartz.

First to Third Terraces In the valley of the Box the First and Second terraces are mapped in ten small patches (amounting in all to 12 hectares) close to the present stream. Three of these patches in the vicinity of Mill Street [988 375] are designated as Second Terrace. However, evidence from borehole NE 45 suggests that the largest of these is in fact an erosional feature cut into the Kesgrave Sands and Gravels.

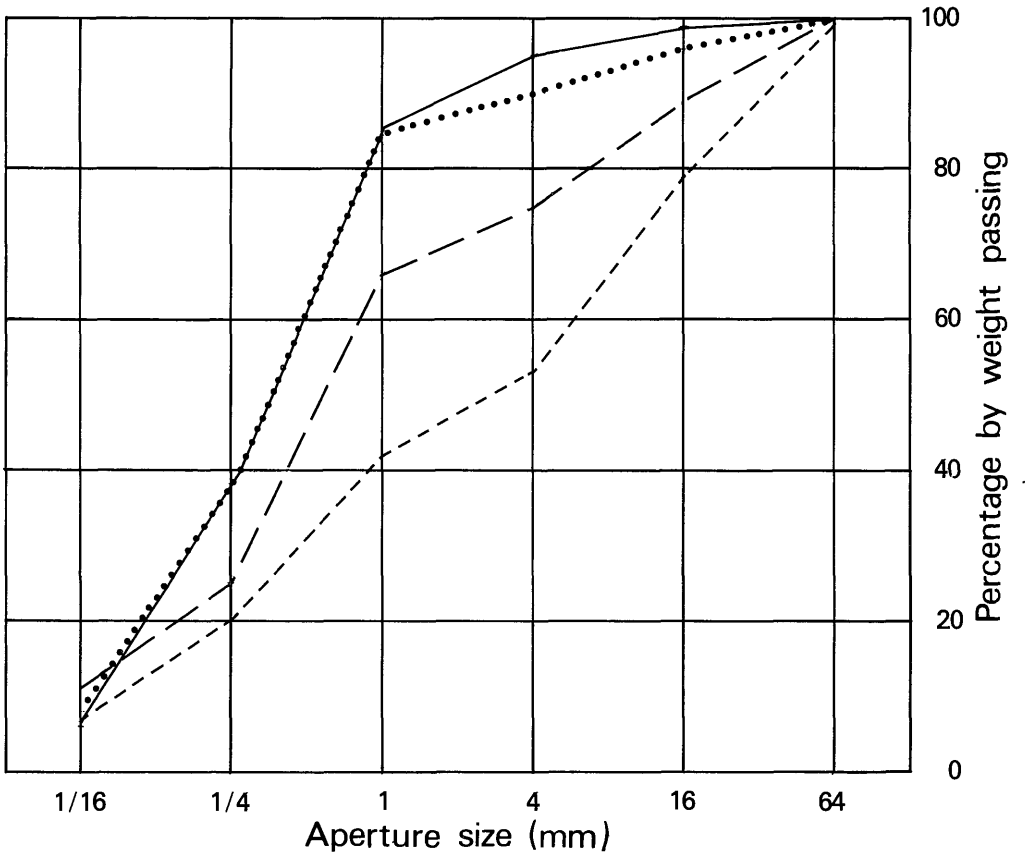
Although no boreholes were drilled within the seven small patches assigned to the First Terrace in the valley of the Box, they have been designated as containing exposed mineral. Head and Alluvium extend over much of the present-day valley floor and conceal terrace gravel deposits, as, for example at the sites of boreholes NE 52 and NE 39, but, since the stratigraphical relationships and the lateral extent of the concealed gravels are not known, they have been classified for simplicity with the overlying Head or Alluvium.

**Table 2** The composition of the gravel fraction proved in IMAU boreholes, by deposit and resource block

| Formation | Composition (weight per cent) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Ironstone | Igneous and metamorphic | Others | Phosphatic nodules |
| River Terrace Deposits | 68 | 14 | 7 | 5 | 2 | 3 | 0 | 1 | 0 | 0 |
| Glacial Sand and Gravel | 50 | 20 | 17 | 7 | 4 | 1 | 0 | 1 | 0 | 0 |
| Kesgrave Sands and Gravels | 42 | 24 | 18 | 9 | 4 | 0 | 1 | 1 | 1 | 0 |
| Red Crag | 30 | 36 | 9 | 2 | 1 | 0 | 15 | 1 | 0 | 6 |
| Resource block | | | | | | | | | | |
| A | 41 | 27 | 19 | 7 | 3 | 0 | 2 | 1 | 0 | 0 |
| B | 53 | 20 | 14 | 6 | 3 | 0 | 3 | 1 | 0 | 0 |
| C | 50 | 20 | 15 | 7 | 3 | 0 | 2 | 2 | 0 | 1 |
| D | 66 | 10 | 6 | 7 | 3 | 3 | 2 | 2 | 0 | 0 |
| E | 43 | 21 | 19 | 7 | 3 | 0 | 3 | 1 | 0 | 1 |
| F | 67 | 15 | 8 | 5 | 2 | 2 | 0 | 1 | 0 | 0 |
| G | 44 | 28 | 19 | 4 | 4 | 0 | 1 | 0 | 0 | 0 |
| H | 47 | 22 | 16 | 9 | 4 | 0 | 0 | 2 | 0 | 0 |

**Table 3** The sand and gravel resources of the country around Nayland, Suffolk: summary of statistical results.

| Block | Area | | Mean thickness | | Volume of sand and gravel | | | Mean grading percentage | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Block | Mineral | Over-burden | Mineral | | Limits at the 95% probability level | | Fines $-\frac{1}{16}$ mm | Sand $+\frac{1}{16}$ -4 mm | Gravel +4 mm |
| | $km^2$ | $km^2$ | m | m | $m^3 \times 10^6$ | $\pm$ % | $\pm m^3 \times 10^6$ | | | |
| A | 11.9 | 10.7 | 6.2 | 9.7 | 104 | 22 | 23 | 9 | 77 | 14 |
| B | 11.0 | 10.6 | 5.1 | 10.2 | 108 | 18 | 19 | 8 | 76 | 16 |
| C | 15.9 | 14.5 | 2.0 | 13.4 | 194 | 16 | 31 | 8 | 82 | 10 |
| D | 3.3 | 3.2 | 0.9 | 5.7 | 18 | 57 | 10 | 19 | 56 | 25 |
| E | 13.7 | 11.1 | 2.2 | 13.7 | 152 | 12 | 18 | 9 | 82 | 9 |
| F | 14.5 | 11.7 | 1.2 | 4.4 | 51 | 22 | 11 | 6 | 43 | 51 |
| G | 13.8 | 11.1 | 6.6 | 8.7 | 97 | 30 | 29 | 10 | 77 | 13 |
| H | 15.9 | 13.4 | 1.6 | 5.7 | 76 | 25 | 19 | 7 | 62 | 31 |
| Blocks A-H | 100.0 | 86.3 | 2.9 | 8.9 | 768 | 10 | 77 | - | - | - |




| Deposit | Percentage by weight passing | | | | | |
|---|---|---|---|---|---|---|
| | $\frac{1}{16}$ mm | $\frac{1}{4}$ mm | 1 mm | 4 mm | 16 mm | 64 mm |
| River Terrace Deposits | 7 | 20 | 42 | 53 | 79 | 99 |
| Glacial Sand and Gravel | 11 | 25 | 66 | 75 | 89 | 10 |
| Kesgrave Sands and Gravels | 8 | 38 | 85 | 90 | 96 | 100 |
| Red Crag | 6 | 38 | 85 | 95 | 99 | 100 |

**Figure 4** The mean particle size distribution for the assessed thickness of mineral proved in IMAU boreholes, by deposit.

In the broader valley of the Stour outcrops of terrace deposits amounting to 4.9 km$^2$ have been mapped on both sides of the river. Upstream of Wissington Hall [955 333] three distinct terrace features can be discerned, but downstream they become indistinct and the terraces are designated on the basis of their height above the present river floodplain.

The Third Terrace, 6 to 13 m above the floodplain, is mapped in three patches south of the river and, in association with the Second and First Terraces, in the vicinity of Tendring Hall Farm [993 353] north of the river. A small area of Second to Third Terrace is mapped north-west of Wissington Hall.

The Second Terrace forms elongate patches extending to about 1.5 km$^2$ north of Wormingford [927 320]; in association with the First Terrace, it also covers 1 km$^2$ between Wissington Hall and Nayland [974 344]. The deposits lie between 2 and 4 metres above the floodplain level.

The First Terrace forms low features approximately 1 m above the floodplain, on both banks of the river, notably in the vicinity of Bures [905 340] and Smallbridge Hall Farm [929 332]. Deposits with the same grading and compositional characteristics as the terraces are concealed beneath Alluvium and Head deposits. They are considered to be penecontemporaneous although their exact age relationships cannot be demonstrated. The terraces have a mean thickness of 5.1 m but, exceptionally, 15.0 m of deposits infilling a buried valley were proved in borehole SW 16.

Alluvium In general the Alluvium is represented by silty sandy clay but some thin seams of sand and silty sand may be present. Large spreads of this deposit occur in the Stour valley, but in the valley of the Box the Alluvium forms a narrow sinuous belt closely following the present-day stream.

The Alluvium is generally thin, particularly in the tributary valleys where it overlies London Clay, though, exceptionally, up to 1.4 m of deposits have been proved as, for example, in borehole SE 15.

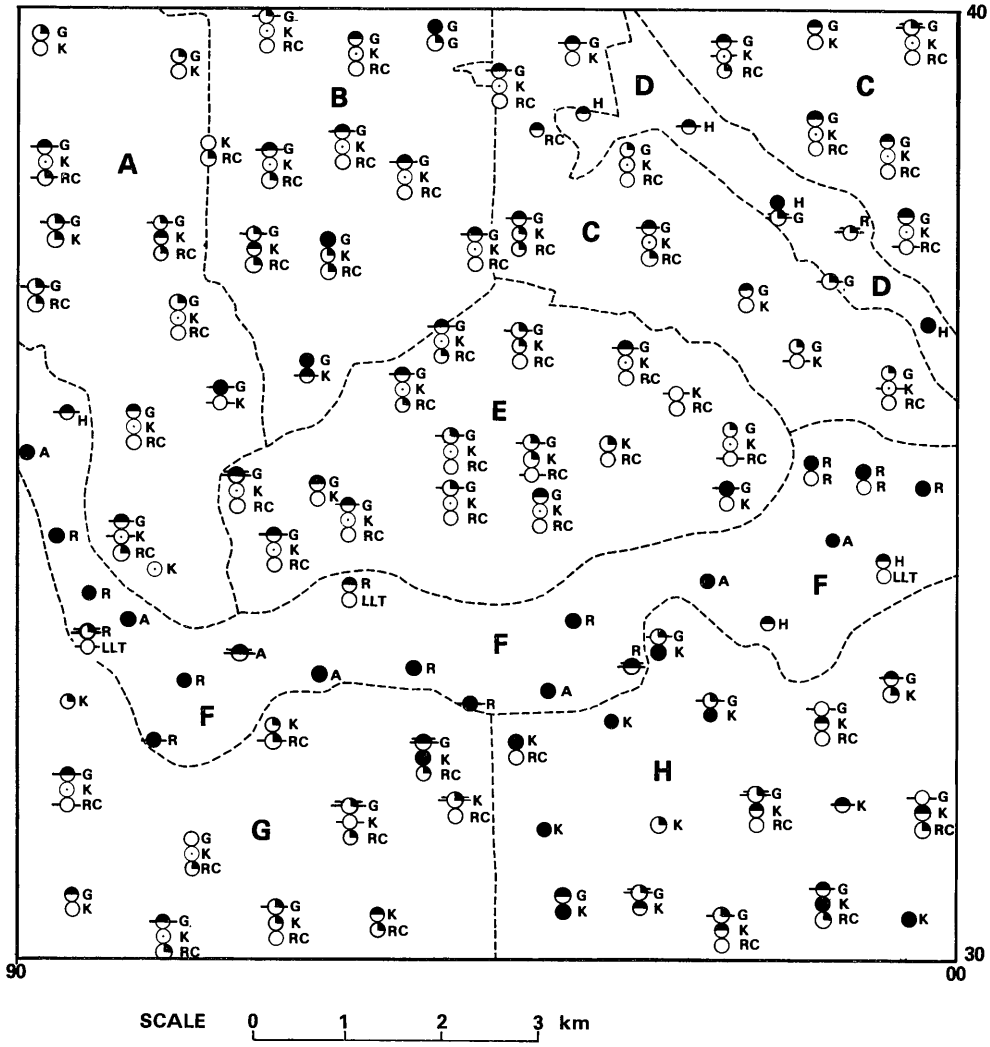



**Figure 5** Map showing the lateral variations in the mean grading of the mineral in each deposit.

Peat Small areas of peat have been mapped in the vicinity of Mount Bures [904 324], Mill Farm, Assington [936 369], and north of The Chantry [972 325].

## COMPOSITION OF THE SAND AND GRAVEL DEPOSITS

Potentially workable sand and gravel occupies 86.3 km$^2$ of the resource sheet area. It occurs in the Red Crag, Kesgrave Sands and Gravels, Glacial Sand and Gravel and the River Terrace Deposits.

The gravel fraction (+4 -64 mm) of the mineral is composed predominatly of flint, both angular and well rounded, with varying amounts of quartz, quartzite, sandstone, ironstone, chalk and phosphatic nodules, with traces of mudstone, shale, limestone, fossil debris, and igneous and metamorphic rock types. Further details are given in Table 2, which shows the percentage composition (by weight) of mineral, by block and by geological deposit, based on pebble analyses of the gravel fraction of borehole samples. Figure 4 shows the particle size distribution of the mineral proved in IMAU boreholes by deposit and Figure 5 illustrates the lateral variations in the mean grading of the mineral in each deposit.

Red Crag Of the 55 IMAU boreholes that proved Red Crag, 29 yielded samples which graded as sand, 19 as pebbly sand, four as 'clayey' sand, two as 'clayey' pebbly sand and one graded as sandy gravel. The mean grading of the Red Crag as a whole is fines 6 per cent, sand 89 per cent and gravel 5 per cent, giving an overall mineral classification of pebbly sand.

The gravel fraction is predominantly fine with coarse grade, only one borehole (NW 32) yielding material of cobble grade (a single angular flint cobble).

The gravel is mainly composed of brown and black with some white patinated flint, with some tabular brown ironstone, rounded to well rounded white and pale yellow quartz and well rounded dark brown phosphatic nodules (coprolites). Some pebbles of quartzite and sandstone occur with a trace of igneous and metamorphic rocks. Fossil debris was found in only 9 boreholes where the shelly lower part of the Red Crag occurs.

Angular flint accounts for 30 per cent and well rounded flint 36 per cent by weight of the gravel fraction. The well rounded flint is probably derived from the pebble beds within the Lower London Tertiaries and the London Clay. The ironstone, which occurs in potentially highly deleterious amounts, forming 15 per cent of the gravel fraction, comprises equal proportions of iron-cemented sandstones and concentrically banded concretionary iron boxstones; the fossil debris includes phosphatised bones and teeth with fragmentary bivalve and gastropod shells.

The coarse-gravel grade has a greater percentage of both angular and well rounded flint and less quartz.

The sands, which are generally ironstained, are predominantly medium- and fine-grained (47 and 32 per cent respectively, see Figure 4) with some coarse grade. Generally the sand is subrounded to rounded quartz with some angular to subangular flint and a trace of well rounded phosphatic nodules, tabular shell debris and tabular ironstone. The coarse sand is composed of rounded quartz and angular flint with ironstone, shell debris and some phosphatic nodules. Generally the angularity of the grains increases in the finer grades.

In some boreholes, ironstone, shell debris and phosphatic nodules become predominant in the fine gravel and coarse sand grade.

Kesgrave Sands and Gravels This deposit was proved in 80 IMAU boreholes: of these 39 proved sand, 11 pebbly sand, 9 sandy gravel, 9 gravel, 7 'clayey' sand, 3 'very clayey' pebbly sand and one each 'clayey' pebbly sand and 'clayey' sandy gravel. The overall grading of the Kesgrave Sands and Gravels (see Figure 4) is fines 8 per cent, sand 82 per cent, and gravel 10 per cent, giving a mineral classification of pebbly sand. However, Block H contains a large number of the boreholes proving gravel or sandy gravel and this block has an overall mean grading of fines 3 per cent, sand 53 per cent, and gravel 44 per cent (including 2 per cent cobble grade).

The gravel fraction, which comprises fine and coarse grades with a trace of cobble grade, is predominantly composed of white patinated, brown and black flint with a preponderance of angular (42 per cent) over well rounded (24 per cent) pebbles (see Table 2). White and pale yellow rounded to well rounded quartz representing 18 per cent, also occurs, with 9 per cent white and liver-coloured rounded quartzite and 4 per cent yellow-brown sandstone. Some pebbles of ironstone, igneous and metamorphic material and a trace of chalk, phosphate nodules, limestone and fossil debris are also recorded. The coarse gravel grade has a higher percentage of flint and quartzite with a corresponding reduction in the quartz content.

The sands are predominantly medium and fine with some coarse grade. However, unlike those from the Red Crag, individual samples of Kesgrave Sands and Gravels have a preponderance of either fine or medium sand grades. Generally the sand is subangular to subrounded quartz with some angular flint and rounded quartzite and a trace of ironstone and fine grade mica. The coarse grade has generlly equal proportions of angular flint and quartz. At the base, particularly when the Kesgrave Sands and Gravels rest on the Red Crag, reworked subrounded to rounded quartz grains become predominant over other components.

Glacial Sand and Gravel The Glacial Sand and Gravel was proved in 63 of the assessment borholes; of these 23 proved 'clayey' sandy gravel, 12 'clayey' pebbly sand, 11 sandy gravel, 6 pebbly sand, 5 'very clayey' pebbly sand, 2 each 'very clayey' sandy gravel and 'clayey' gravel and 1 each sand and 'clayey' sand. The overall mean grading of the Glacial Sand and Gravel (see Figure 4) is fines 11 per cent, sand 64 per cent and gravel 25 per cent, giving a mineral classification of 'clayey' sandy gravel.

The gravel fraction, fine with coarse and containing a trace of cobble grade, is composed of 50 per cent patinated and brown angular to subangular flint, with 20 per cent brown and black well rounded flint and 17 per cent rounded to well rounded white and pale yellow quartz. Some white, cream and liver-coloured rounded quartzite and subrounded brown sandstone amounting to 11 per cent, also occur. Pebbles of chalk and igneous and metamorphic material occur, with a trace of ironstone, limestone, phosphatic nodules and fossil debris. Generally, the coarser grades contain more angular flint and quartzite and less quartz and sandstone.

In the sand fraction, medium sand predominates, with some fine and coarse, and is composed of subangular to rounded quartz and angular flint with some quartzite and sandstone. Some boreholes contain chalk but ironstone and limestone occur rarely.

Where fine sand is found in significant quantities, subrounded to rounded quartz predominates and mica is found rarely.

Head Head masks mineral deposits of uncertain affinity in both the Stour and Box valleys. Although depicted as Head mineral, for simplicity, on the resource sheet, they are described below with the River Terrace Deposits to which they are presumably related.

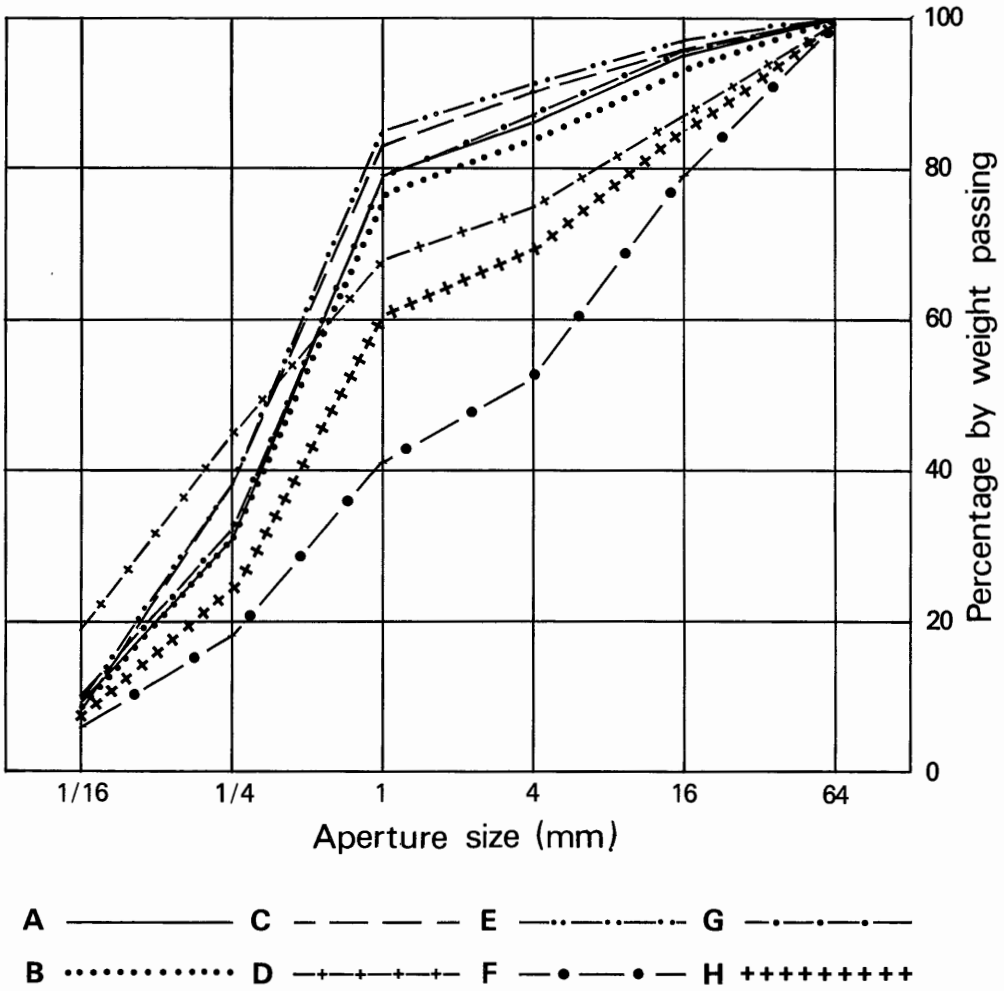
River Terrace Deposits In this section the composition of the mineral-bearing fluvial deposits of the river valleys, including the terrace deposits underlying Head and Alluvium, is described in general terms.

The Undifferentiated Terrace Deposits were proved in borehole SW 27 to be non-mineral and are not considered further here.

Terrace deposits were proved in 28 IMAU boreholes; of these, 15 proved gravel, 4 sandy gravel, 3 'very clayey' sandy gravel, 2 'clayey' gravel, 2 'clayey' sandy gravel, 1 sand, and 1 'very clayey' pebbly sand. The overall grading of mineral in the terrace deposits is fines 7 per cent, sand 46 per cent and gravel 47 per cent; it is thus classified as gravel.

The lithological composition of the gravel fraction is given in Table 2. The flint pebbles, which comprise 82 per cent of the gravel, are brown, black or white-patinated, the last-named type being mainly confined to the dominant angular flint. The remainder of the gravel consists of rounded white, red and pale yellow quartz, rounded white and liver-coloured quartzite, and well rounded chalk, with a few pebbles of sandstone and igneous and metamorphic rocks, with a trace of ironstone, limestone, fossil debris and phosphatic nodules. With decreasing pebble size the quartz and chalk contents increase at the expense of quartzite, sandstone and well rounded flint. The First Terrace and the terrace gravels underlying the Alluvium contain 3 and 5 per cent respectively of chalk; by contrast, the Third Terrace is apparently completely devoid of any calcareous pebbles.

The sand fraction is medium with fine and coarse grades, comprising predominantly angular flint in the coarse-sand grade and subangular to subrounded quartz in the medium and fine grades. Some boreholes yielded chalk pellets, particularly in the First Terrace. Trace amounts of ironstone, sandstone and quartzite occur in most sand grades, but mica is rarely present and is found only in the fine sand.




| Resource block | Percentage by weight passing | | | | | |
|---|---|---|---|---|---|---|
| | $\frac{1}{16}$ mm | $\frac{1}{4}$ mm | 1 mm | 4 mm | 16 mm | 64 mm |
| A | 9 | 31 | 79 | 86 | 95 | 100 |
| B | 8 | 31 | 76 | 84 | 93 | 100 |
| C | 8 | 38 | 83 | 90 | 96 | 100 |
| D | 19 | 45 | 68 | 75 | 87 | 99 |
| E | 9 | 38 | 85 | 91 | 97 | 100 |
| F | 6 | 18 | 41 | 52 | 79 | 99 |
| G | 10 | 32 | 79 | 87 | 95 | 100 |
| H | 7 | 24 | 60 | 69 | 85 | 99 |

**Figure 6** Particle size distribution for the assessed thickness of sand and gravel in Resource Blocks A to H.

The Third Terrace gravels are generally more 'clayey' than those of the other terraces, probably as a result of the breakdown of their original limestone content.

Sands and gravels of the First to Third Terrace Deposits in boreholes NE 48 and NE 55 near Tendring Hall Farm [933 353] have an unusually high content of well rounded flint in the gravel fraction and some mica in the fine sand; they may represent reworked Lower London Tertiaries.

The Second Terrace of the River Box in the vicinity of Mill Street has a composition and grading closely similar to that of the Glacial Sand and Gravel and is thought to be a feature cut into the mixed sequence of sediments that comprise the fill of a glacial tunnel valley.

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, on which the topography is shown in grey, the geological data in black, and the mineral resource information in shades of red.

Geological data The geological boundary lines, symbols, etc., are taken from the geological map of this area, which was surveyed recently at the scale of 1:10 560 by the Institute's East Anglia and South-Eastern England Unit.

Mineral resource information The mineral-bearing ground is divided into resource blocks (see Appendix A).

The mineral is identified as 'exposed' where the thickness of overburden, commonly consisting only of soil and subsoil, averages not more than 1.0 m (3.5 ft).

Areas where bedrock crops out or where mineral is absent are uncoloured on the map. Borehole data, which include the stratigraphic relations and mean particle size distribution of the sand and gravel samples collected during the survey are also show.

The area of the exposed sand and gravel is measured from the mapped geological boundary lines. The whole of this area is considered as mineral, although it may include small areas where sand and gravel is not present or is not potentially workable.

## RESULTS

The statistical results of the survey are summarised in Table 3. Fuller grading particulars are shown in Figures 4 and 6.

Accuracy of the results For the eight resource blocks the accuracy of the results varies between 12 and 57 per cent at the symmetrical 95 per cent probability level (that is, it is probable that 19 times out of 20 the true volume present lies within these limits). However, the true values are more likely to be nearer to the figures estimated than the to limits. Moreover, it is probable that in each block roughly the same percentage limits would apply for the estimate of volume of 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 10 boreholes) were used in the calculation. Thus, if closer limits are needed for the quotation of reserves of part of a block, it can be expected that data from more than 10 sample points will be required, even if the area is quite small. This point can be illustrated by considering the whole of the potentially workable sand and gravel on this sheet. The volume (768 million $m^3$) can be estimated to limits of $\pm$ 10 per cent at the 95 per cent probability level, by a calculation based on the data from 151 sample points spread across the eitht resource blocks.

However, it must be emphasised that the quoted volume of sand and gravel 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

### Block A

Block A covers an area of 11.9 $km^2$ in the north-west of the resource sheet; 10.7 $km^2$ of the block is mineral-bearing. The mineral is present in three deposits, the Glacial Sand and Gravel, the Kesgrave Sands and Gravels, and the Red Crag; the Head and Alluvium in the south-east of the block are thin and are considered to be barren of potentially workable sand and gravel. The assessment is based on 11 IMAU boreholes and on the records of two other boreholes.

The mineral has a mean total thickness of 9.7 m and ranges in thickness from 2.0 m in borehole SW 23 to 14.5 m in borehole NW 22. Its estimated volume is 104 million $m^3$ $\pm$ 22 per cent; its mean grading (see Figure 6) is fines 9 per cent, sand 77 per cent and gravel 14 per cent, giving a classification of pebbly sand.

Mineral belonging to the Glacial Sand and Gravel ranges in thickness from nil in borehole SW 23 to 6.0 m in borehole NW 21; it is generally 'clayey' sandy gravel or 'clayey' pebbly sand. This deposit exhibits the widest range in particle size, containing up to 17 per cent fines (borehole NW 21) and up to 45 per cent gravel (borehole NW 28).

The Kesgrave Sands and Gravels deposit ranges in thickness up to 7.3 m (borehole NW 28). Its mineral generally grades as sand, but ranges to sandy gravel, as in borehole NW 21. The sand content ranges up to 95 per cent (borehole NW 20) and the fines content is low (only 4 per cent in borehole NW 20). In borehole NW 17 the deposit is apparently absent and its position between the Glacial Sand and Gravel and the Red Crag is occupied by 3.2 m of clay and fine clayey sand that is tentatively correlated with the Chillesford Beds.

The Red Crag was proved in six of the boreholes and ranged in thickness up to 5.5 m (borehole NW 22); it generally grades as a pebbly sand with a low fines content (only 4 per cent in boreholes SW 22 and NW 22).

The overburden has a mean thickness of 6.2 m, but ranges from only 0.3 m in borehole NW 15 to 10.7 m in borehole NW 20; on the plateau, where the cover of Boulder Clay is preserved, it is relatively thick, whereas on the flanks of the valleys, where the Boulder Clay has been removed by erosion, it is much thinner and composed merely of soil and subsoil.

There are no active sand and gravel workings in the block, but numerous small shallow pits (not shown on the resource map) indicate that local small-scale exploitation has taken place in the past.

### Block B

Block B, centred on Assington, covers an area of 11.0 $km^2$, of which 10.6 $km^2$ is mineral-bearing. As in Block A, the mineral occurs in the Glacial Sand and Gravel, the Kesgrave Sands and Gravels and in the Red Crag. Its assessment is based on 11 IMAU boreholes and on the records of three other boreholes.

The mineral has a mean total thickness of 10.2 m and ranges in thickness from 2.7 m (borehole NW 33) to 14.2 m (borehole NW 35). Its estimated volume is 108 million $m^3$ $\pm$ 18 per cent, and its mean grading is fines 8 per cent, sand 76 per cent and gravel 16 per cent, giving a mineral classification of pebbly sand.

Mineral belonging to the Glacial Sand and Gravel ranges in proved thickness from nil (borehole NW 25) to 5.1 m (borehole NW 35). It generally falls within the sandy gravel or 'clayey' sandy gravel categories. As in other blocks, this formation shows the widest range in particle size: its fines content ranges up to 19 per cent (borehole NW 26) and its gravel content up to 53 per cent (borehole NW 32). A thick (4.7-m) waste horizon splits the mineral in borehole NW 33.

The Kesgrave Sands and Gravels deposit ranges in thickness from nil in borehole NW 33 to 8.0 m in borehole NW 31; it grades mostly as sand or pebbly sand.

The Red Crag has a mean thickness of 2.7 m; it ranges in thickness from nil in borehole NW 32 to 4.4 m in boreholes NW 27 and NW 34. The mineral falls in the category of sand or pebbly sand. In borehole NW 24 its sand content reaches 96 per cent.

The overburden has a mean thickness of 5.1 m, but ranges in thickness from 0.1 m in borehole NW 30 to 11.5 m in borehole NW 25. On the plateau it is composed of thick Boulder Clay; where the Boulder Clay cover has been removed by erosion, on the flanks of the valley of the stream that flows southwards past Assington, the overburden is much thinner and consists of soil and subsoil, or, in the valley floor, of Head or Alluvium.

### Block C

Block C is in two parts, south-west and north-east of the valley of the Box. Together, the two parts cover an area of 15.9 $km^2$,of which 14.5 $km^2$ is mineral-bearing. The mineral occurs in the same three deposits as in Blocks A and B. The assessment of resources is based upon 15 IMAU boreholes and on the records of 10 other boreholes.

The mineral has a mean total thickness of 13.4 m; it ranges in thickness from 1.8 m in borehole NE 29 to 29.5 m proved in borehole NE 19 (a Hydrogeology Unit borehole at [9846 3967], not shown on the resource map). The estimated volume of mineral is 194 million $m^3$ $\pm$ 16 per cent; its mean grading is fines 8 per cent, sand 82 per cent and gravel 10 per cent.

Mineral belonging to the Glacial Sand and Gravel ranges in proved thickness from nil (borehole NE 29) to 9.8 m (borehole NE 53); it generally falls within the 'clayey' sandy gravel or sandy gravel categories, and, as elsewhere in the district, exhibits the widest range in particle size: its fines content ranges up to 24 per cent (borehole NE 49) and its gravel content up to 44 per cent (borehole NE 50). A thin (0.3-m) waste horizon splits the Glacial Sand and Gravel in borehole NE 30.

The Kesgrave Sands and Gravels deposit ranges in thickness from nil in borehole NE 29 to 11.2 m in borehole NE 40; the mineral grades predominatly as sand. The sand content reaches 97 per cent in borehole NE 44.

The mineral in the Red Crag ranges in thickness up to 6.3 m (borehole NE 51); its fines content is low, only 2 per cent in borehole NE 44, and it generally grades as sand or pebbly sand.

The overburden has a mean thickness of 2.0 m, though it ranges from 0.1 m in borehole NE 50 to 11.5 m in borehole NE 43. As in Blocks A and B, it is composed predominantly of Boulder Clay on the higher ground, but of soil, Head and Alluvium in the valleys.

Block D

This block contains the fluvial and glacial sediments of the valley of the Box. The smallest block on the resource sheet, it extends to only 3.3 $km^2$, of which 3.2 $km^2$ is mineral-bearing. The sequence of deposits within the presumed glacial tunnel valley is variable - hence the wide confidence limits quoted for the volume of mineral: Glacial Silts interdigitate with generally thin seams of Glacial Sand and Gravel and Boulder Clay. These glacial deposits are overlain by thin fluvial gravels which themselves are masked by a large spread of Head that floors the present-day valley.

The assessment of resources is based upon 6 IMAU boreholes and records of 3 other boreholes.

The mineral, which has a mean thickness of 5.7 m, ranges in thickness from 1.2 m in borehole NE 33 to 15.3 m in borehole NE 46. In borehole NE 54, 4.8 m of waste intervenes between 3.1 m of fluvial gravel masked by Head and underlying 'very clayey' pebbly sand assigned to the Glacial Sand and Gravel. The estimated total volume of mineral present in the block is 18 million $m^3$ $\pm$ 57 per cent; its mean grading is fines 19 per cent, sand 56 per cent and gravel 25 per cent, giving an overall classification of 'clayey' sandy gravel.

Fluvial deposits masked by Head were proved in four boreholes; they generally grade as gravel. The maximum gravel content (68 per cent) was proved in borehole NE 52.

Mineral classified as Glacial Sand and Gravel was proved in two boreholes; in each it was found to be 'very clayey', for example its fines content in borehole NE 54 was 33 per cent. The patch mapped as Second Terrace at Mill Street [988 375] has a similar grading to that of the Glacial Sand and Gravel and is considered to represent a bench feature cut into that deposit.

The overburden, generally composed of Head, has a mean thickness of 0.9 m, and ranges in thickness from 0.3 m in boreholes NE 46 and NE 52 to 2.8 m in borehole NE 39.

Block E

Block E, occupying the central portion of the resource sheet, extends to 13.7 $km^2$, of which 11.2 $km^2$ is mineral-bearing. The mineral present belongs to the Red Crag, the Kesgrave Sands and Gravels and the Glacial Sand and Gravel. The assessment is based upon data from 16 IMAU boreholes and one other borehole.

The mineral has a mean total thickness of 13.7 m; it ranges in thickness from 8.3 m in borehole SE 24 to 19.6 m in borehole NW 37. Its estimated volume is 152 million $m^3$ $\pm$ 12 per cent and its mean grading is fines 9 per cent, sand 82 per cent and gravel 9 per cent, giving an overall mineral classification of pebbly sand.

The mineral of the Glacial Sand and Gravel generally falls within the categories 'clayey' sandy gravel or 'clayey' pebbly sand; it ranges in thickness from nil in boreholes NE 37 and NE 41 to 9.8 m in borehole NW 37, where it is split by a waste parting 2.3 m thick. It has the widest range of particle size of the formations within the block, with a fines content reaching 20 per cent in borehole SW 30 and a gravel content ranging up to 47 per cent in borehole SE 24.

The Kesgrave Sands and Gravels deposit was proved in all the IMAU boreholes and was found to range in thickness from 2.0 m in borehole SE 13 to 9.0 m in borehole NE 41; it generally grades as sand, with a sand content that reaches 96 per cent in borehole SE 13. Like the underlying Red Crag, they are normally less 'clayey' than the Glacial Sand and Gravel.

The Red Crag, absent in boreholes SE 24 and SW 35, ranges in thickness up to 7.3 m in borehole SE 13; like the Kesgrave Sands and Gravels, it generally grades as sand; its fines content is as low as 3 per cent in borehole NE 37.

The overburden has a mean thickness of 2.2 m and ranges in thickness from nil in borehole NE 41 to 6.3 m in boreholes NW 36 and SW 35. It is composed predominantly of Boulder Clay with some thin Head deposits in the many small tributary valleys.

Block F

This block contains the fluvial gravels of the Stour valley; it covers 14.5 $km^2$ of ground, of which 11.7 $km^2$ is mineral-bearing. The assessment is based upon 23 IMAU boreholes and the records of 20 other boreholes.

The mineral, which has a mean thickness of 4.4 m, ranges in thickness from 1.3 m in borehole SW 17 to 15.0 m in borehole SW 16; its estimated volume is 51 million $m^3$ $\pm$ 22 per cent. The mean grading is fines 6 per cent, sand 46 per cent and gravel 48 per cent (including 1 per cent of cobble grade), giving an overall mineral classification of gravel.

The River Terrace Deposits generally have a very low fines content. However, the Third Terrace gravels and some of those that are masked by Head are 'clayey' or 'very clayey'. The gravel in borehole SW 16, which infills a deep buried valley beneath Bures, becomes progressively more chalky towards its base where it rests upon the Upper Chalk.

The overburden in this block is usually thin, with a mean thickness of 1.2 m, and ranges in thickness from 0.1 m in borehole SW 31 to 3.1 m in borehole NE 55.

Block G

Block G, in the south-western corner of the resource sheet, covers an area of 13.8 $km^2$, of which 11.1 $km^2$ is mineral-bearing. The mineral present belongs to the Glacial Sand and Gravel, the Kesgrave Sands and Gravels and the Red Crag. Its assessment is based upon 12 IMAU boreholes and the records of 2 other boreholes.

The mineral has a mean total thickness of 8.7 m; it ranges in thickness from 3.0 m in borehole SW 19 to 14.0 m in borehole SW 10. The estimated volume of mineral present in the block is 97 million $m^3$ $\pm$ 30 per cent. Its mean grading is fines 10 per cent, sand 77 per cent and gravel 13 per cent, giving an overall mineral classification of 'clayey' pebbly sand.

The mineral belonging to the Glacial Sand and Gravel ranges in proved thickness from nil in two boreholes (SW 40 and SW 45) to 8.0 m in borehole SW 29. A waste parting 0.7 m thick splits the mineral in borehole SW 20. The mineral in this deposit generally grades as 'clayey' sandy gravel or 'clayey' pebbly sand; the fines content ranges up to 29 per cent (proved in borehole SW 44).

The Kesgrave Sands and Gravels deposit ranges in thickness from 1.0 m in borehole SW 40 to 6.0 m in borehole SW 21; it grades predominantly as sand (the sand content reaches 95 per cent in borehole SW 29) or pebbly sand, although in boreholes SW 40 and SW 44 it proved to be sandy gravel and gravel respectively. The

mineral in the latter borehole yielded the highest gravel content (52 per cent) found in this block.

The Red Crag, which was absent in boreholes SW 19 and SW 21, ranges in thickness up to 5.1 m (proved in borehole SW 33). Its mineral grades as sand or pebbly sand and although occasionally 'clayey', it is normally lower in fines than the other two deposits: in boreholes SW 40 and SW 28 it contained only 2 per cent of fines.

The overburden, predominantly composed of Boulder Clay, has a mean thickness of 6.6 m, but ranges in thickness from 0.1 m (in borehole SW 33) to 11.5 m (in borehole SW 28).

The London Clay bedrock is exposed in two small inliers surrounded by Head in the valley north-west of The Grove [944 304]; this portion of the valley is therefore considered to be barren of potentially workable sand and gravel.

Block H

Block H, in the south-eastern corner of the resource sheet, covers 15.9 $km^2$, of which 13.4 $km^2$ is mineral-bearing. The mineral is found in the same three formations as in Block G, but in two of the formations its mean grading is markedly different from that typical of these formations in the remainder of the sheet area: the gravel content is generally lower in the Glacial Sand and Gravel and higher in the Kesgrave Sands and Gravels than elsewhere on the sheet area. The assessment of aggregate resources is based on 16 IMAU boreholes.

The mineral has a mean total thickness of 5.7 m; it ranges in thickness from 1.4 m in borehole SE 32 to 10.5 m in borehole SE 37. Its estimated volume is 76 million $m^3$ $\pm$ 25 per cent, and its mean grading is fines 7 per cent, sand 62 per cent and gravel 31 per cent.

The mineral of the Glacial Sand and Gravel has higher contents of fines and sand than in other blocks; indeed, the fines content of the formation is high enough in boreholes SE 22 and SE 38 to render it non-mineral, whilst in borehole SW 23 it is 37 per cent.

The Kesgrave Sands and Gravels deposit has an unusually high gravel content (reaching 65 per cent in borehole SE 33) in this block; the fines content is low (only 1 per cent in 5 boreholes) and it grades as gravel or sandy gravel.

The Red Crag was proved in only 6 boreholes, in which it ranged in thickness up to 3.9 m. It grades as sand or pebbly sand, with a sand content of up to 96 per cent (proved in borehole SE 16).

The overburden is generally thin, except south of Little Horkesley, where it ranges up to 8.0 m in thickness (boreholes SE 17); it is predominantly of soil and subsoil, with Boulder Clay in the west, but in some areas it is composed of non-mineral-grade Glacial Sand and Gravel.

## 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.

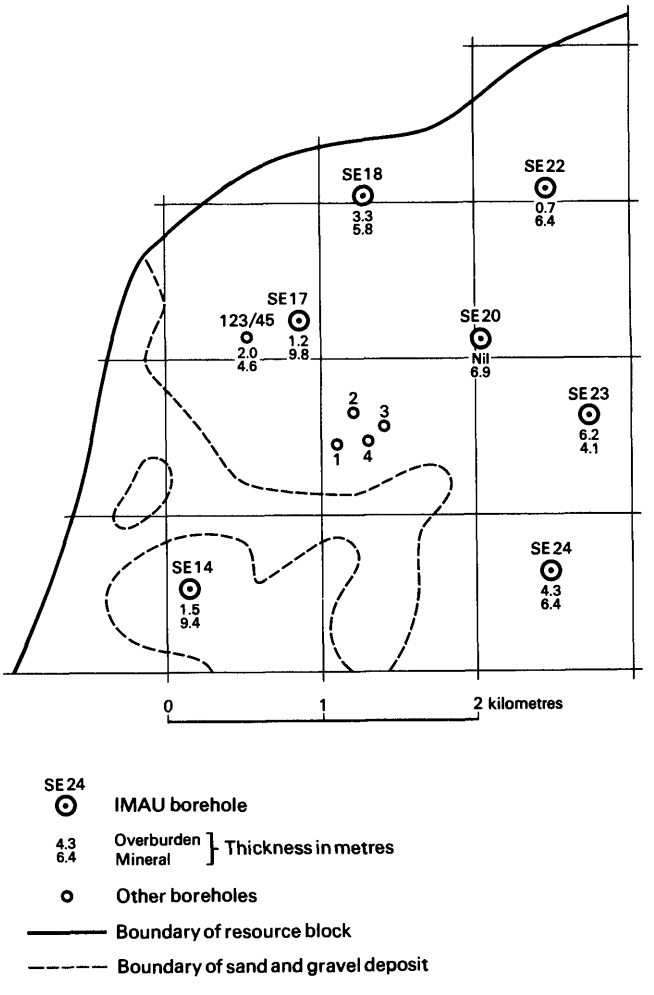
The drilling machine employed should be capable of providing a continuous sample representative of all unconsolidated deposits, so that the in-situ grading can be determined, if necessary, to a depth of 30 m (100 ft) at a diameter of about 200 mm (8 in), beneath different types of overburden. It should 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 $S_A / S_{\bar{l}_m} \leqq 0.\dot{3}$ is assumed in all cases. It follows from Equation [2] that

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

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:

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

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 | Hydrogeology Unit record |
| 123/45 | ½ | 2.0 | | 4.6 | | |
| 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. Orignal 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 |

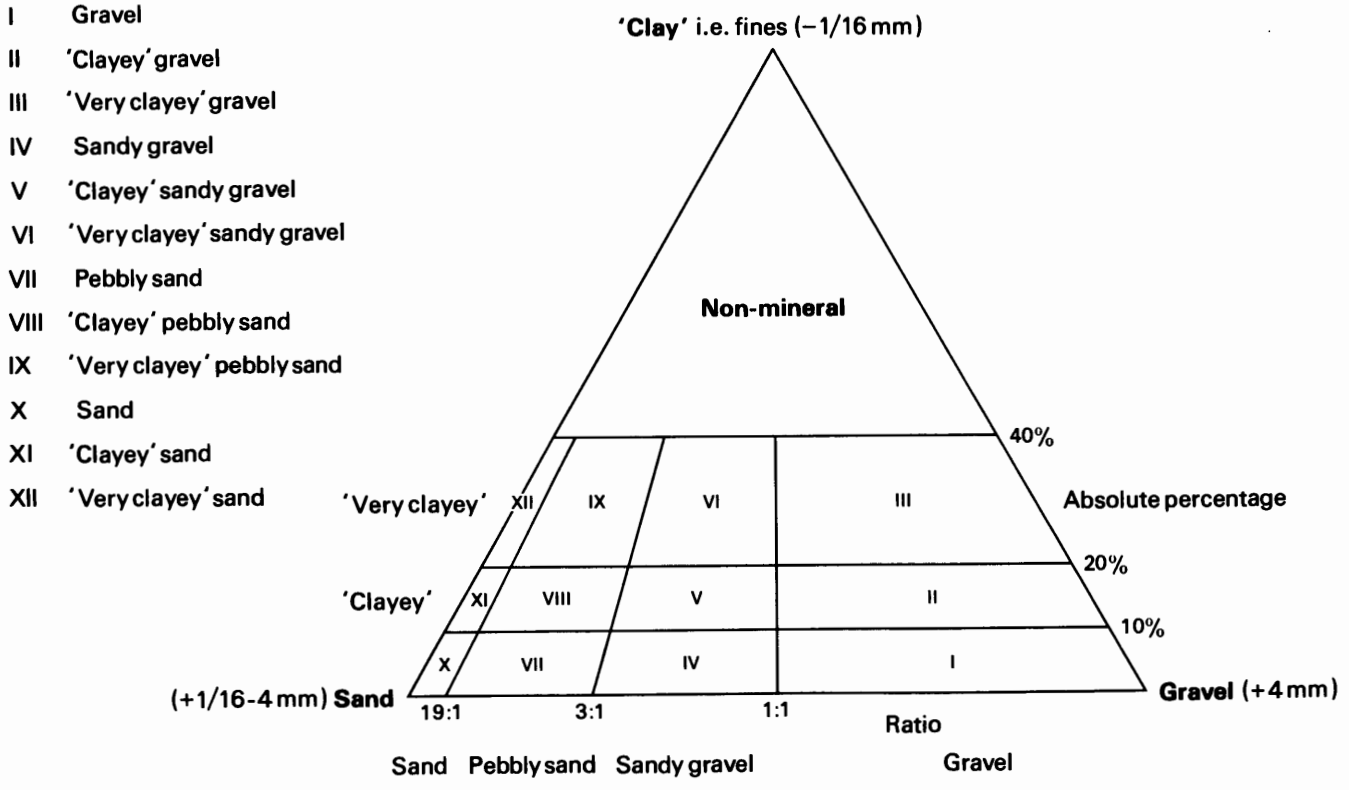



Diagram showing the descriptive categories used in the classification of sand and gravel

APPENDIX D

EXPLANATION OF THE BOREHOLE RECORDS

**Annotated example**

**TL 93 NW 37** **9419 3598** **0.5 km North of Rowley Grove, Leavenheath**[1] **Block E**

Surface level +66.7 m[2]
Water struck at +48.9 m[3]
March 1977[4]

Overburden 3.4 m
Mineral 3.8 m
Waste 2.3 m
Mineral 15.8 m
Bedrock 1.1 m+[5]

**LOG**

| Geological classification[7] | Lithology[8] | Thickness m | Depth[6] m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, sandy, silty, with flint pebbles, pale orange-brown | 2.3 | 2.6 |
| | Clay, very sandy, silty, orange-brown | 0.8 | 3.4 |
| Glacial Sand and Gravel | a 'Clayey' sandy gravel, 'very clayey' in uppermost 1.1 m, with discrete clay seams<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded to rounded quartz, well rounded flint, rounded quartzite and well rounded chalk; with a trace of sandstone<br>Sand: medium with fine and coarse, predominantly rounded quartz with some angular flint and rounded chalk, brown | 3.8 | 7.2 |
| | Clay, very sandy, silty, with chalk, flint quartz and sandstone pebbles, pale yellow-brown | 2.3 | 9.5 |
| | b Sandy gravel, 'clayey' in uppermost 2.2 m, with discrete clay seams and pellets<br>Gravel: fine and coarse, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint and rounded quartzite; with a trace of sandstone<br>Sand: medium with coarse and fine predominantly rounded quartz with some coarse angular flint, orange-brown | 6.0 | 15.5 |

**GRADING**

| | Mean for deposit[9] percentages | | | Depth below surface (m)[10] | 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 | 17 | 51 | 32 | 3.4-4.5 | 31 | 24 | 23 | 5 | 8 | 9 | 0 |
| | | | | 4.5-5.5 | 13 | 7 | 14 | 11 | 22 | 33 | 0 |
| | | | | 5.5-7.2 | 11 | 7 | 36 | 18 | 18 | 10 | 0 |
| | | | | Mean | 17 | 12 | 27 | 12 | 16 | 16 | 0 |
| b | 8 | 62 | 30 | 9.5-11.0 | 14 | 11 | 45 | 9 | 18 | 3 | 0 |
| | | | | 11.0-11.7 | 10 | 7 | 40 | 15 | 19 | 9 | 0 |
| | | | | 11.7-13.2 | 5 | 7 | 20 | 13 | 24 | 31 | 0 |
| | | | | 13.2-14.2 | 5 | 4 | 60 | 14 | 10 | 7 | 0 |
| | | | | 14.2-15.5 | 4 | 5 | 50 | 15 | 13 | 13 | 0 |
| | | | | Mean | 8 | 7 | 42 | 13 | 17 | 13 | 0 |
| a + b | 11 | 58 | 31 | Mean | 11 | 9 | 36 | 13 | 17 | 14 | 0 |



**COMPOSITION**[11]

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a + b | 64 | 9 | 13 | 8 | 1 | 5 | 0 | 0 | 0 | 0 |

The numbered paragraphs below correspond with the annotations given on the specimen record:

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

2 Surface level
The surface level at the borehole site is given in metres (rounded to the nearest 0.1 m) above Ordnance Datum.

3 Groundwater conditions
If groundwater was present, the level at which it was encountered is normally given in metres above Ordnance Datum.

4 Type of drill and date of drilling
Unless otherwise stated the borehole was drilled by a shell and auger rig using 152 mm diameter casing. The month and year of completion of drilling are stated.

5 The plus sign (+) indicates that the base of the deposit was not reached during drilling.

6 Thickness and depth
All measurements were made in metres rounded to the nearest 0.1 m.

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

9 Mean grading
The gradings of the full thickness of the mineral horizons identified in the log represent the means of the individual sample gradings weighted by the thicknesses present, if these vary.

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 proportion of fines and coarse gravel (+16 mm) may be lower.

10 Sampling
A continuous series of bulk samples is taken throughout the thickness of sand and gravel. A new sample is taken wherever there is an appreciable lithological change within the sand and gravel or at every 1 m of depth. Samples obtained by bailing are indicated by an asterisk.

11 Composition
The composition, based on pebble counts in the range +4 mm -64 mm, are given for each discrete mineral horizon. The mean is calculated using the percentage of gravel retained within individual samples.

## APPENDIX E

## INDUSTRIAL MINERALS ASSESSMENT UNIT BOREHOLE RECORDS

Other IGS-registered boreholes used in the assessment of resources are listed at the end of this Appendix.

**TL 93 NW 14** **9018 3969** **Great Greys, Great Cornard** **Block A**

Surface level +63.6 m
Water struck at +53.6 m
March 1977

Overburden 5.3 m
Mineral 8.6
Bedrock 1.0 m+

### LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Boulder Clay | Clay, sandy becoming very sandy, silty, pebbly, orange-brown | 2.3 | 2.5 |
| | Clay, sandy, silty, with pebbles of flint and chalk, light orange brown | 0.5 | 3.0 |
| | Clay, sandy, becoming very sandy at base, silty, with pebbles of fine well rounded chalks and fine to coarse angular flints, pale brown mottled light grey around chalk pellets | 2.3 | 5.3 |
| Glacial Sand and Gravel | **a** Pebbly sand, 'clayey' in upper 1.0 m, 'very clayey' in upper 0.2 m becomes a sandy gravel at base<br>Gravel: fine with some coarse, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint, rounded quartzite and subrounded; sandstone with some subangular igneous and metamorphic rocks<br>Sand: medium with some fine and coarse, predominantly well rounded to rounded quartz, orange brown becoming light brown | 2.8 | 8.1 |
| Kesgrave Sands and Gravels | **b** Sand, becoming finer and pebbly with depth<br>Gravel: fine angular to subrounded and well rounded flint; with tabular ironstone, and well rounded phosphatic nodules and quartz; with some subrounded sandstone; with a trace of quartzite, igneous and metamorphics<br>Sand: medium with fine and some coarse, predominantly subrounded to well rounded quartz with a trace of fine mica, fawn brown becoming orange | 5.8 | 13.9 |
| London Clay | Clay, very silty becoming, silty brown mottled orange | 0.9 | 14.8 |
| | Nodule of silty hard clay, light grey | 0.1+ | 14.9 |

### GRADING

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | -⅛ | +⅛ -¼ | +¼ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| **a** | 8 | 73 | 19 | 5.3-6.3* | 14 | 22 | 56 | 3 | 5 | 0 | 0 |
| | | | | 6.3-7.1* | 3 | 12 | 71 | 4 | 7 | 3 | 0 |
| | | | | 7.1-8.1* | 7 | 7 | 26 | 19 | 28 | 13 | 0 |
| | | | | Mean | 8 | 14 | 50 | 9 | 14 | 5 | 0 |
| **b** | 6 | 91 | 3 | 8.1-9.3* | 8 | 43 | 47 | 2 | 0 | 0 | 0 |
| | | | | 9.3-10.0* | 7 | 17 | 71 | 5 | 0 | 0 | 0 |
| | | | | 10.0-11.1* | 4 | 13 | 72 | 9 | 2 | 0 | 0 |
| | | | | 11.1-12.1* | 2 | 20 | 62 | 10 | 5 | 1 | 0 |
| | | | | 12.1-13.1* | 6 | 28 | 50 | 12 | 4 | 0 | 0 |
| | | | | 13.1-13.9* | 11 | 34 | 39 | 8 | 7 | 1 | 0 |
| | | | | Mean | 6 | 26 | 57 | 8 | 3 | 0 | 0 |
| **a + b** | 7 | 84 | 9 | Mean | 7 | 22 | 54 | 8 | 7 | 2 | 0 |



### COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 55 | 13 | 18 | 6 | 6 | 0 | 0 | 2 | 0 | 0 |
| b | 26 | 25 | 8 | 1 | 2 | 0 | 21 | trace | trace | 17 |
| a+b | 50 | 15 | 16 | 5 | 5 | 0 | 4 | 2 | trace | 3 |

**TL 93 NW 15** **9036 3838** **Costens Hall, Little Cornard** **Block A**

Surface level +60.8 m
Water struck at +52.3 m
February 1977

Overburden 0.3 m
Mineral 11.1 m
Bedrock 1.5 m+

### LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.3 | 0.3 |
| Glacial Sand and Gravel | a 'Clayey' sandy gravel<br>Gravel: fine with coarse, angular to subrounded and well rounded flint; with rounded to well rounded quartz; with some rounded quartzite and subrounded sandstone; with a trace of igneous and metamorphic rocks<br>Sand: medium with some coarse and fine, predominantly rounded quartz with a trace of angular coarse flint, pale brown. | 4.7 | 5.0 |
| Kesgrave Sands and Gravels | **b** Sand, with silty clay seams throughout, becomes slightly finer with depth<br>Gravel: trace of fine, angular to subrounded flint; with rounded quartz, well rounded flint and rounded quartzite, with some subrounded sandstone.<br>Sand: medium with fine and a trace of coarse, quartz, pale brown. | 4.0 | 9.0 |
| Red Crag | **c** 'Clayey' pebbly sand: with thin iron-cemented seams<br>Gravel: fine with coarse, well rounded and angular to subrounded flint; with tabular ironstone; with some rounded quartz.<br>Sand: medium with fine and some coarse, well rounded to rounded quartz with a trace of angular coarse flint, rusty brown. | 2.4 | 11.4 |
| London Clay | Clay, silty, brown mottled grey brown with, some iron staining | 1.0 | 12.4 |
| | Clay, silty, pale grey | 0.4 | 12.8 |
| | Clay, silty, micaceous, dark grey | 0.1+ | 12.9 |

**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 | 10 | 64 | 26 | 0.3-1.3 | 15 | 13 | 44 | 5 | 14 | 9 | 0 |
| | | | | 1.3-2.2 | 12 | 5 | 44 | 9 | 16 | 14 | 0 |
| | | | | 2.2-3.2 | 11 | 6 | 60 | 7 | 12 | 4 | 0 |
| | | | | 3.2-4.2 | 8 | 2 | 39 | 26 | 17 | 8 | 0 |
| | | | | 4.2-5.0 | 3 | 4 | 39 | 13 | 25 | 16 | 0 |
| | | | | Mean | 10 | 6 | 46 | 12 | 16 | 10 | 0 |
| b | 5 | 94 | 1 | 5.0-6.0 | 3 | 21 | 73 | 1 | 1 | 0 | 0 |
| | | | | 6.0-7.0 | 6 | 28 | 64 | 2 | 0 | 0 | 0 |
| | | | | 7.0-8.0 | 5 | 29 | 64 | 2 | 0 | 0 | 0 |
| | | | | 8.0-9.0* | 7 | 31 | 60 | 2 | 0 | 0 | 0 |
| | | | | Mean | 5 | 27 | 65 | 2 | 1 | 0 | 0 |
| c | 10 | 78 | 12 | 9.0-10.0* | 9 | 23 | 47 | 6 | 8 | 7 | 0 |
| | | | | 10.0-11.4* | 11 | 27 | 39 | 14 | 7 | 2 | 0 |
| | | | | Mean | 10 | 25 | 42 | 11 | 8 | 4 | 0 |
| a+b+c | 8 | 78 | 14 | Mean | 8 | 18 | 52 | 8 | 9 | 5 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 43 | 28 | 21 | 4 | 3 | 0 | 0 | 1 | 0 | 0 |
| b | 42 | 23 | 23 | 9 | 3 | 0 | 0 | 0 | 0 | 0 |
| c | 31 | 41 | 4 | 0 | 0 | 0 | 24 | 0 | 0 | 0 |
| a+b+c | 42 | 29 | 20 | 4 | 2 | 0 | 2 | 1 | 0 | 0 |



**TL 93 NW 16** **9046 3760** **Kingsbury Farm, Bures St Mary** **Block A**

Surface level +65.2 m
Water struck at +56.3 m
February 1977

Overburden 6.3 m
Mineral 8.4 m
Bedrock 0.9 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.4 | 0.4 |
| Boulder Clay | Clay, silty, with fine angular and coarse subrounded flint pebbles, grey-brown | 0.6 | 1.0 |
| | Clay, silty, with angular to subrounded flint pebbles and fine well rounded chalk pellets, grey-brown | 3.0 | 4.0 |
| | Clay, silty, with angular to subrounded flint pebbles and sand-sized well rounded chalk pellets with a trace of fossil debris, dark grey-brown | 2.3 | 6.3 |
| Glacial Sand and Gravel | **a** 'Clayey' pebbly sand, with a very silty sand seam between 8.0 m and 8.3 m<br>Gravel: fine with coarse, angular to subrounded flint;with rounded quartzite, well rounded flint and rounded to well rounded quartz; with some subrounded sandstone<br>Sand: medium with some fine and coarse, predominantly rounded quartz with some coarse angular flint, pale yellow becoming yellow-brown | 4.5 | 10.8 |
| Kesgrave Sand and Gravel | **b** Pebbly sand, with a thin basal Red Crag, rod-like flint gravel between 14.4 m and 14.7 m<br>Gravel: fine with some coarse, well rounded and angular to subrounded flint; with rounded quartz; with some tabular ironstone; with a trace of sandstone and quartzite<br>Sand: medium and fine with trace of coarse, quartz, fawn becoming orange-brown and dark brown | 3.9 | 14.7 |
| London Clay | Clay, silty, dark grey mottled brown | 0.5 | 15.2 |
| | Clay, very silty, blue-grey | 0.4+ | 15.6 |

**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 | 11 | 77 | 12 | 6.3-7.3 | 8 | 10 | 70 | 4 | 6 | 2 | 0 |
| | | | | 7.3-8.3 | 10 | 27 | 54 | 5 | 3 | 1 | 0 |
| | | | | 8.3-8.8 | 20 | 4 | 66 | 5 | 4 | 1 | 0 |
| | | | | 8.8-9.8 | 6 | 3 | 51 | 16 | 17 | 7 | 0 |
| | | | | 9.8-10.8 | 13 | 4 | 56 | 9 | 10 | 8 | 0 |
| | | | | Mean | 11 | 10 | 59 | 8 | 8 | 4 | 0 |
| b | 6 | 88 | 6 | 10.8-11.8 | 8 | 67 | 24 | 1 | 0 | 0 | 0 |
| | | | | 11.8-12.8 | 7 | 23 | 54 | 3 | 12 | 1 | 0 |
| | | | | 12.8-13.8* | 4 | 36 | 56 | 3 | 1 | 0 | 0 |
| | | | | 13.8-14.7* | 6 | 42 | 38 | 6 | 7 | 1 | 0 |
| | | | | Mean | 6 | 42 | 43 | 3 | 5 | 1 | 0 |
| a + b | 9 | 82 | 9 | Mean | 9 | 25 | 51 | 6 | 7 | 2 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 49 | 15 | 13 | 20 | 3 | 0 | 0 | 0 | 0 | 0 |
| b | 41 | 51 | 5 | trace | 1 | 0 | 2 | 0 | 0 | 0 |
| a + b | 48 | 19 | 13 | 17 | 3 | 0 | trace | 0 | 0 | 0 |



**TL 93 NW 17 9022 3701** **0.5 km South west of Sawyer's Farm, Bures St Mary** **Block A**

Surface level +69.4 m
Water struck at +65.5 m
March 1977

Overburden 10.5
Mineral 5.3 m
Waste 3.2 m
Mineral 2.6 m
Bedrock 0.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, sandy, silty with carbonaceous traces and flint pebbles, brown | 0.3 | 0.6 |
| | Clay, sandy, silty with chalk pellets and flint pebbles, yellow-brown | 0.5 | 1.1 |
| | Clay, sandy, silty with orange-brown sand pockets and flint pebbles, brown mottled grey | 2.7 | 3.8 |
| | Clay, silty, sandy, alternating with seams of silty fine sand, coarse angular flints at top | 2.3 | 6.1 |
| | Clay, fine, sandy, silty with chalk pellets and angular flint pebbles, brown becoming dark grey from 6.3 m | 2.0 | 8.1 |
| | Clay, silty, with angular flint and rounded quartz pebbles and chalk pellets, dark grey mottled and streaked brown | 1.9 | 10.0 |
| | Clay, sandy, silty, with flint and quartz pebbles and orange-brown silty sand pockets, grey-brown | 0.5 | 10.5 |
| Glacial Sand and Gravel | a 'Clayey' pebbly sand, with discrete clay seams<br>Gravel: fine and coarse, angular to subrounded and well rounded quartz and quartzite; with some subrounded sandstone; with a trace of ironstone, igneous and metamorphics<br>Sand: medium and fine with coarse predominantly rounded quartz with some angular coarse flint, grey-green becoming brown | 5.3 | 15.8 |
| ?Chillesford Beds | Clay, silty, slightly sandy, with brown limonitic pockets, grey-green mottled orange-brown | 1.0 | 16.8 |
| | Sand, very fine, very silty, clayey, alternating with silty, fine sandy clay seams, with some oxidized iron nodules in clay seams, grey mottled orange-brown. A dark brown iron cemented medium sand seam at 18.7 m | 2.2 | 19.0 |
| Red Crag | b Pebbly sand, with some thin ironstone seams<br>Gravel: fine with coarse, well rounded and angular to subrounded flint; with tabular ironstone and rounded to well rounded quartz, with a trace of sandstone<br>Sand: medium with fine and some coarse, predominantly rounded quartz, with some angular coarse flint and ironstone | 2.6 | 21.6 |
| London Clay | Clay, with black pyrite streaks, grey mottled purple-brown | 0.1 | 21.7 |
| | Clay, silty, slightly micaceous, with pyrite nodules, blue-grey becoming dark grey | 0.7+ | 22.4 |

**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 | 10 | 73 | 17 | 10.5-11.5* | 4 | 11 | 35 | 13 | 21 | 16 | 0 |
| | | | | 11.5-12.5* | 7 | 15 | 43 | 16 | 16 | 3 | 0 |
| | | | | 12.5-14.5* | 14 | 46 | 29 | 7 | 7 | 2 | 0 |
| | | | | 14.5-15.8* | 9 | 25 | 42 | 6 | 6 | 10 | 0 |
| | | | | Mean | 10 | 28 | 36 | 9 | 10 | 7 | 0 |
| b | 6 | 77 | 17 | 19.0-20.0* | 6 | 22 | 45 | 9 | 12 | 6 | 0 |
| | | | | 20.0-21.6* | 6 | 20 | 44 | 13 | 12 | 5 | 0 |
| | | | | Mean | 6 | 21 | 44 | 12 | 12 | 5 | 0 |
| a + b | 9 | 75 | 16 | Mean | 9 | 26 | 39 | 10 | 10 | 6 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 49 | 26 | 18 | 5 | 2 | 0 | trace | trace | 0 | 0 |
| b | 30 | 54 | 5 | 0 | 1 | 0 | 10 | 0 | 0 | 0 |
| a + b | 45 | 32 | 15 | 3 | 2 | 0 | 3 | trace | 0 | 0 |



**TL 93 NW 18** **9055 3577** **High Pale Farm, Bures St Mary** **Block F**

Surface level +28.2 m
Water struck at +24.6 m
February 1977

Overburden 0.2 m
Mineral 4.8 m
Bedrock 1.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Head | 'Clayey' sandy gravel, becomes a gravel at base<br>Gravel: fine and coarse, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint and rounded quartzite; with trace of ironstone, sandstone, igneous and metamorphics<br>Sand: medium with fine and coarse, predominantly quartz with some angular flint, brown | 4.8 | 5.0 |
| London Clay | Clay, silty, slightly micaceous brown becoming grey with depth | 1.2+ | 6.2 |

**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 |
| 15 | 50 | 35 | 0.2-1.2 | 18 | 15 | 21 | 14 | 21 | 11 | 0 |
| | | | 1.2-2.2 | 19 | 17 | 21 | 10 | 19 | 14 | 0 |
| | | | 2.2-3.2* | 15 | 22 | 26 | 13 | 18 | 12 | 0 |
| | | | 3.2-4.0* | 19 | 7 | 50 | 6 | 12 | 6 | 0 |
| | | | 4.0-5.0* | 5 | 3 | 21 | 9 | 26 | 36 | 0 |
| | | | Mean | 15 | 13 | 27 | 10 | 19 | 16 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 48 | 19 | 23 | 8 | 1 | 0 | 1 | trace | 0 | 0 |

**TL 93 NW 19** **9010 3534** **0.5 km South west of High Pale Farm, Bures St Mary** **Block F**

Surface level +18.9 m
Water struck at +17.8 m
March 1977

Overburden 0.8 m
Mineral 6.4 m
Bedrock 1.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Alluvium | Clay, sandy, silty, with some flint pebbles and peaty carbonaceous traces, dark grey mottled brown | 0.5 | 0.8 |
| | Gravel, pebbly sand in basal 0.4 m<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint and chalk; with some rounded quartz and quartzite with a trace of sandstone and fossil debris<br>Sand: medium with coarse and some fine predominantly rounded quartz, with flint and some subrounded chalk pellets in coarse fraction | 6.4 | 7.2 |
| Upper Chalk | Chalk, soft grey-white with a thin hard grey chalk cap, with some angular flints | 1.3+ | 8.5 |

**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 |
| 2 | 43 | 55 | 0.8-1.8* | 0 | 1 | 12 | 14 | 36 | 37 | 0 |
| | | | 1.8-2.8* | 2 | 2 | 16 | 21 | 40 | 19 | 0 |
| | | | 2.8-3.8* | 3 | 3 | 21 | 21 | 33 | 19 | 0 |
| | | | 3.8-4.8* | 0 | 3 | 18 | 16 | 34 | 29 | 0 |
| | | | 4.8-5.8* | 2 | 12 | 23 | 9 | 26 | 28 | 0 |
| | | | 5.8-6.8* | 2 | 8 | 30 | 12 | 22 | 26 | 0 |
| | | | 6.8-7.2* | 4 | 25 | 53 | 10 | 7 | 1 | 0 |
| | | | Mean | 2 | 6 | 22 | 15 | 30 | 25 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 70 | 14 | 4 | 2 | 1 | 9 | 0 | 0 | trace | 0 |



**TL 93 NW 20** **9180 3941** **Gouldings Farm, Newton** **Block A**

Surface level +68.4 m
Water struck at +55.8 m
March 1977

Overburden 10.7 m
Mineral 8.6 m
Bedrock 1.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, sandy, pale orange-brown | 0.4 | 0.7 |
| | Clay, silty, light brown, with chalk pellets | 0.7 | 1.4 |
| | Clay, silty, with a trace of sand, with angular flint pebbles and rounded chalk pellets, light brown mottled grey around chalk pellets, becomes grey from 3.0 m | 5.7 | 7.1 |
| | Clay, silty, chalky, with flint pebbles and trace of black shale, stiff dark blue grey. Limestone cobble at 9.0 m | 3.3 | 10.4 |
| | Clay, sandy with pebbles of flint and chalk, with some black shale, orange brown | 0.3 | 10.7 |
| Glacial Sand and Gravel | **a** Pebbly sand, with seams and discrete pellets of clay<br>Gravel: fine and coarse, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint, subrounded sandstone and rounded quartzite; with a trace of igneous and metamorphics<br>Sand: medium with fine and coarse, quartz, fawn brown | 5.2 | 15.9 |
| Kesgrave Sands and Gravels | **b** Sand, with a trace of pebbles<br>Gravel: fine well rounded flint; with angular to subrounded flint and tabular ironstone; with some subangular igneous metamorphics and rounded to well rounded quartz and quartzite; with a trace of sandstone<br>Sand: medium with fine and a trace of coarse quartz, orange-brown | 3.4 | 19.3 |
| London Clay | Clay, sandy, silty, orange-brown | 0.7 | 20.0 |
| | Clay, silty, stiff, dark grey | 0.5+ | 20.5 |

**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** | 8 | 79 | 13 | 10.7-11.5 | 30 | 29 | 32 | 4 | 3 | 2 | 0 |
| | | | | 11.5-12.5 | 7 | 10 | 70 | 5 | 4 | 4 | 0 |
| | | | | 12.5-13.9* | 2 | 5 | 62 | 14 | 9 | 8 | 0 |
| | | | | 13.9-14.9* | 2 | 6 | 63 | 11 | 9 | 9 | 0 |
| | | | | 14.9-15.9* | 5 | 12 | 59 | 11 | 10 | 3 | 0 |
| | | | | Mean | 8 | 11 | 58 | 10 | 7 | 6 | 0 |
| **b** | 4 | 95 | 1 | 15.9-16.9* | 3 | 22 | 71 | 3 | 1 | 0 | 0 |
| | | | | 16.9-18.1* | 2 | 38 | 57 | 2 | 1 | 0 | 0 |
| | | | | 18.1-19.3* | 8 | 35 | 54 | 3 | 0 | 0 | 0 |
| | | | | Mean | 4 | 32 | 60 | 3 | 1 | 0 | 0 |
| **a + b** | 7 | 85 | 8 | Mean | 7 | 19 | 59 | 7 | 5 | 3 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 44 | 20 | 22 | 6 | 7 | 0 | 0 | 1 | 0 | 0 |
| b | 18 | 63 | 2 | 2 | trace | 0 | 11 | 4 | 0 | 0 |
| a + b | 42 | 21 | 23 | 6 | 6 | 0 | trace | 2 | 0 | 0 |

**TL 93 NW 21** **9159 3760** **Birch Avery, Assington** **Block A**

Surface level +69.2 m
Water struck at +67.2 m and +54.2 m
February 1977

Overburden 8.6 m
Mineral 11.9 m
Bedrock 0.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.4 | 0.4 |
| Boulder Clay | Clay, sandy, silty, with fine angular flints, becomes chalky from 1.2 m, pale yellow-brown | 6.0 | 6.4 |
| | Clay, silty, with pellets of chalk and pebbles of flint, quartz and black shale | 1.8 | 8.2 |
| | Clay, sandy, silty, with flint pebbles, grey-brown | 0.4 | 8.6 |
| Glacial and Sand Gravel | **a** 'Clayey' pebbly sand, 'very clayey' in uppermost 2.0 m<br>Gravel: fine with coarse, angular to subrounded flint; with well rounded quartz, well rounded flint and rounded quartzite; with a trace of sandstone<br>Sand: medium with fine and some coarse, predominantly rounded quartz, with some coarse angular flint | 6.0 | 14.6 |
| Kesgrave Sands and Gravels | **b** Sandy gravel, with some discrete clay seams<br>Gravel: fine with coarse, angular to subrounded flint and rounded to well rounded quartz; with well rounded flint, rounded quartzite and subrounded sandstone; with a trace of ironstone<br>Sand: medium with coarse and some fine, rounded quartz with some angular coarse flint | 3.0 | 17.6 |
| Red Crag | **c** Pebbly sand<br>Gravel: fine with a trace of coarse, well rounded and angular to subrounded flint; with tabular ironstone and rounded quartz; with some subrounded sandstone<br>Sand: medium with fine and some coarse, predominantly rounded quartz with some angular coarse flint and subrounded ironstone | 2.9 | 20.5 |
| London Clay | Clay, silty, brown mottled red-brown | 0.2 | 20.7 |
| | Clay, silty, blue-grey | 0.3 + | 21.0 |



**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 | 17 | 69 | 14 | 8.6-9.6 | 33 | 30 | 32 | 2 | 3 | 0 | 0 |
| | | | | 9.6-10.6 | 20 | 22 | 35 | 2 | 4 | 7 | 0 |
| | | | | 10.6-11.6 | 10 | 23 | 39 | 7 | 12 | 9 | 0 |
| | | | | 11.6-12.6 | 8 | 8 | 38 | 12 | 23 | 11 | 0 |
| | | | | 12.6-13.6 | 16 | 21 | 50 | 4 | 6 | 3 | 0 |
| | | | | 13.6-14.6 | 14 | 13 | 62 | 6 | 3 | 2 | 0 |
| | | | | Mean | 17 | 20 | 43 | 6 | 9 | 5 | 0 |
| b | 5 | 52 | 43 | 14.6-15.6* | 6 | 8 | 39 | 10 | 26 | 11 | 0 |
| | | | | 15.6-16.6* | 4 | 2 | 28 | 16 | 29 | 21 | 0 |
| | | | | 16.6-17.6* | 5 | 3 | 37 | 14 | 21 | 20 | 0 |
| | | | | Mean | 5 | 4 | 35 | 13 | 26 | 17 | 0 |
| c | 7 | 88 | 5 | 17.6-18.9* | 9 | 23 | 58 | 8 | 2 | 0 | 0 |
| | | | | 18.9-19.9* | 9 | 21 | 53 | 9 | 5 | 3 | 0 |
| | | | | 19.9-20.5* | 2 | 21 | 65 | 5 | 5 | 2 | 0 |
| | | | | Mean | 7 | 22 | 58 | 8 | 4 | 1 | 0 |
| a+b+c | 12 | 69 | 19 | Mean | 12 | 16 | 45 | 8 | 12 | 7 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 55 | 16 | 19 | 9 | 1 | 0 | 0 | 0 | 0 | 0 |
| b | 42 | 21 | 26 | 5 | 5 | 0 | 1 | 0 | 0 | 0 |
| c | 32 | 48 | 5 | 0 | 2 | 0 | 13 | 0 | 0 | 0 |
| a+b+c | 45 | 21 | 23 | 6 | 4 | 0 | 1 | 0 | 0 | 0 |

**TL 93 NW 22** **9177 3676** **Dorking Tye,Assington** **Block A**

Surface level +70.4 m
Water struck at +66.9 m, +57.7 m and +51.4 m
February/March 1977

Overburden 10.4 m
Mineral 14.5 m
Bedrock 1.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, sandy, silty, with chalk pellets and fine and coarse subangular flints, yellow-brown | 3.1 | 3.4 |
| | Clay, very sandy, silty, orange-brown | 0.6 | 4.0 |
| | Clay, sandy, silty, with subangular flint pebbles and chalk pellets, grey-brown | 0.7 | 4.7 |
| | Clay, sandy, silty, with subangular flint pebbles and chalk pellets, dark brown | 1.4 | 6.1 |
| | Clay, sandy, silty, with chalk and flint pebbles, pale brown | 0.7 | 6.8 |
| | Clay, sandy, silty, with fine subangular flint pebbles and grey quartz with some chalk pellets, grey | 3.2 | 10.0 |
| | Clay, very fine sandy, silty, with fine subangular flint pebbles, orange-brown | 0.4 | 10.4 |
| Glacial Sand and Gravel | a Sandy gravel, 'very clayey' sand in uppermost 1.0 m<br>Gravel: fine and coarse, well rounded and angular to subrounded flint; with rounded quartz with some rounded quartzite and subrounded sandstone<br>Sand: medium with some coarse and fine, predominantly rounded quartz with some subangular flint, pale green | 5.0 | 15.4 |
| Kesgrave Sands and Gravels | b Sand, with a trace of pebbles of flint and quartz, discrete clay seams and pellets throughout<br>Sand: medium with fine and a trace of coarse, predominantly rounded quartz; with some angular flint, green brown becoming brown | 4.0 | 19.4 |
| Red Crag | c Sand, with a thin clay seam near base<br>Gravel: trace of fine and coarse, tabular ironstone; with well rounded and angular to subrounded flint, with some rounded quartz<br>Sand: fine and medium with some coarse, predominantly rounded quartz with coarse angular flint and tabular shell debris from 20.4 m | 5.5 | 24.9 |
| London Clay | Clay, silty, fine sandy, micaceous with pyrite nodules, blue grey | 1.3+ | 26.2 |



**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 | 7 | 54 | 39 | 10.4-11.4 | 22 | 11 | 60 | 4 | 2 | 1 | 0 |
| | | | | 11.4-12.4* | 3 | 2 | 14 | 10 | 33 | 38 | 0 |
| | | | | 12.4-13.4* | 4 | 3 | 22 | 14 | 28 | 29 | 0 |
| | | | | 13.4-14.4* | 3 | 5 | 45 | 16 | 19 | 12 | 0 |
| | | | | 14.4-15.4* | 3 | 16 | 43 | 8 | 16 | 14 | 0 |
| | | | | Mean | 7 | 7 | 37 | 10 | 20 | 19 | 0 |
| b | 8 | 92 | 0 | 15.4-16.4* | 7 | 58 | 33 | 2 | 0 | 0 | 0 |
| | | | | 16.4-17.4* | 13 | 26 | 58 | 3 | 0 | 0 | 0 |
| | | | | 17.4-18.4* | 8 | 31 | 58 | 3 | 0 | 0 | 0 |
| | | | | 18.4-19.4* | 5 | 26 | 66 | 3 | 0 | 0 | 0 |
| | | | | Mean | 8 | 35 | 54 | 3 | 0 | 0 | 0 |
| c | 4 | 92 | 4 | 19.4-20.4* | 4 | 43 | 44 | 5 | 3 | 1 | 0 |
| | | | | 20.4-21.4* | 6 | 42 | 44 | 5 | 3 | 0 | 0 |
| | | | | 21.4-22.4* | 5 | 40 | 45 | 7 | 3 | 0 | 0 |
| | | | | 22.4-23.4* | 2 | 44 | 45 | 7 | 2 | 0 | 0 |
| | | | | 23.4-24.9* | 5 | 54 | 31 | 7 | 3 | 1 | 0 |
| | | | | Mean | 4 | 45 | 41 | 6 | 3 | 1 | 0 |
| a+b+c | 6 | 79 | 15 | Mean | 6 | 29 | 43 | 7 | 8 | 7 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 35 | 36 | 23 | 3 | 3 | 0 | 0 | 0 | 0 | 0 |
| b | 31 | 47 | 19 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| c | 7 | 17 | 4 | 0 | 0 | 0 | 72 | 0 | 0 | 0 |
| a+b+c | 35 | 35 | 22 | 3 | 3 | 0 | 2 | 0 | 0 | 0 |

**TL 93 NW 23** **9131 3560** **Bures Green, Bures St Mary** **Block A**

Surface level +66.5 m
Water struck at +49.4 m
May 1977

Overburden 7.1 m
Mineral 11.9 m
Bedrock 0.7 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Boulder Clay | Clay, sandy, silty, with some angular flint pebbles, pale brown | 0.9 | 1.1 |
| | Clay, sandy, silty, with some angular flint pebbles and chalk pellets, and orange-brown sand seams, pale brown | 5.7 | 6.8 |
| | Clay, very sandy, with a trace of chalk pellets, orange-brown | 0.3 | 7.1 |
| Glacial Sand and Gravel | **a** Sandy gravel, 'clayey' at top becoming more gravelly towards base<br>Gravel: fine and coarse, angular to subrounded and well rounded flint; with rounded to well rounded quartz, rounded quartzite, subrounded sandstone and subangular igneous and metamorphics, with a trace of ironstone<br>Sand: medium with fine and coarse, predominantly rounded quartz with some coarse angular flint, yellow brown becoming fawn brown | 5.6 | 12.7 |
| Kesgrave Sands and Gravels | **b** Sand, with discrete clay seams and pellets<br>Gravel: a trace of fine, angular to subrounded and well rounded flint; with rounded to well rounded quartz and tabular ironstone; with some subangular igneous and metamorphics, well rounded phosphatic nodules and subrounded sandstone<br>Sand: medium with fine and trace of coarse, predominantly quartz with a trace of angular coarse flint, fawn-brown becoming orange-brown | 4.7 | 17.4 |
| Red Crag | **c** Sand<br>Gravel: a trace of fine and coarse, well rounded flint; with tabular ironstone, well rounded phosphatic nodules, angular to subrounded flint and rounded to well rounded quartz; with a trace of sandstone igneous and metamorphics<br>Sand: medium with fine and some coarse, predominantly rounded quartz, with some angular coarse flint and tabular shell debris | 1.6 | 19.0 |
| London Clay | Clay, silty, pale grey mottled orange-brown | 0.2 | 19.2 |
| | Clay, silty, micaceous with some pyrite nodules, dark blue-grey | 0.5+ | 19.7 |



**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 |
| **a** | 5 | 69 | 26 | 7.1-8.1 | 10 | 33 | 42 | 4 | 8 | 3 | 0 |
| | | | | 8.1-9.1 | 4 | 11 | 61 | 11 | 11 | 2 | 0 |
| | | | | 9.1-10.1 | 4 | 19 | 65 | 5 | 4 | 3 | 0 |
| | | | | 10.1-11.1 | 3 | 6 | 50 | 12 | 18 | 11 | 0 |
| | | | | 11.1-12.7 | 3 | 5 | 26 | 11 | 31 | 24 | 0 |
| | | | | Mean | 5 | 14 | 46 | 9 | 16 | 10 | 0 |
| **b** | 6 | 93 | 1 | 12.7-13.7 | 9 | 24 | 2 | 1 | 0 | 0 | 0 |
| | | | | 13.7-14.4 | 3 | 13 | 82 | 1 | 1 | 0 | 0 |
| | | | | 14.4-15.4 | 5 | 16 | 78 | 1 | 0 | 0 | 0 |
| | | | | 15.4-16.4 | 6 | 17 | 75 | 2 | 0 | 0 | 0 |
| | | | | 16.4-17.4* | 6 | 22 | 67 | 4 | 1 | 0 | 0 |
| | | | | Mean | 6 | 19 | 72 | 2 | 1 | 0 | 0 |
| **c** | 8 | 90 | 2 | 17.4-19.0* | 8 | 26 | 60 | 7 | 1 | 1 | 0 |
| **a+b+c** | 5 | 82 | 13 | Mean | 5 | 17 | 59 | 6 | 8 | 5 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 36 | 25 | 19 | 9 | 5 | 0 | 1 | 5 | 0 | 0 |
| **b** | 40 | 31 | 17 | 0 | 2 | 0 | 5 | 3 | 0 | 2 |
| **c** | 13 | 47 | 7 | 0 | 1 | 0 | 17 | 1 | 0 | 14 |
| **a+b+c** | 36 | 25 | 19 | 9 | 5 | 0 | 1 | 5 | 0 | trace |

**TL 93 NW 24** **9258 3996** **Park Farm, Assington** **Block B**

Surface level +61.4 m
Water struck at +55.5 m
March 1977

Overburden 0.7 m
Mineral 1.8 m
Waste 1.5 m
Mineral 7.4 m
Bedrock 1.7 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| | Clay, sandy, silty, with some angular flints and rounded quartz pebbles, brown | 0.5 | 0.7 |
| Glacial Sand and Gravel | **a** 'Clayey' gravel<br>Gravel: coarse and fine, angular to subrounded flint, with well rounded flint rounded to well rounded quartz and quartzite; with some subrounded sandstone<br>Sand: medium with coarse and some fine, predominantly quartz with some angular coarse flint | 1.8 | 2.5 |
| | Clay, sandy, very silty, with angular flint pebbles, carbonaceous traces and pockets of orange-brown sand, grey-brown | 1.5 | 4.0 |
| | **b** Pebbly sand, 'clayey' at base with discrete pebbly clay and sand seams<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint rounded to well rounded quartz and quartzite; with some subangular sandstone<br>Sand: medium with fine and some coarse, quartz, orange brown becoming fawn | 2.0 | 6.0 |
| Kesgrave Sands and Gravels | **c** Sand, with discrete clay seams<br>Gravel: a trace of fine angular to subrounded flint and rounded to well rounded quartz; with well rounded flint and rounded quartzite<br>Sand: fine and medium with a trace of coarse, quartz, pale green-brown | 3.0 | 9.0 |
| Red Crag | **d** Sand, pebbly at base, with some thin dark brown iron cemented seams<br>Gravel: fine, well rounded and angular to subangular flint; with rounded to well rounded quartz; with some subrounded sandstone<br>Sand: medium with fine and some coarse, predominantly quartz with angular coarse flint, dark brown becoming rusty-brown | 2.4 | 11.4 |
| London Clay | Clay, sandy, silty, with oxidised pyrite nodules, pale grey-green | 1.1 | 12.5 |
| | Clay, silty, fine sandy, with pyrite nodules and a seam of red brown nodules at 12.5 m, blue-grey mottled orange brown | 0.3 | 12.8 |
| | Clay, very silty, with pyrite nodules, blue-grey | 0.3 + | 13.1 |



**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** | 12 | 37 | 51 | 0.7-1.7 | 11 | 4 | 21 | 9 | 22 | 33 | 0 |
| | | | | 1.7-2.5 | 14 | 6 | 19 | 16 | 23 | 22 | 0 |
| | | | | Mean | 12 | 5 | 20 | 12 | 23 | 28 | 0 |
| **b** | 9 | 75 | 16 | 4.0-5.0 | 7 | 11 | 51 | 6 | 12 | 13 | 0 |
| | | | | 5.0-6.0 | 10 | 41 | 39 | 2 | 4 | 4 | 0 |
| | | | | Mean | 9 | 26 | 45 | 4 | 8 | 8 | 0 |
| **a + b** | | | | Mean | 10 | 16 | 33 | 8 | 15 | 18 | 0 |
| **c** | 7 | 93 | 0 | 6.0-7.0* | 7 | 54 | 38 | 1 | 0 | 0 | 0 |
| | | | | 7.0-8.0* | 7 | 54 | 38 | 1 | 0 | 0 | 0 |
| | | | | 8.0-9.0* | 8 | 56 | 34 | 1 | 1 | 0 | 0 |
| | | | | Mean | 7 | 55 | 37 | 1 | 0 | 0 | 0 |
| **d** | 3 | 96 | 1 | 9.0-10.0* | 5 | 28 | 62 | 5 | 0 | 0 | 0 |
| | | | | 10.0-11.4* | 2 | 21 | 68 | 7 | 2 | 0 | 0 |
| | | | | Mean | 3 | 24 | 66 | 6 | 1 | 0 | 0 |
| **a+b+c +d** | 7 | 79 | 14 | Mean | 7 | 31 | 43 | 5 | 7 | 7 | 0 |
| **b+c+d** | 6 | 89 | 5 | Mean | 6 | 37 | 48 | 4 | 3 | 2 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a + b** | 77 | 10 | 5 | 6 | 2 | 0 | 0 | 0 | 0 | 0 |
| **c** | 60 | 10 | 25 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| **d** | 25 | 58 | 15 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| **a+b+c +d** | 77 | 10 | 5 | 6 | 2 | 0 | 0 | 0 | 0 | 0 |

**TL 93 NW 25** **9210 3849** **Notts Farm, Newton** **Block B**

Surface level +66.5 m
Water struck at +54.7 m
February 1977

Overburden 11.5 m
Mineral 7.3 m
Bedrock 0.7 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.3 | 0.3 |
| Boulder Clay | Clay, silty, with pebbles of flint and quartz, light brown mottled brown | 0.5 | 0.8 |
| | Clay, silty, slightly sandy at 2.8 m, with angular flint and rounded chalk pebbles, brown | 2.5 | 3.3 |
| | Silt, sandy, with some flint pebbles and some coarse flint sand, brown | 0.4 | 3.7 |
| | Clay, silty, with pebbles of chalk and flint, brown becoming dark brown from 4.9 m | 2.5 | 6.2 |
| | Clay, chalky, silty, with some flints and pockets of fine sandy silt with black carbonaceous patches, yellow brown | 0.7 | 6.9 |
| | Clay, silty, with pebbles of chalk and flint, grey | 2.1 | 9.0 |
| | Clay, silty, becomes sandy, grey-brown | 2.0 | 11.0 |
| | Clay, fine sandy, silty, with pebbles of flint, quartz and chalk, grey-brown | 0.5 | 11.5 |
| Kesgrave Sands and Gravels | **a** Sand, 'clayey' in uppermost 2.0 m and pebbly with some discrete thin clay seams<br>Gravel: fine and coarse, tabular ironstone; with angular to subrounded and well rounded flint; with some rounded quartz and quartzite<br>Sand: medium with fine and some coarse, quartz, green-brown becoming brown | 4.0 | 15.5 |
| Red Crag | **b** Pebbly Sand<br>Gravel: fine and coarse, well rounded and angular to subrounded flint, with tabular ironstone, with some rounded quartz; with a trace of sandstone<br>Sand: medium with some fine and coarse, predominantly rounded quartz with angular flint, brown | 3.3 | 18.8 |
| London Clay | Clay, silty, blue-grey mottled brown | 0.1 | 18.9 |
| | Clay, silty, blue-grey | 0.6 + | 19.5 |



## 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** | 9 | 89 | 2 | 11.5-12.5* | 14 | 26 | 55 | 2 | 1 | 2 | 0 |
| | | | | 12.5-13.5* | 10 | 42 | 47 | 1 | 0 | 0 | 0 |
| | | | | 13.5-14.5* | 8 | 25 | 57 | 7 | 3 | 0 | 0 |
| | | | | 14.5-15.5* | 5 | 14 | 74 | 5 | 2 | 0 | 0 |
| | | | | Mean | 9 | 27 | 58 | 4 | 1 | 1 | 0 |
| **b** | 6 | 81 | 13 | 15.5-16.5* | 6 | 9 | 68 | 6 | 5 | 6 | 0 |
| | | | | 16.5-17.5* | 9 | 14 | 60 | 8 | 6 | 3 | 0 |
| | | | | 17.5-18.8* | 3 | 11 | 57 | 12 | 10 | 7 | 0 |
| | | | | Mean | 6 | 11 | 61 | 9 | 7 | 6 | 0 |
| **a + b** | 8 | 85 | 7 | Mean | 8 | 20 | 59 | 6 | 4 | 3 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 19 | 13 | 2 | 0 | 2 | 0 | 64 | 0 | 0 | 0 |
| **b** | 34 | 42 | 3 | 0 | trace | 0 | 21 | 0 | 0 | 0 |
| **a + b** | 33 | 41 | 3 | 0 | trace | 0 | 23 | 0 | 0 | 0 |

**TL 93 NW 26** **9275 3833** **Assington Thicks, Assington** **Block B**

Surface level +69.2 m
Water struck at +54.4 m
May 1977

Overburden 10.0 m
Mineral 11.8 m
Bedrock 0.7 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Boulder Clay | Clay, sandy, silty, with some angular flint, pale grey mottled orange-brown | 0.9 | 1.0 |
| | Clay, sandy, silty, with angular flint pebbles and rounded chalk pellets, yellow-brown | 4.8 | 5.8 |
| | Clay, sandy, silty, with flint and chalk pebbles, with some thin grey-green silt seams, grey-brown | 1.8 | 7.6 |
| | Clay, sandy, silty, with flint and chalk pebbles, dark grey | 1.8 | 9.4 |
| | Clay, very sandy, silty, with flint and quartz and a trace of chalk pebbles, with thin pale brown medium sand seams, brown | 0.6 | 10.0 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel, very clayey in uppermost 1.0 m<br>Gravel: fine and coarse; angular to subrounded flint; with well rounded flint, rounded to well rounded quartz and quartzite, and subrounded sandstone; with some subangular igneous and metamorphics<br>Sand: medium with fine and coarse; predominantly rounded quartz with some angular coarse flint | 3.8 | 13.8 |
| Kesgrave Sands and Gravels | **b** Sand, 'clayey' and pebbly at top, with discrete clay pellets<br>Gravel: fine, angular to subrounded flint; with well rounded flint; rounded quartzite and rounded to well rounded quartz; with some subangular igneous and metamorphics and sub-rounded sandstone<br>Sand: medium and fine with a trace of coarse, predominantly rounded quartz with some angular flint and fine mica | 5.0 | 18.8 |
| Red Crag | **c** Pebbly sand, very pebbly at base<br>Gravel: fine and coarse, well rounded phosphatic nodules and flint; with some rounded to well rounded quartz, with a trace of sandstone, ironstone quartzite, fossil debris, igneous and metamorphic<br>Sand: medium and fine with some coarse, quartz, rusty-brown becoming green-brown at base | 3.0 | 21.8 |
| London Clay | Clay, silty, dark grey mottled grey-brown | 0.1 | 21.9 |
| | Clay, silty, with some pyrite nodules, dark grey | 0.6 + | 22.5 |



**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** | 19 | 52 | 29 | 10.0–11.0 | 34 | 27 | 28 | 1 | 5 | 5 | 0 |
| | | | | 11.0–12.0 | 15 | 12 | 31 | 10 | 18 | 14 | 0 |
| | | | | 12.0–13.0 | 14 | 7 | 32 | 10 | 18 | 19 | 0 |
| | | | | 13.0–13.8 | 11 | 10 | 34 | 7 | 19 | 19 | 0 |
| | | | | Mean | 19 | 14 | 31 | 7 | 15 | 14 | 0 |
| **b** | 7 | 93 | 0 | 13.8–14.8 | 13 | 61 | 22 | 2 | 1 | 0 | 0 |
| | | | | 14.8–16.8 | 14 | 38 | 53 | 2 | 0 | 0 | 0 |
| | | | | 16.8–17.8 | 3 | 38 | 57 | 2 | 0 | 0 | 0 |
| | | | | 17.8–18.8 | 4 | 34 | 60 | 2 | 0 | 0 | 0 |
| | | | | Mean | 7 | 42 | 49 | 2 | 0 | 0 | 0 |
| **c** | 3 | 85 | 12 | 18.8–19.8 | 4 | 34 | 59 | 2 | 1 | 0 | 0 |
| | | | | 19.8–21.8 | 3 | 39 | 35 | 6 | 9 | 8 | 0 |
| | | | | Mean | 3 | 37 | 43 | 5 | 7 | 5 | 0 |
| **a+b+c** | 10 | 78 | 12 | Mean | 10 | 32 | 42 | 4 | 6 | 6 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 40 | 22 | 17 | 14 | 5 | 0 | 0 | 2 | trace | 0 |
| **b** | 54 | 21 | 8 | 12 | 2 | 0 | 0 | 3 | 0 | 0 |
| **c** | 17 | 36 | 2 | trace | 1 | 0 | 1 | trace | trace | 43 |
| **a+b+c** | 39 | 22 | 16 | 14 | 5 | 0 | trace | 2 | trace | 2 |

**TL 93 NW 27** **9257 3747** **Assington Thicks, Assington** **Block B**

Surface level +66.2 m
Water struck at +53.2 m
May 1977

Overburden 7.0 m
Mineral 13.1 m
Bedrock 0.5 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, sandy, silty, with angular flints, orange-brown | 1.2 | 1.5 |
| | Clay, sandy, silty, with angular flint and abundant chalk pebbles, yellow brown mottled light grey becoming pale brown | 3.5 | 5.0 |
| | Clay, sandy, silty, with flint and chalk pebbles, with some thin silt seams, becomes very sandy from 5.9 m | 2.0 | 7.0 |
| Glacial Sand and Gravel | **a** 'Clayey' pebbly sand, with discrete clay pellets in upper 1.0 m<br>Gravel: fine with coarse, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint, rounded quartzite and sub-rounded sandstone; with some subangular igneous and metamorphics<br>Sand: medium with fine and coarse, quartz, pale brown becoming pale orange-brown | 3.0 | 10.0 |
| Kesgrave Sands and Gravels | **b** Sandy gravel, with discrete clay pellets in uppermost 1.0 m<br>Gravel: fine and coarse, angular to subrounded and well rounded flint, with rounded to well rounded quartz and quartzite, and subrounded sandstone; with some subangular igneous and metamorphics<br>Sand: medium with coarse and some fine, predominantly rounded quartz with some angular coarse flint, yellow-brown | 5.7 | 15.7 |
| Red Crag | **c** Pebbly sand, with grey silt seams at base<br>Gravel: fine with coarse, angular to subrounded flint and well rounded phosphatic nodules; with well rounded flint, rounded to well rounded quartz and tabular ironstone, with some sub-angular igneous and metamorphics; with a trace of sandstone and fossils<br>Sand: medium with fine and coarse, predominantly quartz, with some angular coarse flint and tabular fossil debris | 4.4 | 20.1 |
| London Clay | Clay, silty, light grey passing into dark grey | 0.5+ | 20.6 |



## 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** | 17 | 70 | 13 | 7.0-8.0 | 27 | 13 | 44 | 8 | 6 | 2 | 0 |
| | | | | 8.0-9.0 | 13 | 13 | 46 | 10 | 14 | 4 | 0 |
| | | | | 9.0-10.0 | 10 | 16 | 55 | 5 | 8 | 6 | 0 |
| | | | | Mean | 17 | 14 | 48 | 8 | 9 | 4 | 0 |
| **b** | 4 | 51 | 45 | 10.0-11.0 | 7 | 8 | 44 | 14 | 18 | 9 | 0 |
| | | | | 11.0-12.0 | 6 | 12 | 28 | 13 | 18 | 23 | 0 |
| | | | | 12.0-13.0 | 4 | 5 | 32 | 16 | 25 | 18 | 0 |
| | | | | 13.0-14.0* | 2 | 2 | 21 | 12 | 31 | 32 | 0 |
| | | | | 14.0-15.0* | 1 | 2 | 20 | 14 | 36 | 27 | 0 |
| | | | | 15.0-15.7* | 2 | 8 | 44 | 13 | 18 | 15 | 0 |
| | | | | Mean | 4 | 6 | 31 | 14 | 24 | 21 | 0 |
| **c** | 5 | 83 | 12 | 15.7-16.7* | 4 | 22 | 57 | 11 | 5 | 1 | 0 |
| | | | | 16.7-17.7* | 3 | 18 | 48 | 18 | 10 | 3 | 0 |
| | | | | 17.7-18.7* | 4 | 18 | 47 | 19 | 10 | 2 | 0 |
| | | | | 18.7-20.1* | 7 | 20 | 43 | 16 | 7 | 7 | 0 |
| | | | | Mean | 5 | 19 | 48 | 16 | 8 | 4 | 0 |
| **a+b+c** | 7 | 66 | 27 | Mean | 7 | 12 | 41 | 13 | 16 | 11 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 49 | 14 | 21 | 8 | 6 | 0 | 0 | 2 | 0 | 0 |
| **b** | 32 | 28 | 21 | 11 | 6 | 0 | 0 | 2 | 0 | 0 |
| **c** | 24 | 28 | 9 | 0 | 1 | 0 | 8 | 2 | trace | 28 |
| **a+b+c** | 32 | 27 | 19 | 10 | 6 | 0 | 1 | 2 | trace | 3 |

**TL 93 NW 28** **9225 3595** **Little Ropers Farm, Bures St Mary** **Block A**

Surface level +57.5 m
Water struck at +49.5 m
February 1977

Overburden 0.5 m
Mineral 10.2 m
Bedrock 0.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.5 | 0.5 |
| Glacial Sand and Gravel | **a** 'Clayey' gravel, with discrete clay seams<br>Gravel: fine and coarse, well rounded and angular to subrounded flint; with rounded to well rounded quartz and rounded quartzite; with a trace of sandstone and ironstone<br>Sand: medium with coarse and fine, predominantly rounded quartz with some angular coarse flint, brown | 2.9 | 3.4 |
| Kesgrave Sands and Gravels | **b** 'Clayey' sand, with a trace of pebbles, sand becomes finer with depth<br>Gravel: fine, well rounded flint and tabular ironstone; with angular to subrounded flint; with some rounded quartz; with a trace of sandstone<br>Sand: medium and fine with some coarse, quartz, orange brown becoming yellow brown and brown | 7.3 | 10.7 |
| London Clay | Clay, silty, micaceous, grey brown and pale grey becomes dark grey-blue with depth | 0.8 | 11.5 |

**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** | 13 | 42 | 45 | 0.5-1.5 | 9 | 4 | 32 | 8 | 20 | 27 | 0 |
| | | | | 1.5-3.4 | 15 | 4 | 27 | 10 | 27 | 17 | 0 |
| | | | | Mean | 13 | 4 | 29 | 9 | 25 | 20 | 0 |
| **b** | 15 | 84 | 1 | 3.4-4.4 | 13 | 16 | 68 | 3 | 0 | 0 | 0 |
| | | | | 4.4-5.4 | 10 | 16 | 68 | 6 | 0 | 0 | 0 |
| | | | | 5.4-6.4 | 33 | 35 | 29 | 2 | 1 | 0 | 0 |
| | | | | 6.4-7.4 | 13 | 42 | 42 | 2 | 1 | 0 | 0 |
| | | | | 7.4-8.4* | 6 | 37 | 49 | 7 | 1 | 0 | 0 |
| | | | | 8.4-9.4* | 9 | 32 | 50 | 7 | 2 | 0 | 0 |
| | | | | 9.4-10.7* | 18 | 37 | 37 | 8 | 0 | 0 | 0 |
| | | | | Mean | 15 | 31 | 48 | 5 | 1 | 0 | 0 |
| **a + b** | 14 | 72 | 14 | Mean | 14 | 23 | 43 | 6 | 8 | 6 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 33 | 37 | 23 | 6 | 1 | 0 | trace | 0 | 0 | 0 |
| **b** | 20 | 43 | 3 | 0 | trace | 0 | 34 | 0 | 0 | 0 |
| **a + b** | 32 | 37 | 22 | 6 | 1 | 0 | 2 | 0 | 0 | 0 |



**TL 93 NW 29** **9368 3948** **Clay Birches, Assington** **Block B**

Surface level +61.2 m
Water struck at +55.7 m
March 1977

Overburden 8.5 m
Mineral 7.5 m
Bedrock 0.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Boulder Clay | Clay, silty, with some subangular flint pebbles, brown | 0.5 | 0.7 |
| | Clay, sandy, silty, with some flint and chalk pebbles, yellow brown | 0.5 | 1.2 |
| | Clay, sandy, silty, with sand sized chalk pellets and fine flint pebbles, pinkish brown | 0.3 | 1.5 |
| | Clay, sandy, silty, with chalk and flint pebbles, yellow brown | 0.7 | 2.2 |
| | Clay, silty, with pockets of fine green sand, with some chalk and flint pebbles, pale brown | 1.7 | 4.0 |
| | Clay, sandy, silty, with some chalk and flint pebbles, dark brown faintly mottled light grey from 5.0 m | 2.2 | 6.2 |
| | Clay, silty, slightly sandy and pebbly, dark grey mottled dark brown from 7.5 m | 1.8 | 8.0 |
| | Clay, fine sandy, silty, with flint and quartz pebbles, chalky pellets absent from 8.2 m, grey-brown and orange | 0.5 | 8.5 |
| Glacial Sand and Gravel | **a** Sandy gravel, with discrete clay pellets<br>Gravel: coarse and fine, angular to subrounded and well rounded flint; with rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone<br>Sand: medium with coarse and some fine, predominantly rounded quartz with some coarse angular flint, yellow brown | 1.8 | 10.3 |
| Kesgrave Sands and Gravels | **b** Sand, discrete clay seams and pellets throughout<br>Gravel: a trace of fine subangular flint and well rounded quartz<br>Sand: medium with fine and some coarse, predominantly quartz with some angular coarse flint, yellow-brown becoming brown and reddish-brown | 4.0 | 14.3 |
| Red Crag | **c** Sand, with discrete thin clay seams and pellets, and thin ironstone seams<br>Gravel: a trace of fine rounded flint and tabular ironstone<br>Sand: medium with fine and coarse, quartz, orange brown | 1.7 | 16.0 |
| London Clay | Clay, silty, sandy, purple-grey mottled orange brown | 0.2 | 16.2 |
| | Clay, very silty, micaceous, with pyrite nodules and carbonate cemented light grey patches, blue grey | 0.6+ | 16.8 |

**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 |
| a | 4 | 68 | 28 | 8.5-9.5* | 3 | 3 | 27 | 23 | 19 | 25 | 0 |
| | | | | 9.5-10.3* | 5 | 7 | 60 | 18 | 7 | 3 | 0 |
| | | | | Mean | 4 | 5 | 42 | 21 | 13 | 15 | 0 |
| b | 6 | 94 | 0 | 10.3-11.3* | 5 | 16 | 69 | 9 | 1 | 0 | 0 |
| | | | | 11.3-12.3* | 7 | 36 | 53 | 4 | 0 | 0 | 0 |
| | | | | 12.3-13.3* | 6 | 40 | 51 | 3 | 0 | 0 | 0 |
| | | | | 13.3-14.3* | 6 | 36 | 53 | 5 | 0 | 0 | 0 |
| | | | | Mean | 6 | 32 | 57 | 5 | 0 | 0 | 0 |
| c | 8 | 91 | 1 | 14.3-16.0* | 8 | 34 | 53 | 4 | 1 | 0 | 0 |
| a+b+c | 6 | 87 | 7 | Mean | 6 | 26 | 52 | 9 | 3 | 4 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 44 | 26 | 18 | 9 | 3 | 0 | 0 | 0 | 0 | 0 |
| b | No data available | | | | | | | | | |
| c | No data available | | | | | | | | | |



**TL 93 NW 30** **9353 3853** **Hill Farm, Assington** **Block B**

Surface level +57.4 m
Water struck at +53.5 m
March 1977

Overburden 0.1 m
Mineral 10.1 m
Bedrock 0.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Glacial Sand and Gravel | a 'Clayey' sandy gravel, with a thin chalky, pebbly clay seam at 1.9 m<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint, and rounded to well rounded quartz; with some rounded quartzite and subrounded sandstone<br>Sand: medium with coarse and fine, predominantly rounded quartz with some angular coarse flint | 4.3 | 4.4 |
| Kesgrave Sands and Gravels | b Sand<br>Gravel: a trace of fine angular to subrounded flint; with rounded to well rounded quartz and well rounded flint, with some subrounded sandstone<br>Sand, medium and fine with some coarse, predominantly rounded quartz with some angular coarse flint | 3.0 | 7.4 |
| Red Crag | c Sand, with some iron cemented seams<br>Gravel: a trace of fine and coarse, well rounded flint; with tabular ironstone and angular to subrounded flint; with some rounded to well-rounded quartz<br>Sand: medium with fine and some coarse, predominantly rounded quartz with coarse angular flint and tabular ironstone, red-brown | 2.8 | 10.2 |
| London Clay | Clay, silty, sandy, pale-grey mottled orange brown | 0.3 | 10.5 |
| | Clay, silty, micaceous, with some pyrite nodules, blue-grey becoming dark grey | 0.5 + | 11.0 |

**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 | 13 | 55 | 32 | 0.1-1.1 | 11 | 6 | 21 | 9 | 27 | 26 | 0 |
| | | | | 1.1-2.4 | 20 | 14 | 29 | 10 | 16 | 11 | 0 |
| | | | | 2.4-3.4 | 10 | 9 | 40 | 11 | 16 | 14 | 0 |
| | | | | 3.4-4.4* | 8 | 6 | 51 | 13 | 15 | 7 | 0 |
| | | | | Mean | 13 | 9 | 35 | 11 | 18 | 14 | 0 |
| b | 6 | 93 | 1 | 4.4-5.4* | 7 | 47 | 38 | 7 | 1 | 0 | 0 |
| | | | | 5.4-6.4* | 5 | 21 | 66 | 7 | 1 | 0 | 0 |
| | | | | 6.4-7.4* | 5 | 23 | 65 | 7 | 1 | 0 | 0 |
| | | | | Mean | 6 | 30 | 56 | 7 | 1 | 0 | 0 |
| c | 6 | 92 | 2 | 7.4-8.4* | 5 | 35 | 51 | 8 | 1 | 0 | 0 |
| | | | | 8.4-9.4* | 7 | 33 | 48 | 11 | 1 | 0 | 0 |
| | | | | 9.4-10.2* | 7 | 33 | 46 | 10 | 1 | 3 | 0 |
| | | | | Mean | 6 | 34 | 48 | 10 | 1 | 1 | 0 |
| a+b+c | 9 | 76 | 15 | Mean | 9 | 22 | 45 | 9 | 9 | 6 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 68 | 15 | 11 | 3 | 3 | 0 | 0 | 0 | 0 | 0 |
| b | 70 | 12 | 15 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| c | 16 | 59 | 4 | 0 | 0 | 0 | 21 | 0 | 0 | 0 |
| a+b+c | 67 | 16 | 10 | 3 | 3 | 0 | 1 | 0 | 0 | 0 |

**TL 93 NW 31** **9335 3741** **Pump Farm, Assington** **Block B**

Surface level +59.8 m
Water struck at +50.0 m
February 1977

Overburden 0.6 m
Mineral 13.9
Bedrock 1.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| | Clay, silty, sandy, with pebbles of flint and quartz, dark brown | 0.3 | 0.6 |
| Glacial Sand and Gravel | a Gravel, clayey at top and base, with discrete clay pellets and seams<br>Gravel: coarse and fine, angular to subrounded flint; with well rounded flint and rounded quartz; with some subrounded sandstone<br>Sand: medium with coarse and some fine, predominantly rounded quartz with some coarse angular flint, brown | 3.0 | 3.6 |
| Kesgrave Sands and Gravels | b Pebbly sand,<br>Gravel: fine with coarse angular to subrounded flint; with rounded quartz and well rounded flint; with some rounded quartzite and subrounded sandstone<br>Sand: medium with fine and some coarse, quartz with a trace of angular coarse flint, yellow brown becomes brown | 8.0 | 11.6 |
| Red Crag | c Pebbly sand, very gravelly at base, shelly from 13.6 m<br>Gravel: fine with coarse, angular to subrounded and well rounded flint; with some rounded quartz; with a trace of ironstone, sandstone and fossil debris<br>Sand: medium with fine and coarse, predominantly rounded quartz with some coarse angular flint and tabular shell debris, brown | 2.9 | 14.5 |
| London Clay | Clay, silty, micaceous, with some pyrite and race nodules, blue-grey becoming grey | 1.0+ | 15.5 |



**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 | 9 | 39 | 52 | 0.6-1.6 | 11 | 5 | 20 | 10 | 18 | 36 | 0 |
| | | | | 1.6-2.6 | 6 | 6 | 23 | 10 | 29 | 26 | 0 |
| | | | | 2.6-3.6 | 10 | 5 | 24 | 15 | 28 | 18 | 0 |
| | | | | Mean | 9 | 5 | 22 | 12 | 25 | 27 | 0 |
| b | 6 | 81 | 13 | 3.6-4.6 | 10 | 21 | 53 | 4 | 7 | 5 | 0 |
| | | | | 4.6-5.6 | 6 | 23 | 56 | 5 | 6 | 4 | 0 |
| | | | | 5.6-6.6 | 3 | 5 | 71 | 6 | 12 | 3 | 0 |
| | | | | 6.6-7.6 | 4 | 37 | 51 | 1 | 6 | 1 | 0 |
| | | | | 7.6-8.6 | 5 | 5 | 78 | 4 | 6 | 2 | 0 |
| | | | | 8.6-9.6 | 7 | 13 | 29 | 12 | 26 | 13 | 0 |
| | | | | 9.6-10.6* | 7 | 45 | 33 | 9 | 4 | 2 | 0 |
| | | | | 10.6-11.6* | 4 | 32 | 52 | 10 | 2 | 0 | 0 |
| | | | | Mean | 6 | 22 | 53 | 6 | 9 | 4 | 0 |
| c | 3 | 73 | 24 | 11.6-12.6* | 3 | 27 | 51 | 10 | 6 | 3 | 0 |
| | | | | 12.6-13.6* | 2 | 16 | 36 | 13 | 20 | 13 | 0 |
| | | | | 13.6-14.5* | 4 | 15 | 33 | 18 | 22 | 8 | 0 |
| | | | | Mean | 3 | 19 | 40 | 14 | 16 | 8 | 0 |
| a+b+c | 6 | 71 | 23 | Mean | 6 | 18 | 44 | 9 | 14 | 9 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 83 | 9 | 6 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| b | 53 | 15 | 24 | 5 | 3 | 0 | 0 | 0 | 0 | 0 |
| c | 55 | 40 | 3 | 0 | 1 | 0 | 1 | 0 | trace | 0 |
| a+b+c | 68 | 17 | 11 | 2 | 2 | 0 | trace | 0 | trace | 0 |

**TL 93 NW 32** **9308 3621** **Moors Farm, Assington** **Block B**

Surface level +58.0 m
Water struck at +56.6 m and +52.1 m
February 1977

Overburden 0.3 m
Mineral 3.7 m
Waste 1.0 m
Mineral 5.5 m
Bedrock 1.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Glacial Sand and Gravel | a Gravel, 'very clayey' in uppermost 1.0 m, with some clay seams towards base<br>Gravel: coarse with fine, angular to subrounded flint; with well rounded flint and quartz; with some subrounded sandstone and rounded quartzite; with a trace of igneous and metamorphics<br>Sand: medium with coarse and some fine predominantly rounded quartz with some angular coarse flint, orange brown becoming brown | 3.7 | 4.0 |
| | Clay, sandy, silty, micaceous, becomes very sandy towards base, coarsely laminated | 1.0 | 5.0 |
| Kesgrave Sands and Gravels | b 'Clayey' pebbly sand, 'very clayey' in uppermost 1.0 m becomes more pebbly with depth, Red Crag in basal 0.5 m, thin ironstone and clay seams from 7.0<br>Gravel: fine with a trace of coarse angular to subrounded flint; with rounded quartz, well rounded flint; and tabular ironstone, with a trace of sandstone, becomes in basal 0.5 m fine and coarse with cobbles, angular to subrounded; with well rounded flint; with some tabular ironstone, well rounded phosphatic nodules rounded quartz and subrounded sandstone<br>Sand: medium with fine and coarse, predominantly rounded quartz with some angular flint, brown | 5.5 | 10.5 |
| London Clay | Clay, silty, micaceous, grey mottled orange brown | 0.8 | 11.3 |
| | Clay, silty, micaceous, with pyrite nodules, blue grey | 0.5+ | 11.8 |

**GRADING**

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | -¼ | +¼ -½ | +½ -1 | +1 -4 | +4 -16 | +16 -64 | +64 mm |
| a | 9 | 38 | 53 | 0.3-1.0 | 26 | 8 | 23 | 9 | 16 | 18 | 0 |
| | | | | 1.0-2.0* | 4 | 3 | 31 | 15 | 23 | 26 | 0 |
| | | | | 2.0-3.0* | 3 | 3 | 17 | 13 | 29 | 35 | 0 |
| | | | | 3.0-4.0* | 8 | 4 | 22 | 6 | 17 | 43 | 0 |
| | | | | Mean | 9 | 4 | 23 | 11 | 22 | 31 | 0 |
| b | 11 | 82 | 7 | 5.0-6.0 | 29 | 10 | 56 | 4 | 1 | 0 | 0 |
| | | | | 6.0-7.0 | 16 | 12 | 55 | 12 | 5 | 0 | 0 |
| | | | | 7.0-8.0* | 5 | 17 | 61 | 12 | 5 | 0 | 0 |
| | | | | 8.0-9.0* | 2 | 21 | 57 | 14 | 5 | 1 | 0 |
| | | | | 9.0-10.0* | 6 | 24 | 48 | 13 | 5 | 4 | 0 |
| | | | | 10.0-10.5* | 5 | 26 | 34 | 11 | 8 | 6 | 10 |
| | | | | Mean | 11 | 18 | 53 | 11 | 5 | 1 | 1 |
| a + b | 10 | 64 | 26 | Mean | 10 | 12 | 41 | 11 | 11 | 14 | 1 |



**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 61 | 17 | 15 | 2 | 5 | 0 | 0 | trace | 0 | 0 |
| b | 50 | 18 | 20 | 0 | 1 | 0 | 11 | 0 | 0 | 0 |
| a + b | 59 | 18 | 14 | 1 | 4 | 0 | 3 | trace | 0 | 1 |

**TL 93 NW 33** **9446 3963** **Avely Hall, Assington** **Block B**

Surface level +57.9 m
Water struck at +53.2 m, +52.6 m and +46.8 m
March 1977

Overburden 5.3 m
Mineral 1.1 m
Waste 4.7 m
Mineral 1.6 m
Waste 1.4 m
Bedrock 0.7 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.4 | 0.4 |
| Boulder Clay | Clay, sandy, silty, with chalk pellets and flint pebbles, dark brown mottled light brown | 0.7 | 1.1 |
| | Clay, sandy, silty, with chalk pellets and flint pebbles, pale yellow-brown | 2.9 | 4.0 |
| | Silt, fine sandy, clayey, with flint pebbles in lower 10 cms, fawn brown | 0.5 | 4.5 |
| | Clay, sandy, silty, with chalk and flint pebbles and some thin sandy silt seams, yellow brown mottled orange-brown | 0.8 | 5.3 |
| Glacial Sands and Gravel | a Gravel, with brown sandy clay balls<br>Gravel: coarse with fine and some cobbles, angular to subrounded flint; with well rounded flint, subrounded sandstone and rounded to well rounded quartz; with some well rounded chalk and a trace ironstone, quartzite, igneous, metamorphics and fossil debris<br>Sand: medium and coarse with fine, predominantly rounded quartz with coarse angular flint and rounded chalk | 1.1 | 6.4 |
| Boulder Clay | Clay, sandy, silty, with chalk pellets and flint pebbles, grey-brown mottled yellow-brown | 1.2 | 7.6 |
| | Clay, sandy, silty, with chalk pellets and flint and sandstone pebbles, dark grey | 3.0 | 10.6 |
| | Clay, sandy, silty, with chalk pellets and flint pebbles, dark grey mottled dark brown | 0.5 | 11.1 |
| Glacial Sand and Gravel | b Pebbly sand, with discrete clay pellets<br>Gravel: fine with coarse, angular to subrounded flint with well rounded flint, subrounded sandstone and rounded to well rounded quartz; with some ironstone; with a trace of igneous and metamorphics<br>Sand: medium with fine and some coarse, predominantly rounded quartz with some coarse angular flint | 1.6 | 12.7 |
| Boulder Clay | Clay, silty, slightly micaceous, with chalk pellets and pyrite nodules with some flint pebbles, dark grey | 1.4 | 14.1 |
| London Clay | Clay, very silty, with pyrite and race nodules, blue-grey | 0.7+ | 14.8 |

**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 |
| a | 3 | 32 | 65 | 5.3-6.4 | 3 | 6 | 14 | 12 | 23 | 38 | 4 |
| b | 6 | 80 | 14 | 11.1-12.7 | 6 | 22 | 47 | 11 | 10 | 4 | 0 |
| a + b | 5 | 60 | 35 | Mean | 5 | 15 | 34 | 11 | 15 | 18 | 2 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a + b | 67 | 17 | 5 | 1 | 5 | 3 | 1 | 1 | trace | 0 |



**TL 93 NW 34** **9415 3825** **Dillacks Farm, Assington** **Block B**

Surface level +66.2 m
Water struck at +64.2 m and +51.7 m
March 1977

Overburden 11.3 m
Mineral 11.4 m
Bedrock 0.6 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 3.1 | 3.1 |
| Boulder Clay | Clay, sandy, silty, with chalk and flint pebbles, pale brown | 1.8 | 4.9 |
| | Silt, sandy, pale yellow-brown | 1.9 | 6.8 |
| | Clay, sandy, silty, with chalk and flint pebbles pale yellow-brown mottled grey | 0.9 | 7.7 |
| | Clay, silty, with some red sand pockets with chalk and flint pebbles, grey | 2.1 | 9.8 |
| | Clay, very sandy, silty, with chalk, flint and a trace of quartz pebbles, pale grey-brown mottled brown | 1.5 | 11.3 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel<br>Gravel: fine with coarse, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint and rounded quartzite; with a trace of sandstone<br>Sand: medium with coarse and some fine, predominantly rounded quartz with some coarse angular flint and rounded chalk, fawn brown | 2.4 | 13.7 |
| Kesgrave Sands and Gravels | **b** Sand, with discrete thin clay seams and pellets from 15.3 m and thin ironcemented seams, a trace of pebbles in uppermost 1.6 m<br>Gravel: fine, angular to subrounded flint and rounded to well rounded quartz; with well rounded flint and rounded quartzite with some sub-rounded sandstone<br>Sand: fine with medium and a trace coarse, predominantly rounded quartz with some angular coarse and medium flint, yellow brown becoming orange-brown | 4.6 | 18.3 |
| Red Crag | **c** Sand, becomes pebbly towards base, with some iron-cemented seams and nodules<br>Gravel: fine with a trace of coarse at base, tabular ironstone; with rounded to well rounded quartz and, well rounded and angular to subrounded flint<br>Sand: medium with fine and coarse, rounded quartz with some coarse subrounded iron cemented sandstone and angular flint, orange-brown becoming red-brown | 4.4 | 22.7 |
| London Clay | Clay, silty, sandy, grey mottled dark purple-brown | 0.2 | 22.9 |
| | Clay, silty, micaceous, with nodules of pyrite, blue-grey | 0.4+ | 23.3 |

## 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 |
| a | 11 | 50 | 39 | 11.3-12.3 | 12 | 6 | 31 | 14 | 23 | 14 | 0 |
| | | | | 12.3-13.7 | 10 | 4 | 32 | 14 | 23 | 17 | 0 |
| | | | | Mean | 11 | 5 | 31 | 14 | 23 | 16 | 0 |
| b | 7 | 93 | 0 | 13.7-14.3 | 10 | 83 | 5 | 1 | 1 | 0 | 0 |
| | | | | 14.3-15.3* | 8 | 85 | 5 | 1 | 1 | 0 | 0 |
| | | | | 15.3-16.3* | 7 | 59 | 33 | 1 | 0 | 0 | 0 |
| | | | | 16.3-17.3* | 7 | 57 | 35 | 1 | 0 | 0 | 0 |
| | | | | 17.3-18.3* | 5 | 37 | 54 | 4 | 0 | 0 | 0 |
| | | | | Mean | 7 | 63 | 28 | 2 | 0 | 0 | 0 |
| c | 3 | 93 | 4 | 18.3-19.3* | 4 | 31 | 54 | 10 | 1 | 0 | 0 |
| | | | | 19.3-20.3* | 3 | 23 | 58 | 13 | 3 | 0 | 0 |
| | | | | 20.3-21.3* | 3 | 33 | 48 | 13 | 3 | 0 | 0 |
| | | | | 21.3-22.7* | 3 | 29 | 49 | 12 | 6 | 1 | 0 |
| | | | | Mean | 3 | 29 | 52 | 12 | 4 | 0 | 0 |
| a+b+c | 6 | 84 | 10 | Mean | 6 | 38 | 38 | 8 | 6 | 4 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 45 | 19 | 24 | 11 | 1 | 0 | 0 | 0 | 0 | 0 |
| b | 46 | 15 | 32 | 5 | 2 | 0 | 0 | 0 | 0 | 0 |
| c | 10 | 14 | 16 | 0 | 0 | 0 | 60 | 0 | 0 | 0 |
| a+b+c | 42 | 18 | 24 | 10 | 1 | 0 | 5 | 0 | 0 | 0 |



**TL 93 NW 35** **9491 3745** **Leaden Hall, Leavenheath** **Block B**

Surface level +63.5 m
Water struck at +50.1 m
March 1977

Overburden 5.1 m
Mineral 14.2 m
Bedrock 0.6 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Boulder Clay | Clay, silty, sandy, with flint pebbles, orange-brown | 0.8 | 1.0 |
| | Clay, sandy, silty, becomes less sandy with depth, with thin fine sand seams from 2.7 m with chalk and flint pebbles, pale yellow brown becomes grey brown | 2.5 | 3.5 |
| | Clay, very sandy, silty, with many thin fine and medium orange-brown sand seams, and, chalk and flint pebbles, grey-brown | 1.6 | 5.1 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel, 'very clayey' in uppermost 1.1 m with thin clay seams throughout<br>Gravel: fine with coarse and a trace of cobble, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint and rounded quartzite; with some subrounded sandstone<br>Sand: medium with fine and coarse, predominantly rounded quartz with some coarse angular flint, fawn-brown | 5.1 | 10.2 |
| Kesgrave Sands and Gravels | **b** Sand, with discrete thin clay seams, medium and fine with a trace of coarse, rounded quartz, yellow-brown | 6.0 | 16.2 |
| Red Crag | **c** Sand, with dark brown iron cemented sand seams and a trace of pebbles<br>Gravel: tabular ironstone and angular to subrounded flint; with rounded to well rounded quartz and well rounded flint<br>Sand: medium with fine and some coarse, predominantly rounded quartz with some subrounded iron cemented sandstone, rusty orange-brown | 3.1 | 19.3 |
| London Clay | Clay, silty, micaceous, grey mottled orange-brown around pyrite nodules | 0.4 | 19.7 |
| | Clay, silty, micaceous, with pyrite nodules, dark grey | 0.2+ | 19.9 |

## 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 | 13 | 56 | 31 | 5.1-6.2 | 22 | 33 | 33 | 3 | 6 | 3 | 0 |
| | | | | 6.2-7.2 | 12 | 13 | 31 | 11 | 26 | 7 | 0 |
| | | | | 7.2-8.2 | 12 | 6 | 42 | 11 | 22 | 7 | 0 |
| | | | | 8.2-9.2 | 9 | 5 | 28 | 14 | 27 | 17 | 0 |
| | | | | 9.2-10.2 | 8 | 7 | 33 | 13 | 19 | 12 | 8 |
| | | | | Mean | 13 | 13 | 33 | 10 | 20 | 9 | 2 |
| b | 7 | 93 | 0 | 10.2-11.2 | 5 | 34 | 61 | 0 | 0 | 0 | 0 |
| | | | | 11.2-12.2 | 6 | 37 | 57 | 0 | 0 | 0 | 0 |
| | | | | 12.2-13.2 | 7 | 38 | 54 | 1 | 0 | 0 | 0 |
| | | | | 13.2-14.2* | 4 | 26 | 69 | 1 | 0 | 0 | 0 |
| | | | | 14.2-15.2* | 8 | 33 | 58 | 1 | 0 | 0 | 0 |
| | | | | 15.2-16.2* | 10 | 25 | 61 | 4 | 0 | 0 | 0 |
| | | | | Mean | 7 | 32 | 60 | 1 | 0 | 0 | 0 |
| c | 6 | 93 | 1 | 16.2-17.2* | 5 | 28 | 59 | 7 | 1 | 0 | 0 |
| | | | | 17.2-18.2* | 6 | 27 | 57 | 8 | 2 | 0 | 0 |
| | | | | 18.2-19.3* | 6 | 31 | 55 | 7 | 1 | 0 | 0 |
| | | | | Mean | 6 | 29 | 57 | 7 | 1 | 0 | 0 |
| a+b+c | 9 | 81 | 10 | Mean | 9 | 25 | 50 | 6 | 7 | 3 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 60 | 10 | 18 | 10 | 2 | 0 | 0 | 0 | 0 | 0 |
| b | Pebbles Absent | | | | | | | | | |
| c | 26 | 5 | 16 | 0 | 0 | 0 | 53 | 0 | 0 | 0 |
| a+b+c | 60 | 10 | 18 | 10 | 2 | 0 | trace | 0 | 0 | 0 |



**TL 93 NW 36** **9456 3649** **Oakland Farm, Leavenheath** **Block E**

Surface level +63.9 m
Water struck at +49.8 m
March 1977

Overburden 6.3 m
Mineral 15.8 m
Bedrock 0.5 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, sandy, silty, pale brown mottled orange-brown | 0.4 | 0.7 |
| | Clay, silty, with flint pebbles, with a trace of chalk pellets and carbonaceous material, orange-brown becoming dark brown mottled pale grey | 1.9 | 2.6 |
| | Clay, sandy, silty, with flint and chalk pebbles, brown mottled orange-brown | 1.4 | 4.0 |
| | Clay, sandy, silty, with some fine sand seams and pebbles of chalk and flint, brown | 1.9 | 5.9 |
| | Clay, with thin fine sand seams, pale yellow-brown | 0.4 | 6.3 |
| Glacial Sand and Gravel | a 'Clayey' sandy gravel, 'very clayey' in uppermost 0.8 m with discrete clay seams<br>Gravel: fine with coarse, angular to subrounded flint; with rounded to well rounded quartz and well rounded flint; with some rounded quartzite with a trace of sandstone<br>Sand: medium with fine and coarse, predominantly rounded quartz with some coarse angular flint, orange-brown becoming fawn-brown | 3.7 | 10.0 |
| Kesgrave Sands and Gravels | b Sand, with a trace of fine gravel between 12.0 m and 15.0 m, 'very clayey' in uppermost 1.0 m, and becomes finer with depth<br>Gravel: a trace of fine, angular to subrounded and well rounded flint; with rounded to well rounded quartz with a trace of sandstone<br>Sand: medium with fine and a trace of coarse, rounded quartz, orange-brown | 8.0 | 18.0 |
| Red Crag | c Pebbly sand<br>Gravel: fine with a trace of coarse, tabular ironstone; with well rounded flint, rounded to well rounded quartz and angular to subrounded flint; with a trace of sandstone<br>Sand: medium and fine with some coarse, predominantly rounded quartz; with some coarse subrounded ironstone, tabular shell debris and angular flint, red-brown | 4.1 | 22.1 |
| London Clay | Clay, silty, slightly micaceous, with some pyrite nodules, dark grey | 0.3 | 22.4 |
| | Clay, silty, micaceous, with some pyrite nodules, grey mottled turquoise green | 0.2+ | 22.6 |

## 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 |
| a | 13 | 53 | 34 | 6.3-7.1 | 22 | 39 | 29 | 2 | 4 | 4 | 0 |
| | | | | 7.1-8.1 | 15 | 12 | 28 | 10 | 27 | 8 | 0 |
| | | | | 8.1-8.9 | 10 | 8 | 21 | 14 | 30 | 17 | 0 |
| | | | | 8.9-10.0 | 7 | 6 | 31 | 12 | 23 | 21 | 0 |
| | | | | Mean | 13 | 15 | 28 | 10 | 21 | 13 | 0 |
| b | 9 | 91 | 0 | 10.0-11.0 | 26 | 16 | 54 | 4 | 0 | 0 | 0 |
| | | | | 11.0-12.0 | 12 | 26 | 60 | 2 | 0 | 0 | 0 |
| | | | | 12.0-13.0 | 5 | 36 | 55 | 3 | 1 | 0 | 0 |
| | | | | 13.0-14.0 | 5 | 15 | 76 | 3 | 1 | 0 | 0 |
| | | | | 14.0-15.0* | 2 | 10 | 86 | 1 | 1 | 0 | 0 |
| | | | | 15.0-16.0* | 10 | 48 | 40 | 2 | 0 | 0 | 0 |
| | | | | 16.0-17.0* | 8 | 46 | 44 | 2 | 0 | 0 | 0 |
| | | | | 17.0-18.0* | 5 | 29 | 63 | 3 | 0 | 0 | 0 |
| | | | | Mean | 9 | 28 | 60 | 3 | 0 | 0 | 0 |
| c | 6 | 87 | 7 | 18.0-19.0* | 5 | 33 | 49 | 7 | 6 | 0 | 0 |
| | | | | 19.0-20.0* | 5 | 35 | 48 | 6 | 5 | 1 | 0 |
| | | | | 20.0-21.0* | 6 | 34 | 44 | 9 | 7 | 0 | 0 |
| | | | | 21.0-22.1* | 7 | 33 | 41 | 10 | 8 | 1 | 0 |
| | | | | Mean | 6 | 34 | 45 | 8 | 7 | 0 | 0 |
| a+b+c | 9 | 81 | 10 | Mean | 9 | 27 | 48 | 6 | 7 | 3 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 53 | 19 | 23 | 4 | 1 | 0 | 0 | 0 | 0 | 0 |
| b | 43 | 42 | 14 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| c | 8 | 19 | 12 | 0 | 1 | 0 | 60 | 0 | 0 | 0 |
| a+b+c | 48 | 20 | 22 | 3 | 1 | 0 | 6 | 0 | 0 | 0 |



**TL 93 NW 37 9419 3598** **0.5 km North of Rowley Grove, Leavenheath** **Block E**

Surface level +66.7 m
Water struck at +48.9 m
March 1977

Overburden 3.4 m
Mineral 3.8 m
Waste 2.3 m
Mineral 15.8 m
Bedrock 1.1 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, sandy, silty, with flint pebbles, pale orange-brown | 2.3 | 2.6 |
| | Clay, very sandy, silty, orange-brown | 0.8 | 3.4 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel, 'very clayey' in uppermost 1.1 m, with discrete clay seams<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded to rounded quartz, well rounded flint, rounded quartzite and well rounded chalk; with a trace of sandstone<br>Sand: medium with fine and coarse, predominantly rounded quartz with some angular flint and rounded chalk, brown | 3.8 | 7.2 |
| | Clay, very sandy, silty, with chalk, flint quartz and sandstone pebbles, pale yellow-brown | 2.3 | 9.5 |
| | **b** Sandy gravel, 'clayey' in uppermost 2.2 m, with discrete clay seams and pellets<br>Gravel: fine and coarse, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint and rounded quartzite; with a trace of sandstone<br>Sand: medium with coarse and fine predominantly rounded quartz with some coarse angular flint, orange-brown | 6.0 | 15.5 |
| Kesgrave Sands and Gravels | **c** Sand, pebbly at base<br>Gravel: a trace of fine and coarse, well rounded and angular to subrounded flint; with rounded to well rounded quartz; with some tabular iron-stone and subrounded sandstone<br>Sand: medium and fine with a trace of coarse, rounded quartz with some angular flint, yellow-brown becoming red-brown | 8.0 | 23.5 |
| Red Crag | **d** Pebbly sand, shelly from 24.7 m<br>Gravel: fine with a trace of coarse well rounded flint; with angular to subangular flint and rounded to well rounded quartz; with a trace of phosphatic nodules and sandstone<br>Sand: medium with fine and coarse predominantly rounded quartz with some tabular shell debris and coarse angular flint, red-brown | 1.8 | 25.3 |
| London Clay | Clay, silty, micaceous, with some pyrite nodules, dark grey | 0.7 | 26.0 |
| | Clay, silty, sandy, turquoise grey | 0.4+ | 26.4 |

## 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 | 17 | 51 | 32 | 3.4-4.5 | 31 | 24 | 23 | 5 | 8 | 9 | 0 |
| | | | | 4.5-5.5 | 13 | 7 | 14 | 11 | 22 | 33 | 0 |
| | | | | 5.5-7.2 | 11 | 7 | 36 | 18 | 18 | 10 | 0 |
| | | | | Mean | 17 | 12 | 27 | 12 | 16 | 16 | 0 |
| b | 8 | 62 | 30 | 9.5-11.0 | 14 | 11 | 45 | 9 | 18 | 3 | 0 |
| | | | | 11.0-11.7 | 10 | 7 | 40 | 15 | 19 | 9 | 0 |
| | | | | 11.7-13.2 | 5 | 7 | 20 | 13 | 24 | 31 | 0 |
| | | | | 13.2-14.2 | 5 | 4 | 60 | 14 | 10 | 7 | 0 |
| | | | | 14.2-15.5 | 4 | 5 | 50 | 15 | 13 | 13 | 0 |
| | | | | Mean | 8 | 7 | 42 | 13 | 17 | 13 | 0 |
| a + b | 11 | 58 | 31 | Mean | 11 | 9 | 36 | 13 | 17 | 14 | 0 |
| c | 5 | 95 | 0 | 15.5-16.5 | 9 | 78 | 12 | 1 | 0 | 0 | 0 |
| | | | | 16.5-17.5 | 10 | 86 | 4 | 0 | 0 | 0 | 0 |
| | | | | 17.5-18.5* | 7 | 40 | 51 | 2 | 0 | 0 | 0 |
| | | | | 18.5-19.5* | 6 | 30 | 58 | 6 | 0 | 0 | 0 |
| | | | | 19.5-20.5* | 4 | 52 | 40 | 4 | 0 | 0 | 0 |
| | | | | 20.5-21.5* | 3 | 29 | 67 | 1 | 0 | 0 | 0 |
| | | | | 21.5-22.5* | 1 | 18 | 80 | 1 | 0 | 0 | 0 |
| | | | | 22.5-23.5* | 0 | 10 | 78 | 7 | 4 | 1 | 0 |
| | | | | Mean | 5 | 43 | 49 | 3 | 0 | 0 | 0 |
| d | 3 | 88 | 9 | 23.5-24.5* | 3 | 15 | 61 | 13 | 7 | 1 | 0 |
| | | | | 24.5-25.5* | 3 | 15 | 58 | 16 | 8 | 0 | 0 |
| | | | | Mean | 3 | 15 | 59 | 14 | 8 | 1 | 0 |
| a+b +c+d | 8 | 76 | 16 | Mean | 8 | 24 | 43 | 9 | 9 | 7 | 0 |
| b+c+d | 6 | 81 | 13 | Mean | 6 | 26 | 47 | 8 | 8 | 5 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a + b | 64 | 9 | 13 | 8 | 1 | 5 | 0 | 0 | 0 | 0 |
| c | 38 | 48 | 8 | 0 | 2 | 0 | 4 | 0 | 0 | 0 |
| d | 24 | 62 | 12 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| a+b +c+d | 63 | 12 | 13 | 7 | 1 | 4 | trace | 0 | 0 | trace |



**TL 93 NW 38 9464 3533** **Farthing Hall, Nayland-with-Wissington** **Block E**

Surface level +60.7 m
Water struck at +46.9 m
May/June 1977

Overburden 2.3
Mineral 17.1 m
Bedrock 0.6 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Boulder Clay | Clay, sandy, silty, with flint pebbles, orange-brown mottled grey | 1.9 | 2.1 |
| | Clay, very sandy, with thin sand seams orange-brown | 0.2 | 2.3 |
| Glacial Sand and Gravel | **a** 'Clayey' pebbly sand, 'very clayey' in uppermost 1.0 m becomes more gravelly with depth<br>Gravel: fine with coarse, angular to subrounded flint; with well rounded flint, rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone, and, subangular igneous and metamorphics<br>Sand: medium with fine and some coarse, rounded quartz and a trace of angular flint, orange-brown becoming brown | 3.2 | 5.5 |
| Kesgrave Sands and Gravels | **b** Sand, with a trace of pebbles in uppermost 4.0 m, and discrete clay pellets<br>Gravel: fine with a trace of coarse, angular to subrounded to well rounded quartz; with well rounded flint and rounded quartzite; with some subrounded sandstone; with a trace of igneous and metamorphics<br>Sand: medium with fine and a trace of coarse, predominantly rounded quartz with some angular flint, pale yellow-brown | 7.2 | 12.7 |
| Red Crag | **c** Sand, with a trace of pebbles, becomes shelly from 14.7 m<br>Gravel: fine with a trace of coarse well, rounded and angular to subrounded flint; with tabular ironstone and rounded to well rounded quartz; with some subrounded sandstone and well rounded phosphatic nodules; with a trace of quartzite, igneous and metamorphics<br>Sand: medium and fine with some coarse, predominantly rounded quartz with tabular shell debris and angular flint, rusty brown | 6.7 | 19.4 |
| London Clay | Clay, silty, grey mottled orange-brown | 0.3 | 19.7 |
| | Clay, silty, micaceous, dark grey | 0.3+ | 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 | 16 | 69 | 15 | 2.3-3.3 | 24 | 38 | 32 | 1 | 4 | 1 | 0 |
| | | | | 3.3-4.3 | 14 | 33 | 40 | 3 | 8 | 2 | 0 |
| | | | | 4.3-5.5 | 11 | 6 | 46 | 10 | 15 | 12 | 0 |
| | | | | Mean | 16 | 24 | 40 | 5 | 9 | 6 | 0 |
| b | 9 | 89 | 2 | 5.5-6.5 | 12 | 6 | 77 | 4 | 1 | 0 | 0 |
| | | | | 6.5-7.5 | 12 | 11 | 77 | 1 | 0 | 0 | 0 |
| | | | | 7.5-8.5 | 8 | 8 | 77 | 4 | 2 | 1 | 0 |
| | | | | 8.5-9.5 | 9 | 4 | 69 | 7 | 9 | 2 | 0 |
| | | | | 9.5-10.5 | 13 | 11 | 74 | 2 | 0 | 0 | 0 |
| | | | | 10.5-11.5 | 4 | 67 | 25 | 4 | 0 | 0 | 0 |
| | | | | 11.5-12.7 | 6 | 85 | 8 | 1 | 0 | 0 | 0 |
| | | | | Mean | 9 | 29 | 57 | 3 | 2 | 0 | 0 |
| c | 5 | 94 | 1 | 12.7-13.7 | 5 | 33 | 58 | 3 | 1 | 0 | 0 |
| | | | | 13.7-14.7* | 3 | 22 | 68 | 5 | 2 | 0 | 0 |
| | | | | 14.7-15.7* | 5 | 36 | 54 | 5 | 0 | 0 | 0 |
| | | | | 15.7-16.7* | 5 | 34 | 48 | 12 | 1 | 0 | 0 |
| | | | | 16.7-17.7* | 6 | 32 | 51 | 9 | 2 | 0 | 0 |
| | | | | 17.7-19.4* | 4 | 35 | 51 | 8 | 1 | 1 | 0 |
| | | | | Mean | 5 | 32 | 55 | 7 | 1 | 0 | 0 |
| a+b+c | 9 | 87 | 4 | Mean | 9 | 29 | 53 | 5 | 3 | 1 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 51 | 16 | 14 | 11 | 4 | 0 | 0 | 3 | 1 | 0 |
| b | 32 | 22 | 28 | 11 | 4 | 0 | 0 | 1 | 2 | 0 |
| c | 26 | 42 | 9 | 1 | 2 | 0 | 17 | 1 | trace | 2 |
| a+b+c | 46 | 19 | 16 | 10 | 4 | 0 | 1 | 3 | 1 | trace |



**TL 93 NE 27** **9590 3946** **400 m north-east of Turks Hall, Boxford** **Block C**

Surface level +51.8 m
Water struck at +41.8 m
March 1977

Overburden 0.9 m
Mineral 13.1 m
Bedrock 2.2 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.4 | 0.4 |
| Head | Clay, sandy, silty, with pebbles of flint, quartz and quartzite, very sandy at base, brown | 0.5 | 0.9 |
| Glacial Sand and Gravel | a 'Clayey' sandy gravel, with discrete clay pellets, with an orange-brown silt between 2.5 and 3.0<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint, rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone and subangular igneous and metamorphics with a trace of ironstone<br>Sand: medium with fine and some coarse, predominantly rounded quartz with some angular coarse flint, orange-brown becoming light brown | 6.0 | 6.9 |
| Kesgrave Sands and Gravels | b Sand, with a trace of pebbles at top and discrete thin micaceous silt seams throughout<br>Gravel: trace of fine and coarse, angular to subrounded and well rounded flint; with rounded to well rounded quartz; with some rounded quartzite and subrounded sandstone; with a trace of igneous and metamorphics<br>Sand: medium with fine and a trace of coarse, predominantly rounded quartz with a trace of angular coarse flint and fine mica, banded orange-brown and yellow | 7.1 | 14.0 |
| London Clay | Clay, sandy, silty, orange-brown becoming brown | 0.5 | 14.5 |
| | Clay, sandy, silty, grey-brown | 1.5 | 16.0 |
| | Clay, silty, hard, grey-brown streaked orange | 0.2+ | 16.2 |

**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 |
| a | 14 | 57 | 29 | 0.9-1.9 | 11 | 17 | 34 | 6 | 16 | 16 | 0 |
| | | | | 1.9-2.5 | 12 | 15 | 26 | 10 | 20 | 17 | 0 |
| | | | | 3.0-4.1 | 19 | 8 | 22 | 11 | 23 | 17 | 0 |
| | | | | 4.1-4.4 | 15 | 7 | 29 | 8 | 22 | 19 | 0 |
| | | | | 4.1-5.4 | 16 | 23 | 41 | 4 | 8 | 8 | 0 |
| | | | | 5.4-6.2 | 16 | 28 | 37 | 6 | 9 | 4 | 0 |
| | | | | 6.2-6.9 | 5 | 14 | 33 | 12 | 24 | 16 | 0 |
| | | | | Mean | 14 | 17 | 32 | 8 | 16 | 13 | 0 |
| b | 5 | 95 | 0 | 6.9-7.9 | 3 | 22 | 70 | 2 | 1 | 2 | 0 |
| | | | | 7.9-8.9 | 6 | 28 | 66 | 0 | 0 | 0 | 0 |
| | | | | 8.9-9.9 | 7 | 31 | 62 | 0 | 0 | 0 | 0 |
| | | | | 9.9-10.9* | 7 | 14 | 77 | 2 | 0 | 0 | 0 |
| | | | | 10.9-11.9* | 4 | 58 | 36 | 2 | 0 | 0 | 0 |
| | | | | 11.9-12.9* | 4 | 43 | 40 | 12 | 1 | 0 | 0 |
| | | | | 12.9-14.0* | 2 | 20 | 75 | 3 | 0 | 0 | 0 |
| | | | | Mean | 5 | 31 | 61 | 3 | 0 | 0 | 0 |
| a + b | 9 | 78 | 13 | Mean | 9 | 25 | 48 | 5 | 7 | 6 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 57 | 18 | 13 | 6 | 4 | 0 | trace | 2 | 0 | 0 |
| b | 43 | 33 | 19 | 3 | 2 | 0 | 0 | trace | 0 | 0 |
| a + b | 57 | 18 | 13 | 6 | 4 | 0 | trace | 2 | 0 | 0 |



**TL 93 NE 28 9515 3913** **The Firs, Boxford** **Block C**

Surface level +56.6 m
Water struck at +48.7 m
March 1977

Overburden 2.1 m
Mineral 9.0 m
Bedrock 1.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, sandy, silty, with flint pebbles, mid-brown | 0.4 | 0.7 |
| | Clay, silty, with flint pebbles, grey | 1.4 | 2.1 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel, 'very clayey' in uppermost 0.6 m<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint, rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone; with a trace of igneous metamorphics and ironstone<br>Sand: medium with fine and coarse, predominantly rounded quartz with a trace of angular coarse flint, orange-brown | 3.1 | 5.2 |
| Kesgrave Sands and Gravels | **b** Sand, with a trace of gravel in uppermost 1.0 m<br>Gravel: fine, angular to subrounded flint and rounded to well rounded quartz; with well rounded flint and rounded quartzite; with some subrounded sandstone and subangular igneous and metamorphics<br>Sand: fine with some medium and a trace of coarse, predominantly rounded to subrounded quartz with some fine flaky mica | 2.7 | 7.9 |
| Red Crag | **c** Sand<br>Gravel: a trace of fine, angular to subrounded flint and tabular ironstone, with well rounded flint and rounded to well rounded quartz; with some well rounded phosphatic nodules, subrounded sandstone and subangular igneous and metamorphics<br>Sand: medium and fine with a trace of coarse, predominantly quartz, orange | 3.2 | 11.1 |
| London Clay | Clay, sandy, silty, orange-brown | 0.7 | 11.8 |
| | Clay, silty, blue-grey | 0.3+ | 12.1 |

**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 | 14 | 60 | 26 | 2.1-2.7 | 22 | 21 | 37 | 6 | 8 | 6 | 0 |
| | | | | 2.7-3.6 | 15 | 16 | 62 | 3 | 2 | 2 | 0 |
| | | | | 3.6-4.0 | 11 | 8 | 35 | 8 | 22 | 16 | 0 |
| | | | | 4.0-5.0 | 10 | 8 | 26 | 11 | 28 | 17 | 0 |
| | | | | 5.0-5.2 | 13 | 14 | 13 | 16 | 31 | 13 | 0 |
| | | | | Mean | 14 | 13 | 39 | 8 | 16 | 10 | 0 |
| b | 9 | 90 | 1 | 5.2-6.2 | 9 | 78 | 10 | 1 | 2 | 0 | 0 |
| | | | | 6.2-7.2 | 7 | 58 | 35 | 0 | 0 | 0 | 0 |
| | | | | 7.2-7.9 | 13 | 82 | 5 | 0 | 0 | 0 | 0 |
| | | | | Mean | 9 | 72 | 18 | 0 | 1 | 0 | 0 |
| c | 4 | 95 | 1 | 7.9-8.9* | 6 | 45 | 46 | 2 | 1 | 0 | 0 |
| | | | | 8.9-9.9* | 3 | 32 | 63 | 2 | 0 | 0 | 0 |
| | | | | 9.9-11.1* | 4 | 46 | 46 | 2 | 2 | 0 | 0 |
| | | | | Mean | 4 | 42 | 51 | 2 | 1 | 0 | 0 |
| a+b+c | 9 | 81 | 10 | Mean | 9 | 41 | 37 | 3 | 6 | 4 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 44 | 23 | 17 | 13 | 2 | 0 | trace | 1 | 0 | 0 |
| b | 42 | 11 | 33 | 9 | 0 | 0 | 2 | 0 | 0 | 0 |
| c | 37 | 14 | 7 | trace | 3 | 0 | 33 | 2 | 0 | 4 |
| a+b+c | 43 | 22 | 17 | 13 | 2 | 0 | 1 | 1 | 0 | trace |



**TL 93 NE 29** **9554 3867** **300 m South of Turks Hall, Boxford** **Block C**

Surface level +44.1 m
Water struck at +43.5 m
March 1977

Overburden 0.6 m
Mineral 1.8 m
Bedrock 4.6 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.6 | 0.6 |
| Red Crag | Sandy gravel<br>Gravel: fine with coarse, angular to subrounded and well rounded flint, with rounded to well rounded quartz, well rounded phosphatic nodules and rounded quartzite; with a trace of sandstone, ironstone, igneous and metamorphics<br>Sand: medium with coarse and fine, predominantly rounded quartz with some angular coarse flint, rounded phosphatic nodules and tabular ironstone, brown becoming orange-brown | 1.8 | 2.4 |
| London Clay | Clay, silty, sandy, micaceous, orange-brown clay | 4.2 | 6.6 |
| | Clay, silty, dark grey | 0.4+ | 7.0 |

**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 |
| 2 | 63 | 35 | 0.6-1.3* | 5 | 30 | 36 | 13 | 14 | 2 | 0 |
| | | | 1.3-2.4* | 0 | 5 | 32 | 17 | 25 | 21 | 0 |
| | | | Mean | 2 | 15 | 33 | 15 | 21 | 14 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 44 | 26 | 17 | 5 | 1 | 0 | 1 | 1 | 0 | 5 |

**TL 93 NE 30** **9535 3760** **Vinces Farm, Leavenheath** **Block C**

Surface level +62.0 m
Water struck at +49.4 m
May 1977

Overburden 4.3 m
Mineral 3.9 m
Waste 0.3 m
Mineral 10.0 m
Bedrock 0.9 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, silty, with pebbles of angular flint, dark grey-brown becoming orange-brown | 1.7 | 2.0 |
| | Clay, silty, slightly sandy, with pebbles of flint and chalk, light yellow-brown | 2.3 | 4.3 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel, 'very clayey' in uppermost 1.0 m, discrete clay pellets throughout<br>Gravel: fine with some coarse, angular to sub-rounded flint and rounded to well rounded quartz; with well rounded flint, rounded quartzite and subrounded sandstone; with some subangular igneous and metamorphics<br>Sand: medium with coarse and fine, predominantly quartz with some angular flint, orange-brown becoming light brown | 3.9 | 8.2 |
| | Clay, silty, grey-green mottled orange brown | 0.3 | 8.5 |
| Kesgrave Sands and Gravels | **b** Pebbly sand, with some discrete clay pellets<br>Gravel: fine and coarse with a trace of cobble, angular to subrounded flint and rounded to well rounded quartz; with well rounded flint, subrounded sandstone and rounded quartzite; with a trace of igneous and metamorphics<br>Sand: medium with fine and some coarse, rounded quartz, yellow-brown | 4.0 | 12.5 |
| Red Crag | **c** Pebbly sand<br>Gravel: fine with some coarse, angular to sub-rounded flint; with well rounded flint, rounded to well rounded quartz, rounded quartzite tabular ironstone and subrounded sandstone; with some well rounded phosphatic nodules; with a trace of igneous, metamorphics and fossil debris<br>Sand: medium with fine and coarse, predominantly rounded quartz with some coarse and medium angular flint and tabular ironstone, with a trace of tabular shell debris, brown becoming rusty brown | 6.0 | 18.5 |
| London Clay | Clay, silty, dark grey mottled orange-brown | 0.6 | 19.1 |
| | Clay, silty, micaceous with some pyrite nodules, dark grey | 0.3+ | 19.4 |



**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** | 17 | 58 | 25 | 4.3-5.3 | 29 | 18 | 28 | 7 | 13 | 5 | 0 |
| | | | | 5.3-6.3 | 13 | 9 | 41 | 9 | 22 | 6 | 0 |
| | | | | 6.3-7.3 | 13 | 6 | 52 | 9 | 15 | 5 | 0 |
| | | | | 7.3-8.2 | 13 | 6 | 23 | 23 | 31 | 4 | 0 |
| | | | | Mean | 17 | 10 | 36 | 12 | 20 | 5 | 0 |
| **b** | 6 | 87 | 7 | 8.5-9.5 | 4 | 18 | 71 | 2 | 4 | 1 | 0 |
| | | | | 9.5-10.5 | 4 | 7 | 66 | 11 | 6 | 5 | 1 |
| | | | | 10.5-11.5 | 10 | 31 | 53 | 2 | 1 | 3 | 0 |
| | | | | 11.5-12.5 | 6 | 23 | 57 | 4 | 5 | 5 | 0 |
| | | | | Mean | 6 | 20 | 62 | 5 | 4 | 3 | 0 |
| **c** | 6 | 89 | 5 | 12.5-13.5* | 2 | 5 | 63 | 14 | 12 | 4 | 0 |
| | | | | 13.5-14.5* | 2 | 6 | 71 | 13 | 6 | 2 | 0 |
| | | | | 14.5-16.5* | 9 | 31 | 49 | 10 | 1 | 0 | 0 |
| | | | | 16.5-17.5* | 4 | 17 | 56 | 19 | 3 | 1 | 0 |
| | | | | 17.5-18.5* | 6 | 25 | 49 | 18 | 2 | 0 | 0 |
| | | | | Mean | 6 | 19 | 56 | 14 | 4 | 1 | 0 |
| **a+b+c** | 9 | 79 | 12 | Mean | 9 | 17 | 52 | 10 | 9 | 3 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 33 | 19 | 28 | 10 | 6 | 0 | 0 | 4 | 0 | 0 |
| **b** | 41 | 10 | 36 | 5 | 7 | 0 | 0 | 1 | 0 | 0 |
| **c** | 33 | 23 | 15 | 12 | 6 | 0 | 9 | trace | trace | 2 |
| **a+b+c** | 33 | 19 | 27 | 10 | 6 | 0 | 1 | 4 | trace | trace |

**TL 93 NE 31** **9530 3641** **1 km North of Honey Tye, Leavenheath** **Block E**

Surface level +59.7 m
Water struck at +49.4 m
May 1977

Overburden 2.9 m
Mineral 15.1 m
Bedrock 0.6 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, sandy, silty, with flint pebbles, yellow-brown | 1.5 | 1.8 |
| | Clay, very sandy, silty, with flint pebbles, orange-brown | 0.5 | 2.3 |
| | Clay, sandy, silty, with flint and quartz pebbles, light yellow-brown | 0.6 | 2.9 |
| Glacial Sand and Gravel | **a** 'Clayey' pebbly sand, with discrete clay pellets<br>Gravel: fine with coarse, angular to subrounded flint and rounded to well rounded quartz, with well rounded flint; with some rounded quartzite, subangular igneous and metamorphics and subrounded sandstone<br>Sand: medium with fine and some coarse, predominantly rounded quartz with a trace of angular coarse flint at base, orange-brown becoming yellow-brown | 2.3 | 5.2 |
| Kesgrave Sands and Gravels | **b** Pebbly sand, with some discrete clay pellets in uppermost 5.0 m<br>Gravel: fine with coarse, angular to subrounded and well rounded flint; with rounded to well rounded sandstone; with some rounded quartzite and subangular igneous and metamorphics<br>Sand: medium with some fine and coarse, predominantly rounded quartz with some coarse angular flint, yellow-brown | 7.0 | 12.2 |
| Red Crag | **c** Sand, with a trace of gravel<br>Gravel: fine with a trace of coarse, well rounded and angular to subrounded flint; with tabular ironstone, rounded to well rounded quartz and well rounded phosphatic nodules; with some tabular shell debris; with a trace of sandstone, igneous and metamorphics<br>Sand: medium with fine and coarse, predominantly rounded quartz with some coarse and medium angular flint and tabular ironstone, and fine to coarse tabular shell debris increasing in lower 1.8 m, yellow brown becoming rusty-brown | 5.8 | 18.0 |
| London Clay | Clay, silty, light grey mottled orange-brown | 0.1 | 18.1 |
| | Clay, silty, micaceous, with pyrite nodules, dark grey | 0.5+ | 18.6 |



**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** | 17 | 77 | 6 | 2.9-3.7 | 14 | 47 | 37 | 1 | 1 | 0 | 0 |
| | | | | 3.7-4.2 | 29 | 32 | 30 | 2 | 2 | 5 | 0 |
| | | | | 4.2-5.2 | 13 | 12 | 56 | 9 | 8 | 2 | 0 |
| | | | | Mean | 17 | 28 | 44 | 5 | 4 | 2 | 0 |
| **b** | 6 | 84 | 10 | 5.2-6.2 | 5 | 34 | 58 | 1 | 2 | 0 | 0 |
| | | | | 6.2-7.2 | 7 | 19 | 55 | 7 | 6 | 6 | 0 |
| | | | | 7.2-8.2 | 6 | 8 | 77 | 4 | 4 | 1 | 0 |
| | | | | 8.2-9.2 | 6 | 5 | 53 | 11 | 17 | 8 | 0 |
| | | | | 9.2-10.2 | 3 | 6 | 61 | 11 | 12 | 7 | 0 |
| | | | | 10.2-11.2* | 5 | 12 | 71 | 8 | 4 | 0 | 0 |
| | | | | 11.2-12.2* | 8 | 10 | 73 | 5 | 4 | 0 | 0 |
| | | | | Mean | 6 | 13 | 64 | 7 | 7 | 3 | 0 |
| **c** | 4 | 93 | 3 | 12.2-13.2* | 6 | 28 | 50 | 11 | 4 | 1 | 0 |
| | | | | 13.2-14.2* | 4 | 28 | 48 | 17 | 3 | 0 | 0 |
| | | | | 14.2-15.2* | 3 | 17 | 63 | 15 | 2 | 0 | 0 |
| | | | | 15.2-16.2* | 1 | 20 | 61 | 15 | 3 | 0 | 0 |
| | | | | 16.2-17.2* | 4 | 18 | 56 | 19 | 3 | 0 | 0 |
| | | | | 17.2-18.0* | 4 | 21 | 60 | 13 | 2 | 0 | 0 |
| | | | | Mean | 4 | 22 | 56 | 15 | 3 | 0 | 0 |
| **a+b+c** | 7 | 86 | 7 | Mean | 7 | 19 | 58 | 9 | 5 | 2 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 43 | 12 | 37 | 3 | 2 | 0 | 0 | 3 | 0 | 0 |
| **b** | 31 | 25 | 22 | 3 | 16 | 0 | 0 | 3 | 0 | 0 |
| **c** | 25 | 37 | 8 | 2 | 1 | 0 | 17 | trace | 2 | 8 |
| **a+b+c** | 32 | 26 | 20 | 3 | 5 | 0 | 8 | 1 | 1 | 4 |

**TL 93 NE 32** **9547 3525** **Wissington Stocks, Nayland-with-Wissington** **Block E**

Surface level +59.0 m
Water struck at +47.4 m
June 1977

Overburden 1.6 m
Mineral 16.4 m
Bedrock 0.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Boulder Clay | Clay, sandy, silty, with pebbles of flint, orange-brown mottled grey | 1.4 | 1.6 |
| Glacial Sand and Gravel | **a** 'Clayey' pebbly sand, with discrete thin clay seams and pellets<br>Gravel: fine with coarse, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint and rounded quartzite; with some subrounded sandstone and subangular igneous and metamorphics; with a trace of ironstone<br>Sand: medium with fine and coarse, predominantly rounded quartz, orange-brown becoming light grey-brown | 5.9 | 7.5 |
| Kesgrave Sands and Gravels | **b** Pebbly sand, some discrete clay pellets in uppermost 2.0 m<br>Gravel: fine and coarse, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint and rounded quartzite; with some subrounded sandstone; with a trace of igneous and metamorphics<br>Sand: medium with some fine and coarse, predominantly rounded quartz, with a trace of coarse angular flint, orange-brown becoming yellow brown and brown | 4.0 | 11.5 |
| Red Crag | **c** 'Clayey' sand, very clayey at base<br>Gravel: a trace of fine, tabular ironstone and well rounded flint; with angular to subrounded flint and rounded to well rounded quartz; with some rounded quartzite; with a trace of sandstone<br>Sand: medium with fine and some coarse, predominantly rounded quartz with coarse and medium tabular ironstone and coarse angular flint, brown becoming rusty brown | 6.5 | 18.0 |
| London Clay | Clay, silty, with some pyrite nodules, grey-brown becoming dark grey | 0.5+ | 18.5 |



**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** | 10 | 70 | 20 | 1.6-2.2 | 13 | 15 | 45 | 5 | 14 | 8 | 0 |
| | | | | 2.2-3.2 | 5 | 11 | 51 | 8 | 19 | 6 | 0 |
| | | | | 3.2-4.5 | 4 | 11 | 73 | 5 | 6 | 1 | 0 |
| | | | | 4.5-5.3 | 27 | 57 | 14 | 1 | 1 | 0 | 0 |
| | | | | 5.3-6.2 | 15 | 4 | 50 | 14 | 9 | 8 | 0 |
| | | | | 6.2-7.5 | 5 | 4 | 38 | 15 | 32 | 6 | 0 |
| | | | | Mean | 10 | 15 | 47 | 8 | 15 | 5 | 0 |
| **b** | 5 | 90 | 5 | 7.5-8.5 | 5 | 7 | 65 | 9 | 9 | 5 | 0 |
| | | | | 8.5-9.5 | 6 | 25 | 63 | 3 | 1 | 2 | 0 |
| | | | | 9.5-10.5 | 5 | 17 | 74 | 3 | 1 | 0 | 0 |
| | | | | 10.5-11.5 | 5 | 21 | 65 | 8 | 1 | 0 | 0 |
| | | | | Mean | 5 | 7 | 67 | 6 | 3 | 2 | 0 |
| **c** | 10 | 88 | 2 | 11.5-12.5* | 6 | 25 | 56 | 8 | 5 | 0 | 0 |
| | | | | 12.5-13.5* | 7 | 32 | 50 | 8 | 3 | 0 | 0 |
| | | | | 13.5-14.5* | 7 | 21 | 67 | 5 | 0 | 0 | 0 |
| | | | | 14.5-15.5* | 1 | 26 | 68 | 4 | 1 | 0 | 0 |
| | | | | 15.5-16.5* | 4 | 21 | 68 | 4 | 3 | 0 | 0 |
| | | | | 16.5-18.0* | 24 | 11 | 54 | 7 | 2 | 0 | 0 |
| | | | | Mean | 10 | 22 | 60 | 6 | 2 | 0 | 0 |
| **a+b+c** | 9 | 82 | 9 | Mean | 9 | 18 | 57 | 7 | 7 | 2 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Ironstone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 46 | 17 | 23 | 7 | 4 | 0 | trace | 3 | trace | 0 |
| **b** | 49 | 19 | 19 | 8 | 4 | 0 | 0 | 1 | trace | 0 |
| **c** | 21 | 26 | 5 | 2 | 1 | 0 | 45 | 0 | trace | 0 |
| **a+b+c** | 45 | 17 | 21 | 7 | 5 | 0 | 3 | 2 | trace | 0 |

**TL 93 NE 33** **9602 3882** **700 m West of Peyton Hall, Boxford** **Block D**

Surface level +38.4 m
Water struck at +35.7 m
June 1977

Overburden 2.8 m
Mineral 1.2 m
Waste 13.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Head | Clay, silty, peaty, with some angular flint pebbles, dark grey-brown | 1.1 | 1.4 |
| | Silt, clayey, fine, sandy with some angular flint pebbles, grey streaked brown | 0.6 | 2.0 |
| | Silt, clayey, with some flint pebbles, light grey-green | 0.8 | 2.8 |
| | Sandy gravel<br>Gravel: fine with coarse angular to subrounded flint; with well rounded chalk and flint, and rounded to well rounded quartz; with some rounded quartzite; with a trace of sandstone, ironstone, fossil debris, igneous and metamorphics<br>Sand: medium with coarse and fine, predominantly rounded quartz with angular coarse flint and fine to coarse well rounded chalk, light brown | 1.2 | 4.0 |
| Boulder Clay (R. Box Channel Deposits) | Clay, silty, sandy, with flint and chalk pebbles, light brown-grey | 0.5 | 4.5 |
| | Clay, sandy, silty, with flint and chalk pebbles with some thin grey fine sand seams, dark grey | 4.5 | 9.0 |
| | 'Clayey' pebbly sand<br>Gravel: fine and coarse, angular to subrounded flint; with rounded to well rounded quartz and well rounded flint and chalk; with some rounded quartzite and sub-rounded sandstone; with a trace of igneous, metamorphics and limestone<br>Sand: medium with fine and some coarse, predominantly quartz with some flint and chalk | 0.5 | 9.5 |
| | Clay, silty, sandy with flint and chalk pebbles dark, grey | 4.7 | 14.2 |
| | Silt, fine sandy, with flint pebbles and a trace of chalk pellets, grey-green | 2.3 | 16.5 |
| | Clay, sandy, silty, with flint and chalk pebbles, dark grey | 0.5 | 17.0 |
| | Boulder, dark grey, septarian nodules | 0.2+ | 17.2 |

**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 |
| 4 | 51 | 45 | 2.8-4.0* | 4 | 9 | 27 | 15 | 28 | 17 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 66 | 9 | 5 | 2 | 1 | 14 | 1 | trace | 2 | 0 |



**TL 93 NE 34** **9650 3839** **Hill Farm, Polstead** **Block C**

Surface level +54.9 m
Water struck at +45.6 m
June 1977

Overburden 2.3 m
Mineral 11.0 m
Bedrock 1.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| | Clay, sandy, silty, becomes more sandy with depth, with pebbles of angular flint and rounded quartz, light orange-brown | 2.1 | 2.3 |
| Glacial Sand and Gravel | **a** Pebbly sand, with some clay pellets<br>Gravel: fine and coarse, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint and rounded quartzite; with some subrounded sandstone; with a trace of igneous, metamorphics and limestone<br>Sand: medium with some coarse and fine, predominantly quartz with some coarse angular flint, light brown | 2.8 | 5.1 |
| Kesgrave Sands and Gravels | **b** Sand, pebbly at base with some discrete thin clay seams throughout<br>Gravel: a trace of coarse and fine, tabular ironstone; with some angular to subrounded flint, and rounded to well rounded quartz; with a trace of sandstone<br>Sand: medium and fine with a trace of coarse, predominantly rounded quartz, yellow brown becoming rusty-brown | 6.1 | 11.2 |
| Red Crag | **c** Sand, very pebbly in lowermost 0.3 m<br>Gravel: fine and coarse, well rounded flint; with well rounded phosphatic nodules, subrounded sandstone and angular to subrounded flint; with a trace of quartz<br>Sand: fine with medium and some coarse, predominantly quartz, rusty brown | 2.1 | 13.3 |
| London Clay | Clay, silty, grey mottled dark brown becoming dark grey | 1.0+ | 14.3 |

**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 |
| **a** | 9 | 78 | 13 | 2.3-3.3 | 1 | 11 | 54 | 9 | 12 | 13 | 0 |
| | | | | 3.3-4.3 | 13 | 7 | 73 | 5 | 2 | 0 | 0 |
| | | | | 4.3-5.1 | 12 | 5 | 59 | 10 | 8 | 6 | 0 |
| | | | | Mean | 9 | 8 | 62 | 8 | 7 | 6 | 0 |
| **b** | 6 | 93 | 1 | 5.1-6.1 | 9 | 13 | 77 | 1 | 0 | 0 | 0 |
| | | | | 6.1-7.6 | 8 | 26 | 65 | 1 | 0 | 0 | 0 |
| | | | | 7.6-8.2 | 6 | 19 | 69 | 6 | 0 | 0 | 0 |
| | | | | 8.2-9.2 | 5 | 40 | 52 | 3 | 0 | 0 | 0 |
| | | | | 9.2-10.2* | 3 | 42 | 50 | 1 | 1 | 3 | 0 |
| | | | | 10.2-11.23* | 57 | 35 | 2 | 1 | 2 | 0 | 0 |
| | | | | Mean | 6 | 33 | 58 | 2 | 0 | 1 | 0 |
| **c** | 4 | 92 | 4 | 11.1-12.2* | 4 | 72 | 23 | 1 | 0 | 0 | 0 |
| | | | | 12.2-13.3* | 4 | 58 | 21 | 9 | 4 | 4 | 0 |
| | | | | Mean | 4 | 65 | 22 | 5 | 2 | 2 | 0 |
| **a+b+c** | 6 | 89 | 5 | Mean | 6 | 33 | 52 | 4 | 2 | 3 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamorphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 61 | 13 | 16 | 7 | 2 | 0 | 0 | 1 | trace | 0 |
| b | 4 | 3 | 3 | 0 | trace | 0 | 90 | 0 | 0 | 0 |
| c | 6 | 64 | 1 | 0 | 10 | 0 | 0 | 0 | 0 | 19 |
| a+b+c | 47 | 19 | 13 | 5 | 3 | 0 | 9 | 1 | trace | 3 |

**TL 93 NE 35 9674 3755 Reverends Farm, Stoke-by-Nayland Block C**

Surface level +54.6 m
Water struck at +45.8 m
June 1977

Overburden 2.2 m
*Mineral* 12.3 *m*
Bedrock 0.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Boulder Clay | Clay, sandy, silty, with flint and chalk pebbles, dark brown becoming light brown | 1.5 | 1.7 |
| | Clay, very sandy, silty, with flint and chalk pebbles, light brown | 0.5 | 2.2 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel<br>Gravel: fine with coarse, angular to subrounded flint; with well rounded flint, rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone and well rounded chalk; with a trace of ironstone, igneous, metamorphics and limestone<br>Sand: medium with some coarse and fine, predominantly rounded quartz with some coarse angular flint and fine to coarse well rounded chalk, light brown | 3.2 | 5.4 |
| Kesgrave Sands and Gravels | **b** Sand, with a trace of gravel at base<br>Gravel: fine, angular to subrounded and well rounded flint; with rounded to well rounded quartz and subrounded sandstone; with some subrounded limestone and rounded quartzite<br>Sand: medium and fine with a trace of coarse, predominantly rounded quartz with some coarse angular flint in lowermost 2.0 m, yellow-brown becoming light rusty brown | 5.0 | 10.4 |
| Red Crag | **c** Pebbly sand<br>Gravel: fine with coarse, well rounded flint and phosphatic nodules; with tabular ironstone and angular to subrounded flint; with some rounded to well rounded quartz; with a trace of quartzite<br>Sand: medium with fine and coarse, predominantly rounded quartz with some coarse angular flint, tabular ironstone and well rounded phosphatic nodules | 4.1 | 14.5 |
| London Clay | Clay, very silty, with oxidized pyrite nodules, grey-green mottled orange-brown | 0.4 | 14.9 |
| | Clay, silty, with pyrite nodules, dark blue-grey | 0.4+ | 15.3 |



**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 |
| a | 10 | 56 | 34 | 2.2-3.2 | 11 | 7 | 23 | 12 | 29 | 18 | 0 |
| | | | | 3.2-4.2 | 21 | 4 | 30 | 15 | 24 | 6 | 0 |
| | | | | 4.2-5.4 | 1 | 3 | 61 | 8 | 15 | 12 | 0 |
| | | | | Mean | 10 | 5 | 40 | 11 | 22 | 12 | 0 |
| b | 5 | 95 | 0 | 5.4-6.4 | 7 | 52 | 40 | 1 | 0 | 0 | 0 |
| | | | | 6.4-7.4 | 7 | 53 | 40 | 0 | 0 | 0 | 0 |
| | | | | 7.4-8.4 | 4 | 42 | 53 | 1 | 0 | 0 | 0 |
| | | | | 8.4-9.4* | 6 | 43 | 46 | 5 | 0 | 0 | 0 |
| | | | | 9.4-10.4* | 3 | 33 | 58 | 5 | 1 | 0 | 0 |
| | | | | Mean | 5 | 45 | 47 | 3 | 0 | 0 | 0 |
| c | 5 | 80 | 15 | 10.4-11.4* | 7 | 36 | 40 | 9 | 6 | 2 | 0 |
| | | | | 11.4-12.4* | 5 | 27 | 42 | 13 | 11 | 2 | 0 |
| | | | | 12.4-13.4* | 6 | 28 | 41 | 16 | 9 | 0 | 0 |
| | | | | 13.4-14.5* | 4 | 14 | 29 | 24 | 14 | 15 | 0 |
| | | | | Mean | 5 | 26 | 38 | 16 | 10 | 5 | 0 |
| a+b+c | 7 | 79 | 14 | Mean | 7 | 28 | 42 | 9 | 9 | 5 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamorphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 66 | 11 | 11 | 5 | 2 | 2 | 1 | 1 | 1 | 0 |
| b | 42 | 25 | 22 | 2 | 6 | 0 | 0 | 0 | 3 | 0 |
| c | 9 | 38 | 4 | 1 | 0 | 0 | 18 | 0 | trace | 30 |
| a+b+c | 53 | 17 | 10 | 4 | 2 | 1 | 5 | 1 | trace | 7 |

**TL 93 NE 36** **9651 3627** **Spring Farm, Leavenheath** **Block E**

Surface level +53.3 m
Water struck at +46.9 m
May 1977

Overburden 0.2 m
Mineral 12.4 m
Bedrock 0.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Glacial Sand and Gravel | a 'Clayey' sandy gravel, with some discrete clay pellets<br>Gravel: coarse and fine, angular to subrounded and well rounded flint; with rounded to well rounded quartz, rounded quartzite and subrounded sandstone; with some subangular igneous and metamorphics<br>Sand: medium with some fine and coarse, quartz, dark brown becoming orange-brown | 2.1 | 2.3 |
| Kesgrave Sands and Gravels | b Sand with a trace of pebbles<br>Gravel: trace of fine, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint and rounded quartzite; with some subrounded sandstone coarse, quartz, yellow-brown | 4.0 | 6.3 |
| Red Crag | c Sand, pebbly at top and base<br>Gravel: fine, angular to subrounded and well rounded flint; with rounded to well rounded quartz, well rounded phosphatic nodules and tabular ironstone; with some rounded quartzite with a trace of sandstone, igneous and metamorphics<br>Sand: medium and fine with some coarse, predominantly quartz with some coarse and medium angular flint, tabular ironstone and well rounded phosphatic nodules, red-brown | 6.3 | 12.6 |
| London Clay | Clay, silty, light grey mottled rusty orange brown | 0.3 | 12.9 |
| | Clay, silty, micaceous, dark blue-grey | 0.5+ | 13.4 |

**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 | 61 | 27 | 0.2-1.0 | 16 | 12 | 57 | 6 | 5 | 4 | 0 |
| | | | | 1.0-2.3 | 9 | 8 | 34 | 10 | 20 | 19 | 0 |
| | | | | Mean | 12 | 10 | 43 | 8 | 14 | 13 | 0 |
| b | 8 | 92 | 0 | 2.3-3.3 | 11 | 13 | 74 | 2 | 0 | 0 | 0 |
| | | | | 3.3-4.3 | 8 | 8 | 82 | 2 | 0 | 0 | 0 |
| | | | | 4.3-5.3 | 7 | 14 | 76 | 3 | 0 | 0 | 0 |
| | | | | 5.3-6.3 | 8 | 16 | 75 | 1 | 0 | 0 | 0 |
| | | | | Mean | 8 | 13 | 77 | 2 | 0 | 0 | 0 |
| c | 7 | 92 | 1 | 6.3-8.3* | 12 | 37 | 43 | 6 | 2 | 0 | 0 |
| | | | | 8.3-9.3* | 6 | 36 | 50 | 8 | 0 | 0 | 0 |
| | | | | 9.3-10.3* | 5 | 37 | 50 | 8 | 0 | 0 | 0 |
| | | | | 10.3-11.3* | 5 | 39 | 48 | 8 | 0 | 0 | 0 |
| | | | | 11.3-12.6* | 6 | 44 | 38 | 10 | 2 | 0 | 0 |
| | | | | Mean | 7 | 39 | 45 | 8 | 1 | 0 | 0 |
| a+b+c | 9 | 86 | 5 | Mean | 9 | 25 | 55 | 6 | 3 | 2 | 0 |



**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 34 | 28 | 21 | 9 | 6 | 0 | 0 | 2 | 0 | 0 |
| b | 64 | 6 | 21 | 6 | 3 | 0 | 0 | 0 | 0 | 0 |
| c | 40 | 40 | 6 | 2 | 1 | 0 | 5 | 1 | 0 | 5 |
| a+b+c | 34 | 29 | 20 | 9 | 6 | 0 | trace | 2 | 0 | trace |

**TL 93 NE 37** **9630 3534** **Brunnings Farm, Leavenheath** **Block E**

Surface level +54.6 m
Water struck at +46.1 m and +42.7 m
April 1977

Overburden 1.2 m
Mineral 8.8 m
Bedrock 3.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.4 | 0.4 |
| Boulder Clay | Clay, sandy, silty, with pebbles of flints, quartz and chalk, dark brown becoming mottled orange-brown | 0.8 | 1.2 |
| Kesgrave Sands and Gravels | a Pebbly sand, becomes a sand with depth with discrete thin clay seams<br>Gravel: fine and coarse, angular to subrounded flint and rounded to well rounded quartz, with well rounded flint, rounded quartzite and sub-rounded sandstone; with a trace of igneous and metamorphics<br>Sand: medium with fine and some coarse, predominantly rounded quartz, with some coarse angular flint, fawn | 6.9 | 8.1 |
| Red Crag | b Sand<br>Gravel: a trace of fine, tabular ironstone, with rounded to well rounded quartz, angular to subrounded and well rounded flint, with a trace of sandstone, phosphatic nodules, igneous and metamorphics<br>Sand: medium and fine with coarse, predominantly quartz with some tabular ironstone and coarse angular flint, rusty brown | 1.9 | 10.0 |
| London Clay | Clay, silty, with some fine sand seams with some flint pebbles at top, light grey mottled orange-brown | 2.6 | 12.6 |
| | Clay, silty, with some oxidized pyrite nodules, grey-brown mottled orange-brown | 0.2 | 12.8 |
| | Clay, silty, micaceous, with pyrite nodules, dark grey | 0.2+ | 13.0 |

## 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 | 9 | 85 | 6 | 1.2-1.8 | 25 | 16 | 44 | 5 | 7 | 3 | 0 |
| | | | | 1.8-2.8 | 9 | 8 | 62 | 8 | 8 | 5 | 0 |
| | | | | 2.8-4.1 | 6 | 7 | 68 | 7 | 7 | 5 | 0 |
| | | | | 4.1-5.1 | 5 | 11 | 82 | 2 | 1 | 0 | 0 |
| | | | | 5.1-6.1 | 10 | 38 | 45 | 6 | 1 | 0 | 0 |
| | | | | 6.1-7.1 | 6 | 29 | 57 | 5 | 3 | 0 | 0 |
| | | | | 7.1-8.1 | 9 | 26 | 60 | 4 | 1 | 0 | 0 |
| | | | | Mean | 9 | 19 | 61 | 5 | 4 | 2 | 0 |
| b | 8 | 91 | 1 | 8.1-9.1* | 7 | 32 | 49 | 11 | 1 | 0 | 0 |
| | | | | 9.1-10.0* | 9 | 31 | 44 | 15 | 1 | 0 | 0 |
| | | | | Mean | 8 | 31 | 47 | 13 | 1 | 0 | 0 |
| a+b+c | 9 | 87 | 4 | Mean | 9 | 22 | 58 | 7 | 3 | 1 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 36 | 18 | 33 | 7 | 5 | 0 | 0 | 1 | trace | 0 |
| b | 7 | 5 | 8 | 0 | 1 | 0 | 77 | 1 | 0 | 1 |
| a + b | 35 | 17 | 32 | 7 | 5 | 0 | 3 | 1 | trace | trace |



**TL 93 NE 38** **9754 3948** **Whitestreet Green, Boxford** **Block C**

Surface level +54.7 m
Water struck at +44.8 m
June 1977

Overburden 0.2 m
Mineral 13.6 m
Bedrock 0.8 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel, very clayey in uppermost 1.1 m, with discrete clay seams and pellets<br>Gravel: fine and coarse, angular to subrounded and well rounded flint; with rounded to well rounded quartz, rounded quartzite and subrounded sandstone; with a trace of igneous, metamorphics and ironstone<br>Sand: medium with some fine and coarse, predominantly quartz with some angular coarse flint, orange-brown becoming yellow-brown | 4.4 | 4.6 |
| Kesgrave Sands and Gravels | **b** 'Clayey' sand, with a trace of gravel between 6.4 and 7.4 m, and discrete clay pellets<br>Gravel: a trace of fine, well rounded flint; with angular to subrounded flint and subangular igneous and metamorphics; with some rounded quartzite and rounded to well rounded quartz<br>Sand: fine and medium with a trace of coarse; quartz, yellow-brown | 5.3 | 9.9 |
| Red Crag | **c** Pebbly sand, very pebbly in lowermost 0.3 m<br>Gravel: fine with coarse, angular to subrounded and well rounded flint; with well rounded phosphatic nodules, rounded to well rounded quartz and tabular ironstone; with a trace of sandstone, igneous, metamorphics, and fossil debris<br>Sand: medium and fine with some coarse, predominantly quartz with a trace of angular coarse flint and medium to coarse tabular ironstone, light brown becoming rusty brown | 3.9 | 13.8 |
| London Clay | Clay, silty, with pyrite nodules, dark grey mottled reddish brown becoming dark grey | 0.8+ | 14.6 |

**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 | 11 | 62 | 27 | 0.2-1.3 | 22 | 13 | 22 | 7 | 17 | 19 | 0 |
| | | | | 1.3-2.7 | 10 | 11 | 39 | 9 | 17 | 14 | 0 |
| | | | | 2.7-3.7 | 2 | 19 | 66 | 4 | 5 | 4 | 0 |
| | | | | 3.7-4.6 | 8 | 7 | 49 | 7 | 6 | 13 | 0 |
| | | | | Mean | 11 | 12 | 43 | 7 | 14 | 13 | 0 |
| b | 15 | 85 | 0 | 4.6-5.4 | 11 | 25 | 64 | 0 | 0 | 0 | 0 |
| | | | | 5.4-6.4 | 11 | 67 | 22 | 0 | 0 | 0 | 0 |
| | | | | 6.4-7.4 | 17 | 19 | 63 | 1 | 0 | 0 | 0 |
| | | | | 7.4-8.4 | 18 | 68 | 13 | 1 | 0 | 0 | 0 |
| | | | | 8.4-9.9 | 16 | 69 | 37 | 1 | 0 | 0 | 0 |
| | | | | Mean | 15 | 46 | 38 | 1 | 0 | 0 | 0 |
| c | 3 | 91 | 6 | 9.9-10.9* | 4 | 44 | 41 | 10 | 1 | 0 | 0 |
| | | | | 10.9-11.9* | 3 | 35 | 48 | 12 | 2 | 0 | 0 |
| | | | | 11.9-12.9* | 4 | 37 | 51 | 6 | 2 | 0 | 0 |
| | | | | 12.9-13.8* | 1 | 25 | 44 | 10 | 10 | 10 | 0 |
| | | | | Mean | 3 | 36 | 46 | 9 | 4 | 2 | 0 |
| a+b+c | 10 | 79 | 11 | Mean | 10 | 32 | 42 | 5 | 6 | 5 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 36 | 29 | 22 | 7 | 5 | 0 | trace | 1 | 0 | 0 |
| b | 22 | 63 | 2 | 4 | 0 | 0 | 0 | 9 | 0 | 0 |
| c | 44 | 33 | 5 | 1 | trace | 0 | 5 | 1 | trace | 11 |
| a+b+c | 37 | 30 | 19 | 6 | 4 | 0 | 1 | 1 | trace | 2 |



**TL 93 NE 39** **9715 3875** **Peyton Hall, Boxford** **Block D**

Surface level +23.0 m
Water struck at +22.0 m
March 1977

Overburden 0.9 m
Mineral 2.8 m
Waste 15.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Head | Clay, sandy, silty, light brown | 0.5 | 0.7 |
| | Clay, very silty, fawn brown | 0.2 | 0.9 |
| | 'Clayey' sandy gravel<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint and rounded to well rounded quartz and quartzite; with some subrounded sandstone and subangular igneous and metamorphics<br>Sand: medium and fine with coarse, predominantly rounded quartz and angular flint with some fine to coarse, chalk grey-brown | 2.8 | 3.7 |
| Glacial Silt (R. Box Channel Deposits) | Silt, clayey, slightly micaceous, soft, dark grey | 3.3 | 7.0 |
| | Silt, clayey, with dark brown-black peat layers and disseminated carbonaceous material with a $^{14}C$ date of >45 250 b.p. | 0.7 | 7.7 |
| Boulder Clay (R. Box Channel Deposits) | Silt, clayey, with some very clayey silt seams containing fine to coarse sand-sized chalk pellets, soft light, grey-green and grey | 11.3+ | 19.0 |

**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 |
| 10 | 62 | 28 | 0.9-2.1* | 13 | 37 | 28 | 10 | 8 | 4 | 0 |
| | | | 2.1-3.1* | 7 | 15 | 24 | 15 | 22 | 17 | 0 |
| | | | 3.1-3.7* | 6 | 9 | 26 | 16 | 23 | 20 | 0 |
| | | | Mean | 10 | 23 | 26 | 13 | 16 | 12 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 68 | 13 | 8 | 7 | 2 | trace | 0 | 2 | 0 | 0 |

**TL 93 NE 40** **9782 3693** **400 m south-west of Stoke Priory, Stoke-by-Nayland** **Block C**

Surface level +53.3 m
Water struck at +39.8 m
April 1977

Overburden 0.8 m
Mineral 16.8 m
Bedrock 0.7 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| | Clay, sandy, silty, with pebbles of flint, quartz and quartzite, brown | 0.6 | 0.8 |
| Glacial Sand and Gravel | **a** Sandy gravel, with some discrete thin clay seams at base<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint, rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone; with a trace of igneous, metamorphics, ironstone and phosphatic nodules<br>Sand: medium with some coarse and fine, predominantly rounded quartz with some coarse angular flint; orange-brown becoming fawn brown | 5.6 | 6.4 |
| Kesgrave Sands and Gravels | **b** Sand, becoming pebbly towards base, with many discrete thin clay seams<br>Gravel: fine, well rounded flint; with angular to subrounded flint and rounded to well rounded quartz; with some rounded quartzite, subrounded sandstone and tabular ironstone; with a trace of igneous, metamorphics and phosphatic nodules<br>Sand: fine and medium with some coarse, predominantly rounded quartz with angular coarse flint increasing with depth, fawn brown becoming dark brown | 11.2 | 7.6 |
| London Clay | Clay, silty, light grey mottled orange-brown | 0.3 | 17.9 |
| | Clay, silty, with some pyrite nodules, blue-grey | 0.4+ | 18.3 |

**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 |
| **a** | 6 | 59 | 35 | 0.8-1.8 | 10 | 5 | 21 | 10 | 22 | 32 | 0 |
| | | | | 1.8-2.8 | 8 | 7 | 26 | 9 | 23 | 27 | 0 |
| | | | | 2.8-3.8 | 7 | 5 | 30 | 15 | 25 | 18 | 0 |
| | | | | 3.8-4.8 | 4 | 9 | 50 | 13 | 14 | 10 | 0 |
| | | | | 4.8-6.4 | 4 | 14 | 57 | 10 | 12 | 3 | 0 |
| | | | | Mean | 6 | 9 | 39 | 11 | 19 | 16 | 0 |
| **b** | 8 | 91 | 1 | 6.4-7.4 | 12 | 19 | 68 | 1 | 0 | 0 | 0 |
| | | | | 7.4-8.4 | 11 | 23 | 65 | 1 | 0 | 0 | 0 |
| | | | | 8.4-9.4 | 12 | 46 | 39 | 3 | 0 | 0 | 0 |
| | | | | 9.4-10.4 | 5 | 62 | 31 | 1 | 1 | 0 | 0 |
| | | | | 10.4-11.4 | 7 | 56 | 34 | 1 | 2 | 0 | 0 |
| | | | | 11.4-12.4 | 6 | 86 | 7 | 1 | 0 | 0 | 0 |
| | | | | 12.4-13.4 | 7 | 27 | 44 | 19 | 3 | 0 | 0 |
| | | | | 13.4-14.4 | 5 | 16 | 67 | 11 | 1 | 0 | 0 |
| | | | | 14.4-15.4 | 10 | 57 | 25 | 8 | 0 | 0 | 0 |
| | | | | 15.4-17.6* | 8 | 50 | 31 | 9 | 2 | 0 | 0 |
| | | | | Mean | 8 | 45 | 40 | 6 | 1 | 0 | 0 |
| **a + b** | 7 | 81 | 12 | Mean | 7 | 33 | 40 | 8 | 7 | 5 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 60 | 16 | 11 | 8 | 4 | 0 | trace | 1 | 0 | trace |
| **b** | 23 | 51 | 15 | 4 | 4 | 0 | 2 | 1 | 0 | trace |
| **a + b** | 59 | 17 | 11 | 8 | 4 | 0 | trace | 1 | 0 | trace |



**TL 93 NE 41** **9702 3587** **400 m South of Beachams Farm, Stoke-by-Nayland** **Block E**

Surface level +50.0 m
Water struck at +40.0 m
April 1977

Mineral 12.0 m
Bedrock 1.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| Kesgrave Sands and Gravels | **a** 'Clayey' sand, with a thin topsoil at surface<br>Gravel: a trace of fine and coarse, tabular ironstone and angular to subrounded flint; with rounded to well rounded quartz and well rounded flint; with some rounded quartzite and subrounded sandstone; with a trace of igneous, metamorphics and phosphatic nodules<br>Sand: fine with medium and a trace of coarse, predominantly rounded quartz with a trace of angular coarse flint, orange, orange-brown and fawn horizons | 9.0 | 9.0 |
| Red Crag | **b** Sand, becomes very pebbly in lowermost 30 cms<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint and phosphatic nodules, and rounded to well rounded quartz, with some tabular ironstone; with a trace of quartzite and sandstone<br>Sand: fine and medium with some coarse, predominantly well rounded quartz with some well rounded phosphatic nodules, and coarse tabular ironstone and angular flint, dark brown becoming orange brown | 3.0 | 12.0 |
| London Clay | Clay, silty, grey mottled yellow and dark brown | 0.2 | 12.2 |
| | Clay, silty, fine sandy, with some pyrite nodules and comminuted shell debris, grey becomes blue-grey | 1.1+ | 13.3 |

## 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 |
| a | 14 | 83 | 3 | 0.0-1.0 | 12 | 19 | 57 | 4 | 2 | 6 | 0 |
| | | | | 1.0-2.0 | 33 | 17 | 44 | 4 | 1 | 0 | 0 |
| | | | | 2.0-3.0 | 11 | 27 | 51 | 7 | 4 | 0 | 0 |
| | | | | 3.0-4.0 | 15 | 36 | 44 | 4 | 1 | 0 | 0 |
| | | | | 4.0-5.0 | 13 | 65 | 21 | 1 | 0 | 0 | 0 |
| | | | | 5.0-6.0 | 16 | 56 | 25 | 3 | 0 | 0 | 0 |
| | | | | 6.0-7.0 | 11 | 82 | 3 | 3 | 1 | 0 | 0 |
| | | | | 7.0-8.0 | 10 | 78 | 9 | 2 | 1 | 0 | 0 |
| | | | | 8.0-9.0 | 9 | 33 | 43 | 8 | 7 | 0 | 0 |
| | | | | Mean | 14 | 46 | 33 | 4 | 2 | 1 | 0 |
| b | 7 | 89 | 4 | 9.0-9.7 | 9 | 28 | 51 | 11 | 1 | 0 | 0 |
| | | | | 9.7-10.7* | 7 | 41 | 39 | 13 | 1 | 0 | 0 |
| | | | | 10.7-11.7* | 6 | 47 | 29 | 13 | 4 | 1 | 0 |
| | | | | 11.7-12.0* | 6 | 40 | 20 | 14 | 6 | 14 | 0 |
| | | | | Mean | 7 | 40 | 36 | 13 | 2 | 2 | 0 |
| a + b | 13 | 84 | 3 | Mean | 13 | 44 | 34 | 6 | 2 | 1 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 25 | 19 | 23 | 4 | 2 | 0 | 27 | trace | 0 | trace |
| b | 46 | 23 | 6 | 1 | 1 | 0 | 2 | 0 | 0 | 21 |
| a + b | 38 | 22 | 12 | 2 | 2 | 0 | 12 | trace | 0 | 12 |



**TL 93 NE 42** **9762 3543** **Hicks Plantation, Stoke-by-Nayland** **Block E**

Surface level +53.0 m
Water struck at +38.5 m
April 1977

Overburden 1.1 m
Mineral 15.0 m
Bedrock 1.4 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| | Clay, sandy, brown | 0.1 | 0.4 |
| | Clay, silty, sandy becoming very sandy, with some flint pebbles, light brown | 0.7 | 1.1 |
| Glacial Sand and Gravel | **a** Pebbly sand<br>Gravel: fine and coarse with cobbles in uppermost 1.0 m, angular to subrounded flint; with well rounded flint and rounded to well rounded quartz; with some rounded quartzite, subrounded sandstone and subangular igneous and metamorphics; with a trace of ironstone<br>Sand: medium with some fine and coarse, predominantly quartz with some coarse angular flint and fine mica, orange-brown becoming light brown | 3.6 | 4.7 |
| Kesgrave Sands and Gravels | **b** Sand, becoming pebbly at base<br>Gravel: fine with a trace of coarse, well rounded flint; with angular to subrounded flint and rounded to well rounded quartz; with some subrounded sandstone; with a trace of quartzite igneous and metamorphics<br>Sand: medium with fine and a trace of coarse, predominantly quartz with some fine and medium mica, fawn-brown | 7.2 | 11.9 |
| Red Crag | **c** 'Clayey' sand, very pebbly at base<br>Gravel: fine and coarse, well rounded and angular to subrounded flint; with rounded to well rounded quartz and tabular ironstone; with some rounded quartzite and well rounded phosphatic nodules; with a trace of sandstone<br>Sand: fine and medium with some coarse, predominantly quartz with some tabular ironstone, rounded phosphatic nodules and angular flint, brown becoming orange-brown | 4.2 | 16.1 |
| London Clay | Clay, silty, fine sandy, orange-brown streaked grey | 1.0 | 17.1 |
| | Clay, silty, dark blue-grey | 0.4+ | 17.5 |

**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 | 9 | 70 | 21 | 1.1-2.1 | 12 | 11 | 38 | 11 | 12 | 9 | 7 |
| | | | | 2.1-3.1 | 10 | 31 | 34 | 8 | 10 | 7 | 0 |
| | | | | 3.1-4.1 | 5 | 7 | 55 | 8 | 13 | 10 | 0 |
| | | | | 4.1-4.7 | 10 | 7 | 56 | 13 | 10 | 4 | 0 |
| | | | | Mean | 9 | 15 | 45 | 10 | 11 | 8 | 2 |
| b | 9 | 90 | 1 | 4.7-5.7 | 11 | 21 | 65 | 1 | 0 | 0 | 0 |
| | | | | 5.7-6.7 | 5 | 19 | 75 | 1 | 0 | 0 | 0 |
| | | | | 6.7-7.7 | 9 | 9 | 84 | 0 | 0 | 0 | 0 |
| | | | | 7.7-8.7 | 6 | 13 | 79 | 2 | 0 | 0 | 0 |
| | | | | 8.7-9.9 | 7 | 24 | 64 | 4 | 1 | 0 | 0 |
| | | | | 9.9-10.9 | 12 | 42 | 38 | 4 | 2 | 2 | 0 |
| | | | | 10.9-11.9 | 9 | 46 | 40 | 5 | 2 | 0 | 0 |
| | | | | Mean | 9 | 25 | 63 | 2 | 1 | 0 | 0 |
| c | 10 | 87 | 3 | 11.9-12.9 | 10 | 27 | 54 | 6 | 3 | 0 | 0 |
| | | | | 12.9-13.3 | 6 | 28 | 55 | 8 | 2 | 1 | 0 |
| | | | | 13.3-14.2 | 13 | 67 | 17 | 2 | 1 | 0 | 0 |
| | | | | 14.2-15.6* | 11 | 46 | 28 | 13 | 2 | 0 | 0 |
| | | | | 15.6-16.1* | 5 | 21 | 44 | 23 | 5 | 2 | 0 |
| | | | | Mean | 10 | 41 | 36 | 10 | 2 | 1 | 0 |
| a+b+c | 9 | 84 | 7 | Mean | 9 | 27 | 51 | 6 | 4 | 2 | 1 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 67 | 13 | 9 | 4 | 4 | 0 | 1 | 2 | 0 | 0 |
| b | 15 | 72 | 8 | 1 | 3 | 0 | 0 | 1 | 0 | 0 |
| c | 29 | 44 | 11 | 3 | 1 | 0 | 9 | 0 | 0 | 3 |
| a+b+c | 61 | 19 | 9 | 4 | 3 | 0 | 2 | 2 | 0 | trace |



**TL 93 NE 43** **9856 3973** **Hightrees Farm, Polstead** **Block C**

Surface level +68.9 m
Water struck at +48.3 m
April 1977

Overburden 11.5 m
Mineral 13.6 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Boulder Clay | Clay, silty, slightly sandy, with some flint pebbles, light brown becoming orange brown, mottled dark greyfrom 3.0 m to 3.2 m | 3.5 | 3.6 |
| | Clay, silty, brick red mottled brown and grey-green | 0.6 | 4.2 |
| | Clay, very sandy, silty, with some flint pebbles, brown | 0.8 | 5.4 |
| | Clay, silty, slightly sandy, with flint and chalk pellets light brown | 3.6 | 9.0 |
| | Clay, silty, with flint and chalk pebbles, grey-brown | 1.5 | 10.5 |
| | Clay, silty, dark grey-brown | 0.5 | 11.0 |
| | Clay, silty, with flint and some chalk pebbles, dark grey | 0.5 | 11.5 |
| Glacial Sand and Gravel | **a** Sandy gravel, clayey in uppermost 2.0 m<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint, rounded to well rounded quartz, rounded quartzite and well rounded chalk; with some subrounded sandstone igneous and metamorphics; with a trace of phosphatic nodules and fossil debris<br>Sand: medium with some fine and coarse, predominantly quartz with some coarse angular flint, light brown | 7.1 | 18.6 |
| Kesgrave Sands and Gravels | **b** Sand, with a trace of gravel at base<br>Gravel: a trace of fine, rounded to well rounded quartz and angular to subrounded flint, with well rounded flint and subrounded sandstone; with some ironstone; with a trace of igneous and metamorphics<br>Sand: medium with fine and a trace of coarse, quartz, yellow-brown becoming fawn-brown | 6.5+ | 25.1 |

**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 | 8 | 65 | 27 | 11.5-12.5 | 16 | 19 | 26 | 8 | 16 | 1 | 0 |
| | | | | 12.5-13.5 | 17 | 26 | 28 | 7 | 15 | 7 | 0 |
| | | | | 13.5-14.8 | 9 | 32 | 44 | 6 | 10 | 9 | 0 |
| | | | | 14.8-15.8 | 3 | 11 | 52 | 8 | 15 | 11 | 0 |
| | | | | 15.8-16.8 | 2 | 7 | 51 | 8 | 17 | 15 | 0 |
| | | | | 16.8-17.8 | 2 | 6 | 43 | 13 | 23 | 13 | 0 |
| | | | | 17.8-18.6 | 6 | 15 | 43 | 8 | 13 | 15 | 0 |
| | | | | Mean | 8 | 16 | 41 | 8 | 15 | 12 | 0 |
| b | 8 | 92 | 0 | 18.6-19.6 | 3 | 25 | 69 | 3 | 0 | 0 | 0 |
| | | | | 19.6-20.6 | 5 | 26 | 66 | 3 | 0 | 0 | 0 |
| | | | | 20.6-21.6* | 19 | 66 | 15 | 0 | 0 | 0 | 0 |
| | | | | 21.6-23.6* | 6 | 17 | 76 | 1 | 0 | 0 | 0 |
| | | | | 23.6-25.1* | 7 | 13 | 78 | 2 | 0 | 0 | 0 |
| | | | | Mean | 8 | 26 | 64 | 2 | 0 | 0 | 0 |
| a + b | 8 | 78 | 14 | Mean | 8 | 21 | 52 | 5 | 8 | 6 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 48 | 16 | 16 | 6 | 3 | 5 | 0 | 2 | 3 | 1 |
| b | 30 | 23 | 39 | 0 | 5 | 0 | 2 | 1 | 0 | 0 |
| a + b | 48 | 16 | 16 | 6 | 3 | 5 | trace | 2 | 3 | 1 |

**TL 93 NE 44** **9858 3871** **0.75 km north of Polstead Hall, Polstead** **Block C**

Surface level +55.6 m
Water struck at 41.8 m
March 1977

Overburden 0.8 m
Mineral 13.9 m
Bedrock 1.4 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| | Clay, sandy, silty brown | 0.5 | 0.8 |
| Glacial Sand and Gravel | a Sandy gravel<br>Gravel: fine and coarse, angular to subrounded and well rounded flint; with rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone and subangular igneous and metamorphics; with a trace of ironstone<br>Sand: medium with some fine and coarse, predominantly rounded quartz with some coarse angular flint, orange becoming light brown | 7.7 | 8.5 |
| Kesgrave Sands and Gravels | b Sand, with a trace of gravel<br>Gravel: fine, well rounded and angular to subrounded flint; with rounded to well rounded quartz; with some rounded quartzite and subrounded sandstone; with a trace of igneous and metamorphics<br>Sand: medium and fine with a trace of coarse, quartz, orange-brown becoming fawn brown | 5.0 | 13.5 |
| Red Crag | c Sand, with a trace of gravel<br>Gravel: fine, well rounded flint; with angular to subrounded flint, rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone and subangular igneous and metamorphics<br>Sand: medium and fine with some coarse, quartz, orange brown | 1.2 | 14.7 |
| London Clay | Clay, silty, sandy, orange brown | 0.8 | 15.5 |
| | Clay, silty, dark grey | 0.6+ | 16.1 |



**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 | 3 | 68 | 29 | 0.8-1.5 | 10 | 7 | 34 | 9 | 16 | 24 | 0 |
| | | | | 1.5-2.5 | 6 | 8 | 36 | 12 | 21 | 17 | 0 |
| | | | | 2.5-3.5 | 3 | 6 | 33 | 11 | 24 | 23 | 0 |
| | | | | 3.5-4.5 | 0 | 10 | 62 | 10 | 11 | 7 | 0 |
| | | | | 4.5-5.5 | 0 | 18 | 69 | 4 | 5 | 4 | 0 |
| | | | | 5.5-6.4 | 1 | 7 | 38 | 9 | 21 | 24 | 0 |
| | | | | 6.4-7.5 | 1 | 14 | 58 | 7 | 10 | 10 | 0 |
| | | | | 7.5-8.5 | 1 | 10 | 54 | 12 | 14 | 9 | 0 |
| | | | | Mean | 3 | 10 | 49 | 9 | 15 | 14 | 0 |
| b | 3 | 97 | 0 | 8.5-9.5* | 6 | 19 | 73 | 2 | 0 | 0 | 0 |
| | | | | 9.5-10.5* | 3 | 50 | 45 | 2 | 0 | 0 | 0 |
| | | | | 10.5-11.5* | 1 | 21 | 71 | 6 | 1 | 0 | 0 |
| | | | | 11.5-12.5* | 1 | 33 | 64 | 2 | 0 | 0 | 0 |
| | | | | 12.5-13.5* | 3 | 32 | 60 | 4 | 1 | 0 | 0 |
| | | | | Mean | 3 | 31 | 63 | 3 | 0 | 0 | 0 |
| c | 2 | 96 | 2 | 13.5-14.7* | 2 | 44 | 47 | 5 | 2 | 0 | 0 |
| a+b+c | 3 | 80 | 17 | Mean | 3 | 20 | 53 | 7 | 9 | 8 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 43 | 25 | 20 | 7 | 3 | 0 | trace | 2 | trace | 0 |
| b | 27 | 55 | 13 | 2 | 2 | 0 | 0 | 1 | 0 | 0 |
| c | 22 | 47 | 20 | 6 | 3 | 0 | 0 | 2 | 0 | 0 |
| a+b+c | 43 | 25 | 20 | 7 | 3 | 0 | trace | 2 | trace | 0 |

**TL 93 NE 45** **9890 3765** **Mill Street, Polstead** **Block D**

Surface level +18.6 m
Water struck at +14.8 m
March 1977

Overburden 0.8 m
Mineral 6.2 m
Bedrock 1.1 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.8 | 0.8 |
| Terrace 2 | 'Very clayey' pebbly sand, becomes 'very clayey' sand with depth, clay seam between 1.5 and 1.7 m<br>Gravel: coarse and fine, angular to subrounded flint, with well rounded to well rounded quartzite and rounded flint, rounded quartz; with some subrounded sandstone; with a trace of igneous metamorphics and ironstone<br>Sand: fine with medium and a trace of coarse, predominantly quartz, light brown becoming orange brown | 6.2 | 7.0 |
| London Clay | Silt, fine sandy, clayey becomes silty clay, dark grey | 1.1+ | 8.1 |

**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 |
| 26 | 69 | 5 | 0.8-1.5 | 21 | 20 | 19 | 7 | 12 | 21 | 0 |
| | | | 1.7-2.4 | 32 | 58 | 5 | 1 | 3 | 1 | 0 |
| | | | 2.4-3.4 | 33 | 65 | 2 | 0 | 0 | 0 | 0 |
| | | | 3.4-3.8 | 32 | 66 | 2 | 0 | 0 | 0 | 0 |
| | | | 3.8-4.8* | 28 | 69 | 2 | 1 | 0 | 0 | 0 |
| | | | 4.8-5.8* | 19 | 25 | 52 | 4 | 0 | 0 | 0 |
| | | | 5.8-7.0* | 22 | 25 | 51 | 2 | 0 | 0 | 0 |
| | | | Mean | 26 | 45 | 22 | 2 | 2 | 3 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 60 | 15 | 9 | 12 | 2 | 0 | trace | 1 | 1 | 0 |



**TL 93 NE 46** **9870 3712** **Steps Farm, Polstead** **Block D**

Surface level +37.0 m
Water struck at +22.7 m
March/April 1977

Overburden 0.3 m
Mineral 15.3 m
Waste 4.1 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| Head | Topsoil | 0.3 | 0.3 |
| Glacial Sand and Gravel (River Box Channel Deposits) | 'Very clayey' pebbly sand, very sandy coarse silt between 10.0 m and 11.8 m, well laminated<br>Gravel: fine, coarse and cobbles, angular to subrounded flint, with well rounded flint and rounded quartzite; with some rounded to well rounded quartz, tabular ironstone, well rounded chalk, subrounded sandstone and subangular igneous and metamorphics; with a trace of fossil debris<br>Sand: fine and medium with some coarse, predominantly quartz with fine to coarse well rounded chalk; with some coarse angular flint, light grey-brown and brown | 15.0 | 15.3 |
| | Silt, clayey, fine sandy, with chalk and quartz sand seams, dark grey | 1.5 | 16.8 |
| | Clay, very silty, fine sandy, with some septarian nodules and fine sand seams | 2.6+ | 19.4 |

**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 | 64 | 9 | 0.3-1.3 | 20 | 45 | 23 | 2 | 4 | 6 | 0 |
| | | | 1.3-2.7 | 9 | 26 | 30 | 4 | 8 | 13 | 10 |
| | | | 2.7-3.8 | 11 | 41 | 38 | 3 | 6 | 1 | 0 |
| | | | 3.8-4.7 | 39 | 45 | 12 | 2 | 2 | 0 | 0 |
| | | | 4.7-5.7 | 26 | 43 | 23 | 5 | 3 | 0 | 0 |
| | | | 5.7-6.6 | 31 | 29 | 31 | 5 | 4 | 0 | 0 |
| | | | 6.6-7.6 | 18 | 17 | 54 | 8 | 3 | 0 | 0 |
| | | | 7.6-8.6 | 32 | 29 | 30 | 6 | 3 | 0 | 0 |
| | | | 8.6-9.6 | 17 | 20 | 41 | 11 | 11 | 0 | 0 |
| | | | 9.6-10.0 | 16 | 38 | 45 | 1 | 0 | 0 | 0 |
| | | | 10.0-11.0 | 53 | 30 | 15 | 2 | 0 | 0 | 0 |
| | | | 11.0-11.8 | 63 | 33 | 4 | 0 | 0 | 0 | 0 |
| | | | 11.8-12.8 | 22 | 24 | 44 | 6 | 4 | 0 | 0 |
| | | | 12.8-13.8 | 41 | 47 | 12 | 2 | 0 | 0 | 0 |
| | | | 13.8-14.8* | 25 | 19 | 19 | 10 | 12 | 15 | 0 |
| | | | 14.8-15.3* | 15 | 9 | 10 | 15 | 10 | 13 | 18 |
| | | | Mean | 27 | 31 | 28 | 5 | 4 | 3 | 2 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 72 | 7 | 4 | 5 | 3 | 3 | 4 | 2 | trace | 0 |

**TL 93 NE 47** **9830 3635** **Stoke-by-Nayland** **Block C**

Surface level +53.6 m
Water struck at +40.3 m
April 1977

Overburden 3.5 m
Mineral 8.8 m
Waste 1.9 m
Bedrock 2.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.8 | 0.8 |
| | Silt, clayey, with some flint pebbles, dark brown | 1.4 | 2.2 |
| | Silt, with flint and quartz pebbles increasing with depth, becoming sandy, grey-brown | 1.3 | 3.5 |
| Glacial Sand and Gravel | a Pebbly sand, 'very clayey' in uppermost 0.5 m with some discrete clay pellets<br>Gravel: fine and coarse, angular to subrounded flint, with well rounded flint and rounded to well rounded quartz; with some rounded quartzite and subrounded sandstone; with a trace of limestone, chalk, igneous and fossil debris<br>Sand: medium with fine and some coarse, predominantly quartz with some coarse angular flint, fawn brown | 5.5 | 9.0 |
| Kesgrave Sands and Gravels | b 'Clayey' sand, with a trace of gravel<br>Gravel: fine, angular to subrounded flint, with tabular ironstone, well rounded flint rounded to well rounded quartz and rounded quartzite; with a trace of sandstone, chalk, igneous, metamorphics and fossil debris<br>Sand: fine with medium and some coarse, predominantly rounded quartz, light brown | 3.3 | 12.3 |
| | Clay, silty, with oxidized pyrite nodules, grey-brown mottled orange-brown | 1.0 | 13.3 |
| | 'Clayey' pebbly sand, fine and coarse gravel with medium coarse and fine sand, rusty orange-brown | 0.9 | 14.2 |
| London Clay | Clay, silty, with some pyrite nodules, brown mottled orange-brown | 1.2 | 15.4 |
| | Clay, silty, micaceous, with pyrite nodules, orange-brown becoming dark grey | 0.8+ | 16.2 |

**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 | 8 | 82 | 10 | 3.5-4.0 | 22 | 25 | 32 | 6 | 9 | 6 | 0 |
| | | | | 4.0-5.0 | 3 | 35 | 48 | 5 | 6 | 3 | 0 |
| | | | | 5.0-6.0 | 5 | 20 | 63 | 5 | 4 | 3 | 0 |
| | | | | 6.0-7.0 | 6 | 24 | 53 | 4 | 7 | 6 | 0 |
| | | | | 7.0-8.0 | 9 | 23 | 56 | 3 | 5 | 4 | 0 |
| | | | | 8.0-9.0 | 8 | 31 | 47 | 7 | 5 | 2 | 0 |
| | | | | Mean | 8 | 26 | 51 | 5 | 6 | 4 | 0 |
| b | 13 | 86 | 1 | 9.0-10.0 | 10 | 36 | 48 | 6 | 0 | 0 | 0 |
| | | | | 10.0-11.4 | 16 | 48 | 24 | 10 | 2 | 0 | 0 |
| | | | | 11.4-12.3 | 11 | 77 | 8 | 3 | 1 | 0 | 0 |
| | | | | Mean | 13 | 52 | 27 | 7 | 1 | 0 | 0 |
| a + b | 10 | 84 | 6 | Mean | 10 | 36 | 42 | 6 | 4 | 2 | 0 |



**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 67 | 13 | 10 | 4 | 4 | 1 | trace | 1 | trace | 0 |
| b | 29 | 34 | 10 | 7 | 1 | 1 | 18 | trace | trace | 0 |
| a + b | 60 | 16 | 10 | 5 | 4 | 1 | 3 | 1 | trace | 0 |

**TL 93 NE 48** **9846 3511** **1 km east of Hall Farm, Stoke-by-Nayland** **Block F**

Surface level +19.2 m
Water struck at +15.1 m and +12.3 m
March/April 1977

Overburden 1.0 m
Mineral 5.6 m
Waste 2.1 m
Mineral 1.9 m
Waste 4.0 m
Bedrock 1.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Terrace 1-3 | Very pebbly, very sandy clay, with pebbles of flint, quartz, quartzite, sandstone and a trace of limestone | 0.8 | 1.0 |
| | a Gravel, with cobbles at base<br>Gravel: fine with coarse and a trace of cobbles, angular to subrounded flint; with well rounded flint and rounded to well rounded quartz and quartzite; with some subrounded sandstone; with a trace of igneous, metamorphics ironstone and phosphatic nodules<br>Sand: medium with coarse and some fine, rounded quartz and angular flint with a trace of tabular ironstone, brown | 5.6 | 6.6 |
| | Clay, silty, with some thin gravel and sand seams | 0.8 | 7.4 |
| | Clay, silty, micaceous, dark grey | 0.5 | 7.9 |
| | Clay, silty, yellow-brown mottled orange-brown | 0.8 | 8.7 |
| | b Sand, fine and medium, rounded quartz, yellow-brown | 1.9 | 10.6 |
| | Silt, clayey and fine sandy, with many silty clay and silty sand seams throughout, horizons of brown, green and grey | 4.0 | 14.6 |
| London Clay | Clay, very silty, with pyrite nodules, dark grey | 1.5+ | 16.1 |

**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 | 7 | 46 | 47 | 1.0-2.0 | 3 | 7 | 28 | 13 | 28 | 21 | 0 |
| | | | | 2.0-3.0 | 5 | 8 | 26 | 15 | 32 | 14 | 0 |
| | | | | 3.0-4.0 | 5 | 5 | 19 | 18 | 34 | 19 | 0 |
| | | | | 4.0-5.0* | 19 | 11 | 25 | 18 | 21 | 6 | 0 |
| | | | | 5.0-6.0* | 5 | 8 | 24 | 17 | 32 | 14 | 0 |
| | | | | 6.0-6.6* | 7 | 5 | 12 | 13 | 33 | 25 | 5 |
| | | | | Mean | 7 | 7 | 23 | 16 | 30 | 16 | 1 |
| b | 6 | 94 | 0 | 8.7-9.7* | 5 | 64 | 31 | 0 | 0 | 0 | 0 |
| | | | | 9.7-10.6* | 8 | 63 | 29 | 0 | 0 | 0 | 0 |
| | | | | Mean | 6 | 64 | 30 | 0 | 0 | 0 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 64 | 13 | 10 | 10 | 2 | 0 | trace | 1 | 0 | trace |
| b | No Gravel Retained | | | | | | | | | |



**TL 93 NE 49** **9965 3970** **White Hall, Polstead** **Block C**

Surface level +65.6 m
Water struck at +50.6 m
April 1977

Overburden 7.3 m
Mineral 17.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Boulder Clay | Clay, silty, very sandy, with flint pebbles, light brown | 0.5 | 0.7 |
| | Clay, silty, sandy, with flint pebbles and cobbles, orange-brown | 5.7 | 6.4 |
| Glacial Sand and Gravel | 'Clayey' gravel, coarse and fine with some cobbles, with medium, with some fine and coarse sand | 0.6 | 7.0 |
| | Clay, sandy, silty, with flint pebbles, light brown | 0.3 | 7.3 |
| | a 'Very clayey' pebbly sand<br>Gravel: fine and coarse, angular to subrounded flint; with rounded to well rounded quartz; with some well rounded flint, subrounded sandstone and rounded quartzite; with a trace of igneous, metamorphics and ironstone<br>Sand: fine and medium with a trace of coarse, predominantly quartz with some angular flint, light orange-brown | 5.9 | 13.2 |
| Kesgrave Sands and Gravels | b Sand, becoming pebbly at base, with discrete clay pellets throughout<br>Gravel: a trace of fine, angular to subrounded flint and rounded to well rounded quartz; with rounded quartzite and subrounded sandstone<br>Sand: fine and medium with a trace of coarse, predominantly quartz with a trace of angular flint at base, yellow-brown | 8.0 | 21.2 |
| Red Crag | c Sand, pebbly towards base<br>Gravel: fine with coarse, well rounded flint and tabular ironstone; with angular to subrounded flint, with some rounded to well rounded quartz and well rounded phosphatic nodules; with a trace of quartzite and sandstone<br>Sand: medium and fine with some coarse, predominantly rounded quart with some tabular ironstone, well rounded phosphatic nodules and angular flint, brown becoming rusty brown | 3.6+ | 24.8 |

## 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 |
| a | 24 | 72 | 4 | 7.3-8.3 | 29 | 36 | 28 | 3 | 3 | 1 | 0 |
| | | | | 8.3-10.3 | 37 | 32 | 28 | 2 | 1 | 0 | 0 |
| | | | | 10.3-11.3 | 25 | 45 | 26 | 3 | 1 | 0 | 0 |
| | | | | 11.3-12.3 | 10 | 43 | 40 | 2 | 2 | 3 | 0 |
| | | | | 12.3-13.2 | 4 | 25 | 53 | 6 | 6 | 0 | 0 |
| | | | | Mean | 24 | 36 | 33 | 3 | 2 | 2 | 0 |
| b | 7 | 93 | 0 | 13.2-14.2 | 13 | 72 | 14 | 1 | 0 | 0 | 0 |
| | | | | 14.2-15.2 | 13 | 62 | 24 | 1 | 0 | 0 | 0 |
| | | | | 15.2-16.2* | 11 | 56 | 33 | 0 | 0 | 0 | 0 |
| | | | | 16.2-17.2* | 4 | 73 | 23 | 0 | 0 | 0 | 0 |
| | | | | 17.2-18.2* | 4 | 57 | 39 | 0 | 0 | 0 | 0 |
| | | | | 18.2-19.2* | 1 | 22 | 76 | 1 | 0 | 0 | 0 |
| | | | | 19.2-20.2* | 9 | 36 | 54 | 1 | 0 | 0 | 0 |
| | | | | 20.2-21.2* | 3 | 39 | 54 | 4 | 0 | 0 | 0 |
| | | | | Mean | 7 | 52 | 40 | 1 | 0 | 0 | 0 |
| c | 4 | 92 | 4 | 21.2-22.2* | 4 | 59 | 34 | 2 | 1 | 0 | 0 |
| | | | | 22.2-23.2* | 3 | 18 | 66 | 9 | 3 | 1 | 0 |
| | | | | 23.2-24.8* | 3 | 49 | 37 | 5 | 4 | 2 | 0 |
| | | | | Mean | 4 | 43 | 44 | 5 | 3 | 1 | 0 |
| a+b+c | 12 | 86 | 2 | Mean | 12 | 45 | 39 | 2 | 1 | 1 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 84 | 4 | 5 | 3 | 3 | 0 | trace | 1 | 0 | 0 |
| b | 42 | 0 | 32 | 19 | 7 | 0 | 0 | 0 | 0 | 0 |
| c | 16 | 39 | 3 | 1 | 1 | 0 | 38 | 0 | trace | 2 |
| a+b+c | 79 | 6 | 6 | 2 | 3 | 0 | 3 | 1 | trace | trace |



**TL 93 NE 50** **9934 3846** **200 m north of Polstead Green, Polstead** **Block C**

Surface level +54.7 m
Water struck at +40.0 m
April 1977

Overburden 0.1 m
Mineral 17.4 m
Bedrock 1.2 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Glacial Sand and Gravel | a Sandy gravel, with some clay pellets at top<br>Gravel: fine and coarse, angular to subrounded flint with well rounded flint, rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone and subangular igneous and metamorphics<br>Sand: medium with some coarse and fine, predominantly quartz, brown becoming orange-brown | 3.4 | 3.5 |
| Kesgrave Sands and Gravels | b Sand, very pebbly in upper 3.3 m with discrete clay pellets throughout<br>Gravel: fine with coarse, angular to subrounded and well rounded flint; with rounded to well rounded quartz and quartzite; with some subrounded sandstone, with a trace of ironstone igneous and metamorphics<br>Sand: medium with fine and trace of coarse, predominantly rounded quartz with a trace of coarse angular flint, light brown, becoming yellow-brown and orange-brown | 9.2 | 12.7 |
| Red Crag | c Sand, with a trace of pebbles<br>Gravel: fine with a trace of coarse, well rounded and angular to subrounded flint, with tabular ironstone and rounded to well rounded quartz, with some well rounded phosphatic nodules; with a trace of sandstone<br>Sand: fine and medium with some coarse, predominantly rounded quartz with some coarse angular flint, well rounded phosphatic nodules and tabular ironstone, orange-brown becoming red-brown | 4.8 | 17.5 |
| London Clay | Clay, very silty with some oxidized pyrite nodules, grey green mottled orange-brown | 0.5 | 18.0 |
| | Clay, silty, micaceous, with pyrite nodules, dark grey | 0.7+ | 18.7 |

## 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 |
| a | 6 | 50 | 44 | 0.1-1.1 | 10 | 8 | 27 | 8 | 22 | 25 | 0 |
| | | | | 1.1-2.1 | 6 | 9 | 35 | 9 | 21 | 20 | 0 |
| | | | | 2.1-3.5 | 4 | 8 | 35 | 10 | 27 | 16 | 0 |
| | | | | Mean | 6 | 8 | 33 | 9 | 24 | 20 | 0 |
| b | 7 | 90 | 3 | 3.5-4.5 | 3 | 10 | 72 | 8 | 5 | 2 | 0 |
| | | | | 4.5-5.5 | 4 | 15 | 62 | 6 | 10 | 3 | 0 |
| | | | | 5.5-6.8 | 18 | 20 | 58 | 2 | 1 | 1 | 0 |
| | | | | 6.8-7.8 | 9 | 29 | 56 | 5 | 1 | 0 | 0 |
| | | | | 7.8-8.8 | 7 | 32 | 59 | 2 | 0 | 0 | 0 |
| | | | | 8.8-9.8 | 1 | 28 | 70 | 1 | 0 | 0 | 0 |
| | | | | 9.8-10.8 | 6 | 28 | 61 | 4 | 1 | 0 | 0 |
| | | | | 10.8-11.8 | 5 | 61 | 30 | 4 | 0 | 0 | 0 |
| | | | | 11.8-12.7 | 5 | 73 | 15 | 6 | 1 | 0 | 0 |
| | | | | Mean | 7 | 32 | 54 | 4 | 2 | 1 | 0 |
| c | 7 | 90 | 3 | 12.7-13.7 | 8 | 28 | 44 | 13 | 6 | 1 | 0 |
| | | | | 13.7-14.7 | 10 | 40 | 46 | 1 | 3 | 0 | 0 |
| | | | | 14.7-16.7* | 5 | 59 | 28 | 7 | 1 | 0 | 0 |
| | | | | 16.7-17.5* | 5 | 37 | 42 | 11 | 5 | 0 | 0 |
| | | | | Mean | 7 | 45 | 37 | 8 | 3 | 0 | 0 |
| a+b+c | 7 | 82 | 11 | Mean | 7 | 31 | 45 | 6 | 7 | 4 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 46 | 23 | 15 | 11 | 3 | 0 | 0 | 2 | 0 | 0 |
| b | 43 | 25 | 20 | 6 | 4 | 0 | 1 | 1 | trace | 0 |
| c | 27 | 46 | 11 | 0 | 1 | 0 | 13 | 0 | 0 | 2 |
| a+b+c | 45 | 24 | 15 | 10 | 3 | 0 | 1 | 2 | trace | trace |



**TL 93 NE 51 9952 3766** **300 m north of Frogs Hall, Polstead** **Block C**

Surface level +52.9 m
Water struck at +34.4 m
April 1977

Overburden 0.3 m
Mineral 21.0 m
Bedrock 1.3 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Glacial Sand and Gravel | a Sandy gravel, with some thin clay seams and pellets, a 10 cm silty clay seam at base<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint, rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone and subangular igneous and metamorphics<br>Sand: medium with fine and some coarse, predominantly rounded quartz with some angular coarse flint, fawn brown becoming orange-brown | 8.1 | 8.4 |
| Kesgrave Sands and Gravels | b Sand, very pebbly at base with a 20 cm clay seam between 9.4 m and 9.6 m, discrete clay pellets throughout<br>Gravel: fine with a trace of coarse, well rounded and angular to subrounded flint; with rounded to well rounded quartz and rounded quartzite, with some subrounded sandstone; with a trace of igneous and metamorphics<br>Sand: medium and fine with some coarse, predominantly quartz with some angular coarse flint, increasing with depth, yellow-brown | 6.6 | 15.0 |
| Red Crag | c 'Clayey' sand, pebbles throughout<br>Gravel: fine with a trace of coarse, tabular ironstone and well rounded flint, with angular to subrounded flint, well rounded phosphatic nodules and rounded to well rounded quartz; with some rounded quartzite; with a trace of sandstone<br>Sand: medium with fine and coarse, predominantly rounded quartz with some angular coarse flint, well rounded phosphatic nodules and tabular ironstone, orange-brown | 6.3 | 21.3 |
| London Clay | Clay, silty, grey-brown mottled orange-brown | 0.5 | 21.8 |
| | Clay, silty, micaceous, with pyrite nodules and pyritized wood, blue-grey becoming dark grey | 0.8+ | 22.6 |

## 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 | 5 | 71 | 24 | 0.3-1.3 | 3 | 7 | 39 | 10 | 20 | 21 | 0 |
| | | | | 1.3-2.2 | 4 | 8 | 39 | 9 | 20 | 20 | 0 |
| | | | | 2.2-3.2 | 4 | 20 | 52 | 7 | 9 | 8 | 0 |
| | | | | 3.2-4.2 | 2 | 7 | 57 | 13 | 14 | 7 | 0 |
| | | | | 4.2-5.2 | 0 | 10 | 64 | 9 | 12 | 5 | 0 |
| | | | | 5.2-6.2 | 9 | 31 | 38 | 5 | 7 | 10 | 0 |
| | | | | 6.2-7.6 | 11 | 40 | 39 | 2 | 6 | 2 | 0 |
| | | | | 7.6-8.3 | 6 | 15 | 23 | 11 | 26 | 19 | 0 |
| | | | | Mean | 5 | 19 | 44 | 8 | 13 | 11 | 0 |
| b | 7 | 90 | 3 | 8.4-9.4 | 11 | 38 | 50 | 1 | 0 | 0 | 0 |
| | | | | 9.6-10.6 | 9 | 60 | 28 | 3 | 0 | 0 | 0 |
| | | | | 10.6-11.6 | 8 | 52 | 36 | 4 | 0 | 0 | 0 |
| | | | | 11.6-12.6 | 6 | 18 | 67 | 8 | 1 | 0 | 0 |
| | | | | 12.6-13.6 | 2 | 31 | 53 | 10 | 4 | 0 | 0 |
| | | | | 13.6-15.0 | 5 | 27 | 44 | 15 | 8 | 1 | 0 |
| | | | | Mean | 7 | 37 | 46 | 7 | 3 | 0 | 0 |
| c | 11 | 85 | 4 | 15.0-16.0 | 11 | 37 | 36 | 14 | 2 | 0 | 0 |
| | | | | 16.0-17.0 | 9 | 28 | 60 | 3 | 0 | 0 | 0 |
| | | | | 17.0-18.0 | 8 | 20 | 52 | 15 | 4 | 1 | 0 |
| | | | | 18.0-19.0* | 8 | 10 | 52 | 21 | 8 | 1 | 0 |
| | | | | 19.0-20.0* | 14 | 23 | 45 | 13 | 5 | 0 | 0 |
| | | | | 20.0-21.3* | 13 | 21 | 48 | 14 | 4 | 0 | 0 |
| | | | | Mean | 11 | 23 | 49 | 13 | 4 | 0 | 0 |
| a+b+c | 7 | 82 | 11 | Mean | 7 | 26 | 46 | 10 | 7 | 4 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 45 | 24 | 17 | 8 | 4 | 0 | 0 | 2 | 0 | 0 |
| b | 29 | 43 | 20 | 6 | 2 | 0 | 0 | trace | 0 | 0 |
| c | 21 | 28 | 9 | 2 | trace | 0 | 29 | 0 | 0 | 11 |
| a+b+c | 43 | 25 | 16 | 8 | 4 | 0 | 2 | 2 | 0 | trace |



**TL 93 NE 52** **9972 3668** **Scotland Street, Stoke-by-Nayland** **Block D**

Surface level +14.0 m
Water struck at +12.0 m
April 1977

Overburden 0.3 m
Mineral 5.8 m
Bedrock 1.2 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Head | Gravel<br>Gravel: coarse and fine with a trace cobbles, angular to subrounded flint; with well rounded flint, rounded to well rounded quartz and rounded quartzite; with a trace of sandstone, igneous and metamorphics<br>Sand: medium and coarse with some fine, rounded quartz and angular coarse and medium flint, dark becoming light brown | 5.8 | 6.1 |
| London Clay | Silt, very clayey, fine sandy, dark brown mottled light brown and grey-green | 0.9 | 7.0 |
| | Clay, silty, slightly sandy, grey-green | 0.3+ | 7.3 |

## 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 |
| 3 | 29 | 68 | 0.3-1.3 | 6 | 4 | 16 | 13 | 26 | 30 | 5 |
| | | | 1.3-2.3 | 7 | 5 | 19 | 15 | 31 | 23 | 0 |
| | | | 2.3-3.3* | 2 | 2 | 14 | 11 | 34 | 37 | 0 |
| | | | 3.3-4.3* | 2 | 1 | 10 | 11 | 39 | 37 | 0 |
| | | | 4.3-5.3* | 0 | 2 | 6 | 8 | 33 | 51 | 0 |
| | | | 5.3-6.1* | 2 | 13 | 21 | 6 | 18 | 40 | 0 |
| | | | Mean | 3 | 4 | 14 | 11 | 31 | 36 | 1 |

## COMPOSITION

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 69 | 14 | 8 | 7 | 1 | 0 | 0 | 1 | trace | 0 |

**TL 93 NE 53 9930 3595** **Tendring Hall, Stoke-by-Nayland** **Block C**

Surface level +53.9 m
Water struck at 37.7 m
April 1977

Overburden 1.4 m
Mineral 16.7 m
Bedrock 0.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| | Clay, sandy, silty, with flint pebbles, brown becoming orange-brown | 1.2 | 1.4 |
| Glacial Sand and Gravel | **a** Pebbly sand, with some clay seams in upper 4.0 m<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint, rounded to well rounded quartz and rounded quartzite; with some subangular igneous and metamorphics and subrounded sandstone<br>Sand: medium with fine and some coarse, predominantly rounded quartz with some coarse angular flint, orange-brown | 9.8 | 11.2 |
| Kesgrave Sands and Gravels | **b** 'Clayey' sand, pebbly towards base<br>Gravel: fine, well rounded flint, with angular to subrounded flint, tabular ironstone and rounded to well rounded quartz; with a trace of quartzite and sandstone<br>Sand: fine with medium and some coarse, quartz, yellow brown becoming rusty-brown | 5.0 | 16.2 |
| Red Crag | **c** Sand with a trace of gravel<br>Gravel: fine, well rounded flint, with angular to subrounded flint, rounded to well rounded quartz and taublar ironstone; with a trace of sandstone<br>Sand: medium and fine with some coarse, quartz, rusty orange-brown | 1.9 | 18.1 |
| London Clay | Clay, silty, with oxidized pyrite nodules, dark grey mottled yellow-brown | 0.3 | 18.4 |
| | Clay, silty, micaceous, with pyrite nodules, dark grey | 0.5+ | 18.9 |

**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 | 76 | 18 | 1.4-2.4 | 11 | 7 | 53 | 8 | 12 | 9 | 0 |
| | | | | 2.4-3.4 | 8 | 8 | 37 | 9 | 17 | 21 | 0 |
| | | | | 3.4-4.4 | 10 | 15 | 53 | 7 | 6 | 9 | 0 |
| | | | | 4.4-5.4 | 5 | 22 | 53 | 9 | 5 | 6 | 0 |
| | | | | 5.4-6.4 | 2 | 10 | 70 | 9 | 8 | 1 | 0 |
| | | | | 6.4-7.4 | 2 | 15 | 74 | 4 | 4 | 1 | 0 |
| | | | | 7.4-8.4 | 5 | 26 | 53 | 6 | 8 | 2 | 0 |
| | | | | 8.4-9.2 | 3 | 13 | 43 | 9 | 16 | 16 | 0 |
| | | | | 9.2-10.2 | 3 | 35 | 61 | 1 | 0 | 0 | 0 |
| | | | | 10.2-11.2 | 5 | 21 | 23 | 9 | 19 | 23 | 0 |
| | | | | Mean | 6 | 17 | 52 | 7 | 9 | 9 | 0 |
| **b** | 10 | 88 | 2 | 11.2-12.2 | 9 | 47 | 33 | 11 | 0 | 0 | 0 |
| | | | | 12.2-13.2 | 8 | 69 | 18 | 5 | 0 | 0 | 0 |
| | | | | 13.2-14.2 | 11 | 45 | 36 | 5 | 3 | 0 | 0 |
| | | | | 14.2-15.2 | 8 | 57 | 24 | 9 | 2 | 0 | 0 |
| | | | | 15.2-16.2 | 13 | 60 | 15 | 9 | 3 | 0 | 0 |
| | | | | Mean | 10 | 55 | 25 | 8 | 2 | 0 | 0 |
| **c** | 9 | 90 | 1 | 16.2-18.1* | 9 | 29 | 46 | 15 | 1 | 0 | 0 |
| **a+b+c** | 7 | 82 | 11 | Mean | 7 | 30 | 44 | 8 | 6 | 5 | 0 |



**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 54 | 17 | 15 | 10 | 2 | 0 | 0 | 2 | 0 | 0 |
| **b** | 18 | 57 | 11 | 1 | trace | 0 | 13 | 0 | 0 | 0 |
| **c** | 19 | 64 | 10 | 0 | trace | 0 | 7 | 0 | 0 | 0 |
| **a+b+c** | 53 | 18 | 15 | 10 | 2 | 0 | trace | 2 | 0 | 0 |

**TL 93 NE 54 9802 3783** **600 km North of Stoke Priory, Stoke-by-Nayland** **Block D**

Surface level +20.5 m
Water struck at +18.1 m and +16.8 m
March 1977

Overburden 1.3 m
Mineral 3.1 m
Waste 4.8 m
Mineral 1.9 m
Waste 4.4 m
Bedrock 1.1 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Head | Clay, silty, sandy, with some flint pebbles, brown | 0.3 | 0.6 |
| | 'Very clayey' sandy gravel, yellow-brown | 0.1 | 0.7 |
| | Silt, sandy, becoming very sandy, yellow-brown | 0.6 | 1.3 |
| | **a** Gravel<br>Gravel: coarse and fine with some cobbles at base, angular to subrounded to well rounded quartz and rounded quartzite, with a trace of sandstone, igneous, metamorphics, ironstone and chalk<br>Sand: medium and coarse with some fine, angular flint with well rounded quartz, light grey becoming orange-brown | 3.1 | 4.4 |
| Boulder Clay (R.Box Channel Deposits) | Silt, clayey, laminated, with seams of chalky silty clay, chalk sand grade, dark grey | 4.8 | 9.2 |
| Glacial Sand and Gravel | **b** 'Very clayey' pebbly sand<br>Gravel: fine with coarse, angular to subrounded flint and well rounded chalk; with subrounded sandstone; with some rounded to well rounded quartz, rounded quartzite and well rounded flint; with a trace of ironstone<br>Sand: fine with medium and some coarse, predominantly quartz with rounded chalk and a trace of coarse angular flint, light brown | 1.9 | 11.1 |
| Boulder Clay (R. Box Channel Deposits) | Clay, sandy, silty, with some chalk pellets and thin chalk and flint gravel seams, dark grey | 2.1 | 13.2 |
| | Clay, silty, with some chalk pellets | 1.0 | 14.2 |
| | Clay, sandy, silty, grey-green | 0.2 | 14.5 |
| | Sand, very glauconite, drab green-black | 0.5 | 15.0 |
| | Clay, silty, with yellow-brown thin gravel seams, grey-green | 0.5 | 15.5 |
| Lower London Tertairies | Sand, becoming a fine sandstone, glauconitic with some pyrite, dark green-black | 0.8 | 16.3 |
| Upper Chalk | Chalk, soft, with dark green flints at top, creamy white | 0.3+ | 16.6 |

**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 |
| a | 2 | 41 | 57 | 1.3-2.4 | 1 | 5 | 17 | 12 | 28 | 37 | 0 |
| | | | | 2.4-3.3* | 3 | 7 | 24 | 17 | 23 | 26 | 0 |
| | | | | 3.3-4.4* | 2 | 7 | 19 | 17 | 26 | 24 | 7 |
| | | | | Mean | 2 | 6 | 20 | 15 | 26 | 29 | 2 |
| b | 33 | 63 | 4 | 9.2-10.5 | 31 | 40 | 20 | 4 | 4 | 1 | 0 |
| | | | | 10.5-11.1 | 37 | 36 | 19 | 6 | 2 | 0 | 0 |
| | | | | Mean | 33 | 39 | 20 | 4 | 3 | 1 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 69 | 15 | 7 | 7 | 1 | trace | trace | 1 | 0 | 0 |
| b | 55 | 2 | 4 | 3 | 7 | 27 | 1 | 0 | trace | 0 |



**TL 93 NE 55** **9902 3502** **Hall Farm, Stoke-by-Nayland** **Block F**

Surface level +14.5 m
Water struck at +13.0 m, +10.3 m and +5.1 m
March 1977

Overburden 3.1 m
Mineral 5.0 m
Waste 1.4 m
Bedrock 1.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Terrace 1-3 | Clay, sandy, silty, with flint pebbles and carbonaceous pockets, grey-brown | 0.6 | 0.8 |
| | Gravel, fine and coarse, with some cobbles, ironstone flint and quartz; with medium and coarse with some fine quartz sand | 0.7 | 1.5 |
| | Clay, sandy, silty, with thin flint gravel seams, orange-brown | 1.0 | 2.5 |
| | Silt, fine sandy, with some angular flints, yellow-brown | 0.6 | 3.1 |
| | Sand, fine with medium, with a trace of coarse, rounded quartz, with some thin clay seams, yellow-brown | 5.0 | 8.1 |
| | Clay, sandy, silty, green-grey mottled orange-brown | 0.9 | 9.0 |
| | Clay, very silty becomes very sandy at base with pockets of sand throughout, green-grey becoming fawn brown | 0.5 | 9.5 |
| London Clay | Silt, sandy with some contamination quartz pebbles, dark grey-green | 0.9 | 10.4 |
| | Clay, very silty, micaceous, grey | 0.6+ | 11.0 |

**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 |
| 7 | 93 | 0 | 3.1-4.1* | 5 | 84 | 11 | 0 | 0 | 0 | 0 |
| | | | 4.1-5.1* | 6 | 83 | 11 | 0 | 0 | 0 | 0 |
| | | | 5.1-6.1* | 7 | 76 | 16 | 1 | 0 | 0 | 0 |
| | | | 6.1-7.1* | 5 | 62 | 32 | 1 | 0 | 0 | 0 |
| | | | 7.1-8.1* | 10 | 53 | 36 | 1 | 0 | 0 | 0 |
| | | | Mean | 7 | 72 | 21 | 0 | 0 | 0 | 0 |

**TL 93 SW 15** **9047 3445** **Ward Barn, Bures Hamlet** **Block F**

Surface level +19.0 m
Water struck at +17.5 m
May 1977

Overburden 1.2 m
Mineral 5.2 m
Bedrock 1.6 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Terrace 1 | Clay, sandy, silty, with some angular flint, rusty brown mottled light grey | 1.0 | 1.2 |
| | Gravel, with a seam of grey-brown silt between 5.9 and 6.0 m<br>Gravel: fine and coarse, angular to subrounded flint with well rounded flint and rounded to well rounded quartz; with some rounded quartzite and subrounded sandstone; with a trace of chalk, iron-stone, igneous and metamorphics<br>Sand: medium with coarse and some fine predominantly rounded quartz, with some coarse angular flint and well rounded coarse to fine chalk, light brown | 5.2 | 6.4 |
| Lower London Tertiaries | Silt, dark grey | 1.6+ | 8.0 |

**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 |
| 4 | 38 | 58 | 1.2-2.2* | 7 | 4 | 27 | 10 | 32 | 20 | 0 |
| | | | 2.2-3.2* | 4 | 3 | 21 | 12 | 38 | 22 | 0 |
| | | | 3.2-4.2* | 2 | 2 | 15 | 11 | 30 | 40 | 0 |
| | | | 4.2-5.2* | 2 | 2 | 25 | 11 | 36 | 24 | 0 |
| | | | 5.2-6.4* | 3 | 5 | 31 | 12 | 30 | 19 | 0 |
| | | | Mean | 4 | 3 | 24 | 11 | 33 | 25 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 74 | 10 | 7 | 4 | 2 | 1 | 1 | 1 | trace | 0 |



**TL 93 SW 16** **9080 3384** **School Grounds, Bures** **Block F**

Surface level +19.8 m
Water struck at +17.2 m
May 1977

Overburden 0.7 m
Mineral 15.0 m
Bedrock 0.7 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.7 | 0.7 |
| Terrace 1 | Gravel, with a thin light brown silt seam at 6.0 m; chalk absent in uppermost 1.0 m increases with depth<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint and chalk, rounded to well rounded quartzite; with some subrounded sandstone; and a trace of limestone, igneous and metamorphics<br>Sand: coarse with medium and some fine, predominantly rounded quartz with coarse angular flint and rounded coarse to fine chalk, fawn-brown | 15.0 | 15.7 |
| Upper Chalk | Chalk, soft, white | 0.7+ | 16.4 |

**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 |
| 2 | 44 | 54 | 0.7-1.7 | 5 | 8 | 28 | 7 | 23 | 29 | 0 |
| | | | 1.7-2.7 | 7 | 8 | 21 | 14 | 29 | 21 | 0 |
| | | | 2.7-3.7* | 3 | 3 | 19 | 12 | 37 | 26 | 0 |
| | | | 3.7-4.7* | 0 | 1 | 12 | 8 | 34 | 45 | 0 |
| | | | 4.7-5.7* | 0 | 1 | 9 | 8 | 36 | 46 | 0 |
| | | | 5.7-6.7* | 3 | 9 | 22 | 9 | 29 | 28 | 0 |
| | | | 6.7-7.7* | 2 | 9 | 27 | 14 | 32 | 16 | 0 |
| | | | 7.7-8.7* | 2 | 7 | 29 | 15 | 34 | 13 | 0 |
| | | | 8.7-9.7* | 1 | 10 | 26 | 11 | 32 | 20 | 0 |
| | | | 9.7-10.7* | 2 | 11 | 33 | 15 | 24 | 15 | 0 |
| | | | 10.7-11.7* | 1 | 9 | 32 | 15 | 23 | 20 | 0 |
| | | | 11.7-12.7* | 1 | 15 | 41 | 16 | 19 | 8 | 0 |
| | | | 12.7-13.7* | 2 | 4 | 26 | 18 | 28 | 22 | 0 |
| | | | 13.7-14.7* | 0 | 2 | 10 | 8 | 33 | 47 | 0 |
| | | | 14.7-15.7* | 2 | 3 | 32 | 8 | 31 | 24 | 0 |
| | | | Mean | 2 | 7 | 25 | 12 | 29 | 25 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 69 | 9 | 5 | 5 | 4 | 6 | 1 | 1 | trace | 0 |

**TL 93 SW 17** **9079 3337** **Brook House, Bures Hamlet** **Block F**

Surface level +20.7 m
Water struck at +17.1 m
July 1977

Overburden 1.4 m
Mineral 4.1 m
Bedrock 0.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Head | Clay, sandy, silty, with some flint pebbles, grey-brown | 1.3 | 1.4 |
| | **a** 'Very clayey' sandy gravel<br>Gravel: fine with coarse angular to subrounded and well rounded flint; with rounded to well rounded quartz; with some subrounded sandsotne; with a trace of ironstone and quartzite<br>Sand: fine with medium and some coarse, predominantly rounded quartz with some coarse angular flint, light brown | 1.2 | 2.6 |
| Lower London Tertiaries | **b** 'Clayey' sand, with some discrete clay pellets, contaminated with subangular flint pebbles from above<br>Sand: fine with a trace of medium, quartz, yellow-brown | 2.9 | 5.5 |
| | Clay, silty, pinkish-brown mottled grey-brown with some thin light blue-grey seams and white race nodules | 0.5+ | 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 |
| **a** | 35 | 44 | 21 | 1.4-2.6 | 35 | 21 | 15 | 8 | 14 | 7 | 0 |
| **b** | 15 | 84 | 1 | 2.6-3.6 | 19 | 78 | 1 | 0 | 0 | 2 | 0 |
| | | | | 3.6-4.6* | 16 | 84 | 0 | 0 | 0 | 0 | 0 |
| | | | | 4.6-5.5* | 9 | 89 | 2 | 0 | 0 | 0 | 0 |
| | | | | Mean | 15 | 83 | 1 | 0 | 0 | 1 | 0 |
| **a + b** | 21 | 72 | 7 | Mean | 21 | 65 | 5 | 2 | 4 | 3 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 47 | 27 | 21 | trace | 4 | 0 | 1 | 0 | 0 | 0 |
| **b** | 100 | contaminated sample | | | | | | | | |



**TL 93 SW 18** **9003 3349** **Bakers Hall, Bures Hamlet** **Block G**

Surface level +45.7 m
Water struck at +43.9 m
January 1977

Waste 2.1 m
Bedrock 3.9 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Head | Clay, silty, sandy, with some subangular flints, light yellow-brown. | 0.9 | 1.2 |
| | Clay, silty, sandy, with flint and quartz pebbles, grey-brown | 0.09 | 2.1 |
| London Clay | Clay, silty, grey mottled brown | 2.5 | 4.6 |
| | Clay, silty, with some oxidised black pyrite grains, grey | 1.4+ | 6.0 |

**TL 93 SW 19** **9058 3272** **Village Hall, Mount Bures** **Block G**

Surface level +45.6 m
Water struck at +44.3 m
March 1977

Overburden 1.0 m
Mineral 3.0 m
Bedrock 2.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made Ground | 0.5 | 0.5 |
| Boulder Clay | Clay, very sandy, silty, with well rounded flint and quartz pebbles, brown | 0.5 | 1.0 |
| Kesgrave Sands and Gravels | Pebbly sand, 'clayey' and gravelly in uppermost 0.3 m<br>Gravel: coarse and fine, angular to subrounded flint; with well rounded flint and rounded to well rounded quartz and quartzite; with some subangular igneous and metamorphics and subrounded sandstone; with a trace of ironstone.<br>Sand: medium with coarse and fine, predominantly rounded quartz with some angular flint, orange brown. | 3.0 | 4.0 |
| London Clay | Clay, silty, orange-brown streaked grey | 0.2 | 4.2 |
| | Clay, silty, with some pockets of fine sand, micaceous, orange brown becoming grey | 1.8+ | 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 |
| 5 | 74 | 21 | 1.0-1.3 | 11 | 7 | 15 | 7 | 22 | 38 | 0 |
| | | | 1.3-2.3* | 5 | 11 | 31 | 22 | 13 | 18 | 0 |
| | | | 2.3-3.3* | 2 | 8 | 55 | 27 | 6 | 2 | 0 |
| | | | 3.3-4.0* | 5 | 30 | 38 | 19 | 8 | 0 | 0 |
| | | | Mean | 5 | 14 | 39 | 21 | 10 | 11 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 40 | 23 | 16 | 16 | 2 | 0 | 1 | 2 | 0 | 0 |

**TL 93 SW 20** **9053 3177** **Thatchers Arms, Mount Bures** **Block G**

Surface level +62.6 m
Water struck at +48.1 m
January 1977

Overburden 3.3 m
Mineral 3.6 m
Waste 0.7 m
Mineral 9.2 m
Bedrock 1.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, silty, sandy, with pebbles of chalk flint, quartz and quartzite, orange-brown | 3.0 | 3.3 |
| Glacial Sand and Gravel | **a** 'Clayey' pebbly sand, with discrete thin clay laminae<br>Gravel: fine and coarse, angular to subrounded and well rounded flint; with rounded to well rounded quartz and quartzite; with some subrounded sandstone and a trace of ironstone.<br>Sand: medium with some fine and coarse, predominantly quartz with some angular coarse flint, dark red-brown. | 3.6 | 6.9 |
| | Clay, silty, sandy, pebbly at base, brown with seams of grey-green | 0.7 | 7.6 |
| | **b** Sandy gravel<br>Gravel: fine with coarse, angular to subrounded; with well rounded flint and rounded to well rounded quartz and quartzite; with some subrounded sandstone and a trace of ironstone.<br>Sand: medium with fine and coarse, predominantly quartz with coarse angular flint, light brown | 1.7 | 9.3 |
| Kesgrave Sands and Gravels | **c** Sand, with a trace of fine gravel at base<br>Gravel: fine angular to subrounded and well rounded flint; with some rounded quartz; with some subrounded sandstone.<br>Sand: fine and medium with a trace of coarse, predominantly rounded quartz brown becoming orange-brown. | 4.0 | 13.3 |
| Red Crag | **d** 'Clayey' sand, becoming less 'clayey' with depth<br>Gravel: fine with coarse, angular to subrounded and well rounded flint; with rounded quartz; with some ironstone; with a trace of quartzite and sandstone.<br>Sand: medium with fine and some coarse, predominantly rounded quartz with some angular flint, brown. | 3.5 | 16.8 |
| London Clay | Clay, silty, micaceous, brown mottled grey becoming grey | 1.2+ | 18.0 |



**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** | 15 | 67 | 22 | 3.3-3.6 | 28 | 28 | 30 | 3 | 5 | 6 | 0 |
| | | | | 3.6-4.6 | 13 | 27 | 43 | 4 | 8 | 6 | 0 |
| | | | | 4.6-5.6 | 18 | 8 | 54 | 4 | 10 | 6 | 0 |
| | | | | 5.6-6.9 | 11 | 5 | 52 | 7 | 17 | 20 | 0 |
| | | | | Mean | 15 | 14 | 44 | 5 | 11 | 11 | 0 |
| **b** | 6 | 56 | 38 | 7.6-8.6 | 3 | 11 | 42 | 11 | 19 | 14 | 0 |
| | | | | 8.6-9.3 | 10 | 15 | 19 | 9 | 25 | 22 | 0 |
| | | | | Mean | 6 | 13 | 33 | 10 | 21 | 17 | 0 |
| **a + b** | 12 | 60 | 28 | Mean | 12 | 13 | 40 | 7 | 15 | 13 | 0 |
| **c** | 7 | 93 | 0 | 9.3-10.3 | 8 | 60 | 32 | 0 | 0 | 0 | 0 |
| | | | | 10.3-11.3 | 5 | 29 | 65 | 1 | 0 | 0 | 0 |
| | | | | 11.3-12.3 | 7 | 35 | 57 | 1 | 0 | 0 | 0 |
| | | | | 12.3-13.3 | 6 | 21 | 69 | 3 | 1 | 0 | 0 |
| | | | | Mean | 7 | 36 | 56 | 1 | 0 | 0 | 0 |
| **d** | 10 | 86 | 4 | 13.3-14.3 | 17 | 37 | 38 | 6 | 2 | 0 | 0 |
| | | | | 14.3-15.3* | 7 | 41 | 46 | 4 | 2 | 0 | 0 |
| | | | | 15.3-16.8* | 7 | 28 | 50 | 10 | 4 | 1 | 0 |
| | | | | Mean | 10 | 34 | 45 | 7 | 3 | 1 | 0 |
| **b+c+d** | 9 | 83 | 8 | Mean | 9 | 30 | 48 | 5 | 5 | 3 | 0 |
| **a+b+ c+d** | 10 | 77 | 13 | Mean | 10 | 26 | 46 | 5 | 7 | 6 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a + b** | 46 | 26 | 17 | 8 | 2 | 0 | 1 | 0 | 0 | 0 |
| **c** | 54 | 27 | 16 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| **d** | 48 | 30 | 15 | 1 | 1 | 0 | 5 | 0 | 0 | 0 |
| Mean | 46 | 26 | 17 | 8 | 2 | 0 | 1 | 0 | 0 | 0 |

**TL 93 SW 21** **9074 3047** **Golden Square, Mount Bures** **Block G**

Surface level +70.8 m
Water struck at +63.8 m and +59.3 m
January 1977

Ovewrburden 11.3 m
Mineral 12,0 m
Bedrock 0.7 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, chalky, pebbly, light brown | 0.6 | 0.9 |
| | Clay, silty, with pebbles of chalk, flint and quartz, brown mottled grey, becomes light brown | 3.3 | 4.2 |
| | Clay, silty, with pebbles of chalk, flint and fossil debris chalk pellets become coarse sand size with depth, light brown | 3.8 | 8.0 |
| | Clay, silty, with some thin sand seams and pebbles of chalk and flint, dark grey | 2.9 | 10.9 |
| | Clay, silty, chalky,flinty grey-brown | 0.4 | 11.3 |
| Glacial Sand and Gravel | **a** Sandy gravel, with discrete clay seams<br>Gravel: coarse and fine, angular to subrounded flint; with well rounded flint and rounded to well rounded quartz; with some rounded quartzite and subrounded sandstone; with a trace of ironstone, igneous and metamorphics.<br>Sand: medium with coarse and fine, predominantly rounded quartz with some coarse angular flint, brown | 6.0 | 17.3 |
| | **b** Sand<br>Gravel: fine,well rounded and angular to subrounded flint; with rounded to well rounded quartz; with some tabular ironstone, with a trace of sandstone<br>Sand; medium with fine and some coarse, predominantly quartz, light brown becoming red-brown. | 6.0 | 23.3 |
| London Clay | Clay, silty, micaceous, brown becoming grey | 0.7+ | 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 | 69 | 25 | 11.3-12.3* | 10 | 27 | 43 | 17 | 3 | 0 | 0 |
| | | | | 12.3-13.3* | 5 | 1 | 23 | 11 | 20 | 30 | 0 |
| | | | | 13.3-14.3* | 6 | 3 | 46 | 18 | 17 | 10 | 0 |
| | | | | 14.3-15.3* | 4 | 2 | 46 | 23 | 16 | 9 | 0 |
| | | | | 15.3-16.3* | 2 | 3 | 57 | 12 | 10 | 16 | 0 |
| | | | | 16.3-17.3* | 6 | 17 | 55 | 8 | 5 | 9 | 0 |
| | | | | Mean | 6 | 9 | 45 | 15 | 12 | 13 | 0 |
| **b** | 6 | 93 | 1 | 17.3-18.3* | 7 | 46 | 45 | 2 | 0 | 0 | 0 |
| | | | | 18.3-19.3* | 4 | 47 | 45 | 3 | 1 | 0 | 0 |
| | | | | 19.3-20.3* | 5 | 24 | 65 | 5 | 1 | 0 | 0 |
| | | | | 20.3-21.3* | 4 | 33 | 59 | 4 | 0 | 0 | 0 |
| | | | | 21.3-22.3* | 9 | 29 | 53 | 7 | 2 | 0 | 0 |
| | | | | 22.3-23.3* | 4 | 22 | 65 | 7 | 2 | 0 | 0 |
| | | | | Mean | 6 | 33 | 55 | 5 | 1 | 0 | 0 |
| **a + b** | 6 | 81 | 13 | Mean | 6 | 21 | 50 | 10 | 7 | 6 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 49 | 24 | 19 | 3 | 3 | 0 | 1 | 1 | 0 | 0 |
| **b** | 30 | 46 | 19 | 0 | 1 | 0 | 4 | 0 | 0 | 0 |
| **a + b** | 48 | 25 | 19 | 3 | 3 | 0 | 1 | 1 | 0 | 0 |

**TL 93 SW 22** **9115 3446** **Fysh House, Bures St Mary** **Block A**

Surface level +56.1 m
Water struck at +44.6 m
February 1977

Overburden 1.6 m
Mineral 12.5 m
Bedrock 0.9 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, sandy, silty, with pebbles of chalk, flint and quartz, grey-brown | 1.3 | 1.6 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel<br>Gravel: coarse and fine, angular to subrounded and well rounded flint; with rounded to well rounded quartz and quartzite; with some subrounded sandstone<br>Sand: medium with coarse and fine, predominantly quartz with some angular coarse flint, orange-brown | 4.5 | 6.1 |
| Kesgrave Sands and Gravels | **b** 'Clayey' sand, very pebbly between 8.1 m and 9.1 m<br>Gravel: fine with a trace of coarse, rounded quartzite and angular to subrounded flint; with well rounded flint; with some rounded quartz and a trace of sandstone<br>Sand: medium and fine with a trace of coarse, predominantly quartz, fawn-brown | 5.0 | 11.1 |
| Red Crag | **c** Pebbly sand<br>Gravel: fine with coarse, tabular ironstone and well rounded flint; with rounded quartz; with a trace of angular flint<br>Sand: medium with fine and some coarse, predominantly quartz with some platy coarse ironstone and angular flint | 3.0 | 14.1 |
| London Clay | Clay, silty, micaceous, brown mottled orange-brown | 0.1 | 14.2 |
| | Clay, silty, micaceous, blue-grey | 0.8+ | 15.0 |



## 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** | 10 | 46 | 44 | 1.6-2.5 | 15 | 9 | 26 | 7 | 20 | 23 | 0 |
| | | | | 2.5-3.5 | 9 | 5 | 30 | 12 | 25 | 19 | 0 |
| | | | | 3.5-4.5 | 11 | 11 | 33 | 7 | 18 | 20 | 0 |
| | | | | 4.5-5.5 | 6 | 5 | 18 | 9 | 23 | 39 | 0 |
| | | | | 5.5-6.1 | 10 | 5 | 43 | 15 | 12 | 15 | 0 |
| | | | | Mean | 10 | 7 | 29 | 10 | 20 | 24 | 0 |
| **b** | 10 | 87 | 3 | 6.1-7.1 | 12 | 48 | 40 | 0 | 0 | 0 | 0 |
| | | | | 7.1-8.1 | 11 | 30 | 56 | 2 | 1 | 0 | 0 |
| | | | | 8.1-9.1 | 7 | 22 | 57 | 1 | 12 | 1 | 0 |
| | | | | 9.1-10.1 | 8 | 38 | 53 | 1 | 0 | 0 | 0 |
| | | | | 10.1-11.1 | 12 | 47 | 40 | 1 | 0 | 0 | 0 |
| | | | | Mean | 10 | 37 | 49 | 1 | 3 | 0 | 0 |
| **c** | 4 | 85 | 11 | 11.1-12.1* | 4 | 32 | 49 | 7 | 5 | 3 | 0 |
| | | | | 12.1-13.1* | 3 | 40 | 43 | 5 | 6 | 3 | 0 |
| | | | | 13.1-14.1* | 3 | 22 | 46 | 13 | 12 | 4 | 0 |
| | | | | Mean | 4 | 31 | 46 | 8 | 8 | 3 | 0 |
| **a+b+c** | 9 | 72 | 19 | Mean | 9 | 25 | 41 | 6 | 10 | 9 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 45 | 31 | 12 | 10 | 2 | 0 | 0 | 0 | 0 | 0 |
| **b** | 39 | 11 | 3 | 47 | trace | 0 | 0 | 0 | 0 | 0 |
| **c** | trace | 45 | 8 | 0 | 0 | 0 | 47 | 0 | 0 | 0 |
| **a+b+c** | 41 | 31 | 12 | 11 | 1 | 0 | 4 | 0 | 0 | 0 |

**TL 93 SW 23** **9152 3414** **Fysh House Farm, Bures St Mary** **Block A**

Surface level +54.7 m
Water struck at +47.3 m
February 1977

Overburden 7.4 m
Mineral 2.0 m
Bedrock 1.9 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Boulder Clay | Clay, silty, chalky, with some flint pebbles, brown | 6.9 | 7.1 |
| | Clay, silty, chalky, sandy, very pebbly at base | 0.3 | 7.4 |
| Kesgrave Sands and Gravels | Sand, with a trace of pebbles<br>Gravel: fine with a trace of coarse, angular to subrounded flint; with well rounded flint, rounded to well rounded quartz and subrounded sandstone; with a trace of quartzite and ironstone<br>Sand, medium and fine with a trace of coarse, predominantly quartz orange-brown | 2.0 | 9.4 |
| London Clay | Clay, silty, grey-brown mottled red | 0.8 | 10.2 |
| | Clay, silty, micaceous, dark brown | 0.5 | 10.7 |
| | Clay, silty, micaceous, with commuted shell debris, dark-grey | 0.6+ | 11.3 |

**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 |
| 8 | 91 | 1 | 7.4-8.4* | 9 | 37 | 48 | 3 | 2 | 1 | 0 |
| | | | 8.4-9.4* | 7 | 44 | 48 | 1 | 0 | 0 | 0 |
| | | | Mean | 8 | 41 | 48 | 2 | 1 | 0 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 62 | 19 | 12 | trace | 7 | 0 | trace | 0 | 0 | 0 |



**TL 93 SW 24** **9121 3359** **Bures Hall, Bures St Mary** **Block F**

Surface level +18.2 m
Water struck at +16.2 m
January/February 1977

Overburden 0.7 m
Mineral 4.5 m
Bedrock 2.1 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.4 | 0.4 |
| Alluvium | Clay, sandy, silty, with fine subangular flint pebbles, brown | 0.3 | 0.7 |
| | Gravel, 'clayey' at top and base, becomes sandy at base<br>Gravel: fine and coarse, angular to subrounded, with well rounded flint and rounded to well rounded quartz and quartzite; with some rounded chalk; with some a trace of sandstone, ironstone and fossil debris<br>Sand: medium with coarse and fine, predominantly rounded quartz with some angular coarse flint and fine to coarse rounded chalk, dark brown becoming light brown | 4.5 | 5.2 |
| Lower London Tertiaries | Clay, sandy, silty, micaceous, green mottled brown and dark purple red | 1.2 | 6.4 |
| | Clay, sandy, silty, micaceous, green-blue streaked and mottled red-brown | 0.9+ | 7.3 |

**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 | 36 | 55 | 0.7-1.7 | 11 | 6 | 23 | 11 | 31 | 18 | 0 |
| | | | 1.7-2.7* | 9 | 2 | 9 | 7 | 32 | 41 | 0 |
| | | | 2.7-3.7* | 8 | 2 | 12 | 7 | 39 | 32 | 0 |
| | | | 3.7-4.7* | 4 | 4 | 38 | 10 | 20 | 24 | 0 |
| | | | 4.7-5.2* | 11 | 7 | 46 | 10 | 11 | 15 | 0 |
| | | | Mean | 9 | 4 | 23 | 9 | 28 | 27 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 71 | 14 | 6 | 5 | 1 | 2 | 1 | 0 | trace | 0 |

**TL 93 SW 25** **9194 3281** **Staunch Farm, Mount Bures** **Block F**

Surface level +18.0 m
Water struck at +15.3 m
January 1977

Overburden 0.7 m
Mineral 8.2 m
Bedrock 1.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Alluvium | Clay, silty, with fine subangular flints, brown mottled grey | 0.6 | 0.7 |
| | Gravel, 'very clayey' in uppermost 0.8 m<br>Gravel: fine and coarse, angular to subrounded with well rounded flint; with some quartz and quartzite, and a trace of sandstone and quartz<br>Sand: medium with coarse and fine predominantly rounded quartz with some coarse angular flint and fine to coarse rounded chalk | 8.2 | 8.9 |
| Lower London Tertiaries | Silt, sandy, clayey, green mottled red | 1.3+ | 10.2 |

**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 |
| 5 | 40 | 55 | 0.7-1.5 | 26 | 19 | 16 | 6 | 20 | 13 | 0 |
| | | | 1.5-2.5 | 4 | 12 | 21 | 11 | 32 | 20 | 0 |
| | | | 2.5-3.5* | 1 | 7 | 28 | 12 | 29 | 23 | 0 |
| | | | 3.5-4.5* | 2 | 1 | 20 | 12 | 33 | 32 | 0 |
| | | | 4.5-5.5* | 6 | 2 | 26 | 12 | 31 | 23 | 0 |
| | | | 5.5-6.5* | 1 | 3 | 25 | 12 | 28 | 31 | 0 |
| | | | 6.5-7.5* | 5 | 2 | 19 | 17 | 33 | 24 | 0 |
| | | | 7.5-8.5* | 1 | 2 | 24 | 11 | 30 | 32 | 0 |
| | | | 8.5-8.9* | 3 | 10 | 16 | 10 | 29 | 32 | 0 |
| | | | Mean | 5 | 6 | 22 | 12 | 30 | 25 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 71 | 17 | 6 | 4 | 1 | 1 | 0 | 0 | 0 | 0 |



**TL 93 SW 26** **9151 3230** **Elm Farm, Mount Bures** **Block F**

Surface level +31.7 m
Water struck at +29.4 m
May 1977

Overburden 0.2 m
Mineral 2.2 m
Bedrock 2.1 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Terrace 3 | 'Clayey' gravel, 'very clayey' in uppermost 0.6 m<br>Gravel: coarse with fine, angular to subrounded flint; with well rounded flint and rounded to well rounded quartz; with some rounded quartzite and subrounded sandstone; with a trace of ironstone, igneous and metamorphics<br>Sand: medium with fine and coarse, predominantly rounded quartz with some angular coarse flint, pale brown | 2.2 | 2.4 |
| Lower London Tertiaries | Clay, silty with oxidised pyrite nodules, pinkish grey and grey-green | 2.1+ | 4.5 |

**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 |
| 17 | 36 | 47 | 0.2-0.8 | 36 | 17 | 14 | 2 | 11 | 20 | 0 |
| | | | 0.8-2.4 | 10 | 4 | 27 | 6 | 21 | 32 | 0 |
| | | | Mean | 17 | 8 | 23 | 5 | 18 | 29 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 9 | 5 | 3 | 2 | 0 | 1 | 1 | 0 | 0 |

**TL 93 SW 27** **9142 3185** **Withers Farm, Mount Bures** **Block G**

Surface level +42.8 m
Water not struck
January 1977

Waste 1.6 m
Bedrock 2.9 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.6 | 0.6 |
| Terrace, undifferentiated | Clay, sandy, silty, with pebbles of flint and quartz grey mottled brown | 1.0 | 1.6 |
| London Clay | Clay, silty, micaceous, orange-brown | 2.4 | 4.0 |
| | Clay, silty, micaceous, dark grey mottled brown | 0.5+ | 4.5 |

**TL 93 SW 28** **9188 3111** **Wormingford Airfield, Mount Bures** **Block G**

Surface level +68.6 m
Water struck at +50.5 m
March 1977

Overburden 11.5 m
Mineral 11.3 m
Bedrock 0.7 m

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, sandy, silty, with a trace of flint pebbles, light orange brown | 0.8 | 1.1 |
| | Clay, silty, with pebbles of chalk, flint and quartz increasing with depth, orange becoming light brown and brown with depth | 7.6 | 8.7 |
| | Clay, silty, slightly sandy, with pebbles of flint, quartz, chalk and some fossil debris, dark grey | 2.2 | 10.9 |
| | Clay, very sandy and pebbly with flint, quartz, and quartzite and rare chalk, orange brown | 0.6 | 11.5 |
| Glacial Sand and Gravel | **a** Sand, pebbly in uppermost 1.0 m<br>Gravel: fine with coarse, angular to subrounded flint with rounded to well rounded quartz, well rounded flint, subrounded sandstone and rounded quartzite with a trace of igneous and metamorphics<br>Sand: medium with fine and a trace of coarse, predominantly quartz, fawn-brown | 4.5 | 16.0 |
| Kesgrave Sands and Gravels | **b** Sand, with a trace of pebbles, 'very clayey' in uppermost 0.4 m<br>Gravel: fine with a trace of coarse, well rounded and angular to subrounded flint; with rounded to well rounded quartz and subangular igneous and metamorphics with some subrounded sandstone and rounded quartzite<br>Sand: fine with medium and a trace of coarse, predominantly quartz with fine mica flakes, orange-brown | 5.2 | 21.2 |
| Red Crag | **c** Pebbly sand<br>Gravel: fine and coarse, well rounded with angular to subrounded flint; with rounded to well rounded quartz; with some subrounded sandstone and tabular ironstone with a trace of quartzite, igneous, metamorphics and phosphatic nodules<br>Sand: medium and fine with some coarse, predominantly quartz with some coarse tabular ironstone, orange | 1.6 | 22.8 |
| London Clay | Clay, silty, grey | 0.7+ | 23.5 |



**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** | 9 | 87 | 4 | 11.5-12.5 | 13 | 11 | 56 | 5 | 11 | 4 | 0 |
| | | | | 12.5-13.5 | 11 | 19 | 69 | 0 | 1 | 0 | 0 |
| | | | | 13.5-14.5 | 11 | 22 | 67 | 0 | 0 | 0 | 0 |
| | | | | 14.5-15.5 | 4 | 24 | 72 | 0 | 0 | 0 | 0 |
| | | | | 15.5-16.0 | 3 | 27 | 68 | 2 | 0 | 0 | 0 |
| | | | | Mean | 9 | 20 | 66 | 1 | 3 | 1 | 0 |
| **b** | 6 | 93 | 1 | 16.0-16.4 | 34 | 25 | 35 | 6 | 0 | 0 | 0 |
| | | | | 16.4-16.9 | 5 | 77 | 16 | 2 | 0 | 0 | 0 |
| | | | | 16.9-17.6 | 3 | 50 | 43 | 3 | 1 | 0 | 0 |
| | | | | 17.6-18.1 | 9 | 35 | 48 | 6 | 1 | 1 | 0 |
| | | | | 18.1-19.2* | 4 | 57 | 36 | 2 | 1 | 0 | 0 |
| | | | | 19.2-20.2* | 2 | 70 | 27 | 1 | 0 | 0 | 0 |
| | | | | 20.2-21.2* | 3 | 31 | 63 | 2 | 1 | 0 | 0 |
| | | | | Mean | 6 | 51 | 39 | 3 | 1 | 0 | 0 |
| **c** | 2 | 93 | 5 | 21.2-22.2* | 2 | 35 | 56 | 6 | 1 | 0 | 0 |
| | | | | 22.2-22.8* | 3 | 52 | 27 | 8 | 6 | 4 | 0 |
| | | | | Mean | 2 | 41 | 45 | 7 | 3 | 2 | 0 |
| **a+b+c** | 7 | 90 | 3 | Mean | 7 | 37 | 51 | 3 | 2 | 1 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 40 | 21 | 23 | 6 | 9 | trace | 0 | 1 | 0 | 0 |
| **b** | 55 | 25 | 10 | 2 | 3 | 0 | 5 | 0 | 0 | 0 |
| **c** | 24 | 61 | 7 | 1 | 3 | 0 | 2 | 1 | 0 | 1 |
| **a+b+c** | 31 | 42 | 14 | 3 | 9 | trace | 1 | trace | 0 | trace |

**TL 93 SW 29** **9156 3020** **Wormingford Airfield, Mount Bures** **Block G**

Surface level +66.4 m
Water struck at +52.4 m
January 1977

Overburden 6.0 m
Mineral 12.7 m
Bedrock 0.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Boulder Clay | Clay, sandy, silty, with pebbles of chalk, flint, quartz and quartzite, brown with grey mottling and pockets of orange brown | 5.8 | 6.0 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel, 'very clayey' in uppermost 3.0 m<br>Gravel: fine with coarse, angular to subrounded and well rounded flint; with rounded quartz; with some subrounded sandstone<br>Sand: medium with some fine and coarse, predominantly quartz with some coarse angular flint, orange becoming brown and light brown | 8.0 | 14.0 |
| Kesgrave Sands and Gravels | **b** Sand: with a trace of fine gravel<br>Gravel: fine, well rounded and angular to subrounded flint; with subrounded to rounded quartz; with a trace of sandstone<br>Sand: medium with some fine and coarse predominantly quartz, with some coarse angular flint, brown | 2.0 | 16.0 |
| Red Crag | **c** Pebbly sand<br>Gravel: fine with some coarse, well rounded and angular to subrounded quartz, with a trace of ironstone and sandstone<br>Sand: medium, fine and coarse, predominantly rounded quartz with angular coarse and medium flint | 2.7 | 18.7 |
| London Clay | Clay, silty, brown becoming grey and dark grey | 0.8+ | 19.5 |



**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** | 15 | 62 | 23 | 6.0–7.0 | 28 | 30 | 26 | 1 | 6 | 9 | 0 |
| | | | | 7.0–8.0 | 24 | 18 | 37 | 4 | 13 | 4 | 0 |
| | | | | 8.0–9.0 | 20 | 8 | 32 | 8 | 27 | 5 | 0 |
| | | | | 9.0–10.0 | 13 | 11 | 41 | 11 | 19 | 5 | 0 |
| | | | | 10.0–11.0 | 9 | 8 | 38 | 15 | 22 | 8 | 0 |
| | | | | 11.0–12.0 | 13 | 10 | 60 | 6 | 8 | 3 | 0 |
| | | | | 12.0–13.0 | 12 | 13 | 52 | 5 | 12 | 6 | 0 |
| | | | | 13.0–14.0 | 4 | 5 | 33 | 20 | 28 | 10 | 0 |
| | | | | Mean | 15 | 13 | 40 | 9 | 17 | 6 | 0 |
| **b** | 3 | 95 | 2 | 14.0–15.0* | 3 | 13 | 70 | 12 | 2 | 0 | 0 |
| | | | | 15.0–16.0* | 2 | 22 | 69 | 5 | 2 | 0 | 0 |
| | | | | Mean | 3 | 17 | 70 | 8 | 2 | 0 | 0 |
| **c** | 5 | 85 | 10 | 16.0–17.0* | 5 | 30 | 36 | 18 | 9 | 2 | 0 |
| | | | | 17.0–18.0* | 2 | 23 | 38 | 25 | 10 | 2 | 0 |
| | | | | 18.0–18.7* | 9 | 27 | 38 | 19 | 6 | 1 | 0 |
| | | | | Mean | 5 | 27 | 37 | 21 | 8 | 2 | 0 |
| **a+b+c** | 11 | 72 | 17 | Mean | 11 | 17 | 44 | 11 | 13 | 4 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 51 | 25 | 20 | 0 | 4 | 0 | 0 | 0 | 0 | 0 |
| **b** | 38 | 44 | 17 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| **c** | 33 | 51 | 13 | 0 | 1 | 0 | 2 | 0 | 0 | 0 |
| **a+b+c** | 48 | 29 | 19 | 0 | 4 | 0 | trace | 0 | 0 | 0 |

**TL 93 SW 30** **9238 3497** **0.5 km East of Moat Farm, Bures St Mary** **Block E**

Surface level +56.3 m
Water struck at +45.5 m
May 1977

Overburden 1.3 m
Mineral 9.7 m
Bedrock 1.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, sandy, silty, with pebbles of chalk and flint, light brown | 1.0 | 1.3 |
| Glacial Sand and Gravel | **a** 'Very clayey' sandy gravel<br>Gravel: fine with coarse and some cobbles, angular to subrounded flint with well rounded flint and chalk, and rounded to well rounded quartz and quartzite; with some subrounded sandstone and subangular igneous and metamorphics; with a trace of limestone, ironstone and fossil debris<br>Sand: medium with fine and some coarse, predominantly rounded quartz with angular coarse flint and fine to coarse well rounded chalk, light brown | 3.4 | 4.7 |
| Kesgrave Sands and Gravels | **b** Sand<br>Gravel: a trace of fine, angular to subrounded flint<br>Sand: medium with fine and a trace of coarse, quartz, fawn brown with seams of rusty brown | 2.7 | 7.4 |
| Red Crag | **c** Sand, pebbly at base with discrete clay pellets<br>Gravel: fine with a trace of coarse, angular to subrounded flint<br>Sand: fine and medium with a trace of coarse, quartz, rusty orange-brown | 3.6 | 11.0 |
| London Clay | Clay, silty, pinkish-grey mottled orange-brown | 0.6 | 11.6 |
| | Clay, silty, with pyrite and race nodules, dark grey | 0.4+ | 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 |
| **a** | 20 | 53 | 27 | 1.3-2.2 | 14 | 9 | 33 | 7 | 24 | 13 | 0 |
| | | | | 2.2-3.2 | 8 | 4 | 46 | 9 | 16 | 17 | 0 |
| | | | | 3.2-4.7 | 32 | 24 | 21 | 5 | 8 | 2 | 8 |
| | | | | Mean | 20 | 14 | 32 | 7 | 15 | 9 | 3 |
| **b** | 7 | 91 | 2 | 4.7-5.4 | 5 | 33 | 57 | 3 | 2 | 0 | 0 |
| | | | | 5.4-6.4 | 7 | 12 | 78 | 2 | 1 | 0 | 0 |
| | | | | 6.4-7.4 | 8 | 29 | 58 | 3 | 2 | 0 | 0 |
| | | | | Mean | 7 | 24 | 65 | 2 | 2 | 0 | 0 |
| **c** | 7 | 92 | 1 | 7.4-8.4 | 7 | 29 | 60 | 3 | 1 | 0 | 0 |
| | | | | 8.4-9.4 | 7 | 45 | 46 | 2 | 0 | 0 | 0 |
| | | | | 9.4-11.0 | 7 | 61 | 28 | 2 | 1 | 1 | 0 |
| | | | | Mean | 7 | 48 | 42 | 2 | 1 | 0 | 0 |
| **a+b+c** | 12 | 78 | 10 | Mean | 12 | 29 | 45 | 4 | 6 | 3 | 1 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 68 | 7 | 6 | 6 | 3 | 7 | trace | 2 | 1 | 0 |
| **b** | No data available | | | | | | | | | |
| **c** | No data available | | | | | | | | | |

TL 93 SW 31 9276 3433 0.5 km south of Overhall, Bures St Mary **Block E**

Surface level +58.6 m
Water struck at +47.2 m
May 1977

Overburden 0.6 m
Mineral 13.6 m
Bedrock 0.6 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Boulder Clay | Clay, sandy, silty, with some flint and a trace of chalk pebbles, orange brown | 0.4 | 0.6 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel, 'very clayey' in the uppermost 0.9 m, with discrete clay pellets throughout<br>Gravel: fine with coarse, angular to subrounded flint, with well rounded flint and rounded to well rounded quartz and quartzite; with some subrounded sandstone; with a trace of igneous and metamorphics<br>Sand: medium with fine and some coarse, predominantly rounded quartz with some coarse angular flint, rusty-brown becoming light brown | 3.5 | 4.1 |
| Kesgrave Sands and Gravels | **b** Sand, with a trace of fine gravel at top, and discrete clay pellets<br>Gravel: a trace of fine, well rounded and angular to subrounded flint; with rounded to well rounded quartz<br>Sand: medium with fine and a trace of coarse, quartz, yellow brown | 4.0 | 8.1 |
| Red Crag | **c** Sand<br>Gravel: a trace of fine, well rounded and angular to subrounded flint; with tabular ironstone, well rounded phosphatic nodules and rounded to well rounded flint; with a trace of sandstone, igneous and metamorphics<br>Sand: fine and medium with some coarse, predominantly quartz with some coarse tabular ironstone, rusty brown | 6.1 | 14.2 |
| London Clay | Clay, silty, with pyrite and race nodules, dark grey mottled orange brown in uppermost 0.2 m | 0.6+ | 14.8 |



**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 |
| a | 12 | 65 | 23 | 0.6-1.5 | 22 | 32 | 41 | 2 | 2 | 1 | 0 |
| | | | | 1.5-2.2 | 13 | 17 | 62 | 1 | 4 | 3 | 0 |
| | | | | 2.2-3.2 | 6 | 5 | 28 | 11 | 32 | 18 | 0 |
| | | | | 3.2-4.1 | 8 | 7 | 48 | 10 | 19 | 8 | 0 |
| | | | | Mean | 12 | 15 | 43 | 7 | 15 | 8 | 0 |
| b | 8 | 92 | 0 | 4.1-5.1 | 10 | 23 | 64 | 2 | 1 | 0 | 0 |
| | | | | 5.1-6.1 | 8 | 18 | 72 | 2 | 0 | 0 | 0 |
| | | | | 6.1-7.1 | 7 | 29 | 61 | 3 | 0 | 0 | 0 |
| | | | | 7.1-8.1 | 8 | 30 | 58 | 4 | 0 | 0 | 0 |
| | | | | Mean | 8 | 25 | 64 | 3 | 0 | 0 | 0 |
| c | 8 | 90 | 2 | 8.1-9.0 | 15 | 54 | 25 | 5 | 1 | 0 | 0 |
| | | | | 9.0-10.0 | 12 | 39 | 36 | 11 | 2 | 0 | 0 |
| | | | | 10.0-11.0 | 11 | 35 | 38 | 15 | 1 | 0 | 0 |
| | | | | 11.0-12.0* | 6 | 53 | 37 | 3 | 1 | 0 | 0 |
| | | | | 12.0-13.0* | 4 | 49 | 41 | 4 | 2 | 0 | 0 |
| | | | | 13.0-14.2* | 4 | 48 | 41 | 5 | 2 | 0 | 0 |
| | | | | Mean | 8 | 46 | 37 | 7 | 2 | 0 | 0 |
| a+b+c | 9 | 84 | 7 | Mean | 9 | 32 | 46 | 6 | 5 | 2 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 41 | 22 | 22 | 12 | 2 | 0 | 0 | 1 | 0 | 0 |
| b | No data available | | | | | | | | | |
| c | 27 | 37 | 5 | 1 | 1 | 0 | 22 | 1 | 0 | 6 |
| a+b+c | 40 | 22 | 22 | 12 | 2 | 0 | 1 | 1 | 0 | trace |

**TL 93 SW 32** **9239 3322** **0.5 km West of Small Bridge Hall Farm, Bures St Mary** **Block F**

Surface level +18.4 m
Water struck at +16.3 m
May 1977

Overburden 0.1 m
Mineral 2.3 m
Bedrock 0.6 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Head | 'Very clayey' sandy gravel, 'very clayey' sand in uppermost 1.0 m<br>Gravel: fine with coarse, angular to subrounded flint; with rounded flint, rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone; with a trace of igneous, metamorphics, ironstone and phosphatic nodules<br>Sand: fine and medium with some coarse, predominantly rounded quartz with angular coarse flint, yellow brown becoming dark orange-brown | 2.3 | 2.4 |
| Lower London Tertiaries | Clay, silty, pinkish-brown mottled light green grey and red | 0.6+ | 3.0 |

**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 |
| 20 | 52 | 28 | 0.1-1.1 | 39 | 42 | 17 | 1 | 1 | 0 | 0 |
| | | | 1.1-2.4 | 5 | 10 | 24 | 12 | 33 | 16 | 0 |
| | | | Mean | 20 | 24 | 21 | 7 | 19 | 9 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 60 | 15 | 15 | 6 | 2 | 0 | 1 | 1 | trace | trace |



**TL 93 SW 33** **9276 3240** **Lodge Hills, Wormingford** **Block G**

Surface level +50.5 m
Water not struck
January 1977

Overburden 0.1 m
Mineral 7.1 m
Bedrock 2.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Kesgrave Sands and Gravels | a Pebbly sand<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint and rounded to well rounded quartz; with some subrounded to rounded quartzite and subrounded sandstone<br>Sand: medium with some fine and coarse, predominantly quartz with a trace of angular coarse flint, orange-brown | 2.0 | 2.1 |
| Red Crag | b 'Clayey' pebbly sand<br>Gravel: fine and coarse, angular to subrounded and well rounded flint; with rounded to well rounded quartz; with some subrounded sandstone and quartzite, and tabular ironstone; with a trace of igneous and metamorphics<br>Sand: medium with fine and coarse, predominantly quartz with tabular coarse ironstone, brown | 5.1 | 7.2 |
| London Clay | Clay, silty, micaceous, brown | 0.1 | 7.3 |
| | Clay, silty, micaceous, grey | 1.9+ | 9.2 |

**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 |
| a | 12 | 74 | 14 | 0.1-1.1 | 6 | 11 | 67 | 5 | 6 | 5 | 0 |
| | | | | 1.1-2.1 | 6 | 10 | 78 | 3 | 2 | 1 | 0 |
| | | | | Mean | 6 | 11 | 72 | 4 | 4 | 3 | 0 |
| b | 6 | 87 | 7 | 2.1-3.1 | 9 | 28 | 51 | 7 | 4 | 1 | 0 |
| | | | | 3.1-4.1 | 10 | 15 | 52 | 13 | 8 | 2 | 0 |
| | | | | 4.1-5.1 | 6 | 15 | 52 | 18 | 7 | 2 | 0 |
| | | | | 5.1-6.1 | 13 | 24 | 39 | 20 | 4 | 0 | 0 |
| | | | | 6.1-7.1 | 20 | 6 | 27 | 7 | 21 | 19 | 0 |
| | | | | Mean | 12 | 17 | 44 | 13 | 9 | 5 | 0 |
| a + b | 10 | 77 | 13 | Mean | 10 | 15 | 52 | 10 | 8 | 5 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 50 | 22 | 18 | 2 | 2 | 0 | 0 | 0 | 6 | 0 |
| b | 39 | 33 | 17 | 2 | 4 | 0 | 4 | 1 | 0 | 0 |
| a + b | 41 | 32 | 18 | 2 | 4 | 0 | 3 | trace | trace | 0 |

**TL 93 SW 34** **9272 3042** **Wormingford Airfield, Wormingford** **Block G**

Surface level +65.3 m
Water struck at +52.2 m
February/March 1977

Overburden 9.5 m
Mineral 8.7 m
Bedrock 0.6 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Boulder Clay | Clay, silty, fine sandy, with some flint, quartz, quartzite sandstone and limestone, chalk pellets increasing with depth, brown becoming yellow brown and orange brown | 6.8 | 7.0 |
| | Clay, silty with some flint and quartz, chalk with grey clay halo's, orange brown | 1.7 | 8.7 |
| | Clay, sandy, pebbly, silty, with chalk, flint and quartz fine gravel, mid-brown | 0.6 | 9.3 |
| | Clay, very sandy and pebbly, orange | 0.2 | 9.5 |
| Glacial Sand and Gravel | **a** 'Clayey' pebbly sand, 'very clayey' in uppermost 1.0 m<br>Gravel: fine with coarse, angular to subrounded flint and rounded to well rounded quartz, with well rounded quartzite: with some subrounded sandstone and subangular igneous and metamorphics<br>Sand: fine with some medium and coarse, predominantly quartz with a trace of coarse angular flint, orange-brown becoming fawn brown | 3.0 | 12.5 |
| Kesgrave Sands and Gravels | **b** Pebbly sand<br>Gravel: coarse and fine, angular to subrounded flint, with rounded to well rounded quartz, well rounded flint and rounded quartzite; with some subrounded sandstone and subangular igneous and metamorphics; with a trace of phosphatic nodules<br>Sand: medium with some coarse and fine, predominantly rounded quartz with some angular coarse flint, fawn-brown | 2.6 | 15.1 |
| Red Crag | **c** Sand, becomes pebbly at base<br>Gravel: fine with a trace of coarse, well rounded and angular to subrounded flint; with rounded to well rounded quartz and quartzite and tabular ironstone; with some subrounded sandstone and subangular igneous and metamorphics; with a trace of phosphatic nodules<br>Sand: medium and fine with coarse, predominantly rounded quartz with some coarse angular flint and tabular ironstone, fawn becoming bright orange brown 15.8 m | 3.1 | 18.2 |
| London Clay | Clay, silty, brown streaked orange brown | 0.3 | 18.5 |
| | Clay, silty, fine sandy, grey streaked drab green | 0.3+ | 18.8 |



**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 |
| **a** | 17 | 63 | 20 | 9.5–10.5 | 24 | 29 | 41 | 2 | 2 | 2 | 0 |
| | | | | 10.5–11.5 | 17 | 8 | 24 | 13 | 30 | 8 | 0 |
| | | | | 11.5–12.5 | 9 | 8 | 54 | 10 | 14 | 5 | 0 |
| | | | | Mean | 17 | 15 | 40 | 8 | 15 | 5 | 0 |
| **b** | 3 | 83 | 14 | 12.5–13.1 | 6 | 4 | 81 | 3 | 4 | 2 | 0 |
| | | | | 13.1–14.1* | 3 | 4 | 65 | 12 | 8 | 8 | 0 |
| | | | | 14.1–15.1* | 2 | 13 | 62 | 7 | 5 | 11 | 0 |
| | | | | Mean | 3 | 7 | 68 | 8 | 6 | 8 | 0 |
| **c** | 3 | 94 | 3 | 15.1–16.1* | 3 | 24 | 52 | 17 | 3 | 1 | 0 |
| | | | | 16.1–18.2* | 3 | 36 | 45 | 13 | 3 | 0 | 0 |
| | | | | 18.2–18.4 | 2 | 26 | 53 | 12 | 6 | 0 | 0 |
| | | | | Mean | 3 | 32 | 48 | 14 | 3 | 0 | 0 |
| **a+b+c** | 8 | 80 | 12 | Mean | 8 | 19 | 51 | 10 | 8 | 4 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 40 | 21 | 26 | 6 | 4 | 0 | 0 | 3 | trace | 0 |
| **b** | 51 | 11 | 24 | 8 | 4 | 0 | 0 | 2 | 0 | trace |
| **c** | 26 | 42 | 15 | 6 | 3 | 0 | 5 | 2 | 0 | 1 |
| **a+b+c** | 42 | 19 | 24 | 7 | 4 | 0 | 1 | 3 | trace | trace |

**TL 93 SW 35** **9338 3498** **Dead Lane, Bures St Mary** **Block E**

Surface level +66.1 m
Water struck at +47.6 m
July 1977

Overburden 6.3 m
Mineral 14.0 m
Bedrock 0.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.6 | 0.6 |
| Boulder Clay | Clay, sandy, silty, with flints, orange brown | 0.2 | 0.8 |
| | Clay, silty, with chalk, flint, quartz and fossil fragments, yellow brown becoming brown | 4.7 | 5.5 |
| | Clay, silty, sandy, with pebbles of flint quartz and fine chalk, orange brown | 0.8 | 6.3 |
| Glacial Sand and Gravel | **a** Sandy gravel 'clayey' in uppermost 2.0 m becomes progressively more gravelly with depth<br>Gravel: fine with coarse, with cobbles at base, well rounded and angular to subrounded flint; with rounded to well rounded quartz and rounded quartzite; with a trace of sandstone and chalk<br>Sand: medium with some coarse and fine predominantly rounded quartz with some coarse angular flint, yellow brown becomes orange brown | 9.0 | 15.3 |
| Kesgrave Sands and Gravels | **b** Sand with a trace of pebbles at top and base with discrete thin clay seams<br>Gravel: a trace of fine and coarse, well rounded flint and tabular ironstone with angular to subrounded flint and rounded to well rounded quartz; with a trace of sandstone and chalk<br>Sand: fine with some medium and a trace of coarse, quartz, fawn brown | 5.0 | 20.3 |
| London Clay | Clay, silty, dark brown mottled grey | 0.3 | 20.6 |
| | Clay, silty, micaceous, with comminuted shell debris and pyrite nodules, blue-grey | 0.5+ | 21.1 |



**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** | 8 | 65 | 27 | 6.3-7.3 | 19 | 20 | 42 | 7 | 8 | 4 | 0 |
| | | | | 7.3-8.3 | 12 | 10 | 55 | 13 | 9 | 1 | 0 |
| | | | | 8.3-9.3 | 7 | 9 | 53 | 12 | 12 | 7 | 0 |
| | | | | 9.3-10.3 | 5 | 7 | 41 | 11 | 25 | 11 | 0 |
| | | | | 10.3-11.3 | 4 | 5 | 63 | 8 | 6 | 15 | 0 |
| | | | | 11.3-12.3 | 7 | 10 | 70 | 6 | 3 | 4 | 0 |
| | | | | 12.3-13.3 | 6 | 9 | 36 | 12 | 23 | 14 | 0 |
| | | | | 13.3-14.3 | 5 | 7 | 31 | 15 | 27 | 15 | 0 |
| | | | | 14.3-15.3 | 3 | 6 | 27 | 10 | 22 | 18 | 14 |
| | | | | Mean | 8 | 9 | 46 | 10 | 15 | 10 | 2 |
| **b** | 6 | 92 | 2 | 15.3-16.3 | 10 | 64 | 19 | 3 | 3 | 1 | 0 |
| | | | | 16.3-17.3 | 7 | 89 | 4 | 0 | 0 | 0 | 0 |
| | | | | 17.3-18.3 | 6 | 85 | 8 | 1 | 0 | 0 | 0 |
| | | | | 18.3-19.3* | 4 | 95 | 1 | 0 | 0 | 0 | 0 |
| | | | | 19.3-20.3* | 5 | 85 | 4 | 2 | 3 | 1 | 0 |
| | | | | Mean | 6 | 84 | 7 | 1 | 1 | 1 | 0 |
| **a + b** | 7 | 75 | 18 | Mean | 7 | 36 | 32 | 7 | 10 | 7 | 1 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 33 | 37 | 20 | 9 | 1 | trace | 0 | 0 | 0 | 0 |
| **b** | 11 | 47 | 7 | trace | 1 | 1 | 33 | 0 | 0 | 0 |
| **a + b** | 32 | 37 | 20 | 9 | 1 | trace | trace | 0 | 0 | 0 |

**TL 93 SW 36** **9340 3459** **Nayland End Wood, Bures St Mary** **Block E**

Surface level +60.9 m
Water struck at +44.7 m
July 1977

Overburden 4.0 m
Mineral 12.7 m
Bedrock 0.6 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Boulder Clay | Clay, silty, sandy, with flint pebbles, brown | 0.7 | 0.9 |
| | Clay, silty, with pebbles of flint, quartz and sandstone, and coarse sand chalk pellets, light brown becoming brown | 2.9 | 3.8 |
| | Clay, silty, very sandy and pebbly with flint, quartz and sandstone | 0.2 | 4.0 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel<br>Gravel: fine and coarse, angular to subrounded and well rounded flint, and rounded to well rounded quartz; with rounded quartzite; with a trace of sandstone, igneous and metamorphics<br>Sand: medium with fine and some coarse, predominantly quartz with some angular flint, yellow brown | 4.2 | 8.2 |
| Kesgrave Sands and Gravels | **b** Sand,: with discrete thin clay seams<br>Gravel: a trace of fine and coarse, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint, subangular igneous and metamorphics and rounded quartzite; with a trace of ironstone and sandstone<br>Sand: medium and fine with some coarse, predominantly quartz with some fine mica, fawn brown | 6.0 | 14.2 |
| Red Crag | **c** Sand, very pebbly at base<br>Gravel: a trace of fine, well rounded flint and tabular ironstone; with angular to subrounded flint and rounded to well rounded quartz; with a trace of sandstone and quartzite<br>Sand: fine and medium with some coarse, predominantly rounded quartz with some tabular ironstone, fawn becomes orange brown | 2.5 | 16.7 |
| London Clay | Clay, very silty, fine sandy, brown mottled yellow | 0.3 | 17.0 |
| | Clay, silty, fine sandy, blue-grey | 0.3+ | 17.3 |



**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 |
| **a** | 17 | 57 | 26 | 4.0-5.0 | 24 | 30 | 34 | 4 | 6 | 2 | 0 |
| | | | | 5.0-6.0 | 9 | 5 | 46 | 10 | 19 | 11 | 0 |
| | | | | 6.0-6.8 | 17 | 12 | 25 | 8 | 19 | 19 | 0 |
| | | | | 6.8-7.3 | 42 | 29 | 13 | 2 | 6 | 8 | 0 |
| | | | | 7.3-8.2 | 5 | 13 | 36 | 8 | 19 | 19 | 0 |
| | | | | Mean | 17 | 17 | 33 | 7 | 14 | 12 | 0 |
| **b** | 6 | 92 | 2 | 8.2-9.2 | 6 | 50 | 32 | 3 | 4 | 5 | 0 |
| | | | | 9.2-10.2 | 10 | 59 | 30 | 1 | 0 | 0 | 0 |
| | | | | 10.2-11.2 | 7 | 45 | 47 | 1 | 0 | 0 | 0 |
| | | | | 11.2-12.2 | 5 | 24 | 61 | 9 | 1 | 0 | 0 |
| | | | | 12.2-13.2 | 4 | 31 | 61 | 4 | 0 | 0 | 0 |
| | | | | 13.2-14.2 | 5 | 15 | 75 | 4 | 1 | 0 | 0 |
| | | | | Mean | 6 | 37 | 51 | 4 | 1 | 1 | 0 |
| **c** | 6 | 92 | 2 | 14.2-15.2 | 7 | 46 | 39 | 4 | 4 | 0 | 0 |
| | | | | 15.2-16.2* | 5 | 46 | 40 | 8 | 1 | 0 | 0 |
| | | | | 16.2-16.7* | 5 | 45 | 34 | 14 | 2 | 0 | 0 |
| | | | | Mean | 6 | 46 | 38 | 8 | 2 | 0 | 0 |
| **a+b+c** | 10 | 80 | 10 | Mean | 10 | 32 | 43 | 5 | 6 | 4 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 33 | 25 | 27 | 14 | 1 | 0 | 0 | trace | 0 | 0 |
| **b** | 52 | 18 | 18 | 5 | trace | 0 | 1 | 6 | 0 | 0 |
| **c** | 21 | 35 | 15 | 1 | 1 | trace | 27 | 0 | 0 | 0 |
| **a+b+c** | 33 | 25 | 26 | 13 | 1 | trace | 1 | 1 | 0 | 0 |

**TL 93 SW 37** **9359 3388** **Malting Farm, Nayland with Wissington** **Block F**

Surface level +18.0 m
Water struck at +14.5 m
May 1977

Overburden 2.6 m
Mineral 2.5 m
Bedrock 3.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Terrace 2 | Silt, extremely clayey, and sandy with flint pebbles, light brown | 1.2 | 1.5 |
| | Silt, extremely sandy, with discrete clay pellets with a trace of fine flint pebbles, brown | 1.1 | 2.6 |
| | Sandy gravel, pebbly sand in lowermost 0.5 m<br>Gravel: fine with coarse, angular to subrounded flint; well rounded flint and chalk, rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone; with a trace of limestone, igneous metamorphics and fossil debris<br>Sand: medium with fine and coarse, predominantly rounded quartz with coarse angular flint and fine to coarse well rounded chalk, brown | 2.5 | 5.1 |
| Lower London Tertiaries | Clay, silty, light pink mottled grey-green and light blue grey | 1.1 | 6.2 |
| | Sand, 'clayey', fine, and medium with a trace of coarse and fine gravel, light pinkish grey, predominantly quartz with *some* fine mica and glauconite | 0.9 | 7.1 |
| | Silt, sandy, with thin discrete blue-grey clay seams light green mottled red brown | 1.2+ | 8.3 |

**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 |
| 3 | 61 | 36 | 2.6-3.6 | 6 | 7 | 30 | 12 | 31 | 14 | 0 |
| | | | 3.6-4.6 | 1 | 11 | 34 | 12 | 31 | 11 | 0 |
| | | | 4.6-5.1 | 1 | 28 | 62 | 3 | 3 | 0 | 0 |
| | | | Mean | 3 | 13 | 38 | 10 | 26 | 10 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamorphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 70 | 8 | 6 | 5 | 3 | 5 | 0 | 1 | 2 | 0 |



**TL 93 SW 38** **9321 3298** **Wormingford Bridge, Nayland-with-Wissington** **Block F**

Surface level +16.4 m
Water struck at +14.2 m
May 1977

Overburden 2.2 m
Mineral 1.8 m
Bedrock 1.2 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Madeground | 1.3 | 1.3 |
| Alluvium | Clay, silty, with some angular flint pebbles, grey-brown with red brown iron rich pockets | 0.9 | 2.2 |
| | Gravel<br>Gravel: fine and coarse, angular to subrounded flint with well rounded flint, rounded to well rounded quartz, and rounded quartzite; with some subangular igneous and metamorphics and subrounded sandstone; with a trace of limestone<br>Sand: coarse and medium with some fine, angular flint and rounded quartz with some fine to coarse well rounded chalk, light grey-brown | 1.8 | 4.0 |
| London London Tertiaries | Clay, silty, red-brown mottled light blue-grey | 1.2+ | 5.2 |

**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 |
| 1 | 20 | 79 | 2.2-3.2* | 0 | 3 | 10 | 10 | 43 | 35 | 0 |
| | | | 3.2-4.0* | 1 | 2 | 9 | 9 | 40 | 39 | 0 |
| | | | Mean | 1 | 2 | 9 | 9 | 42 | 37 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamorphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 72 | 10 | 7 | 6 | 2 | 0 | 0 | 3 | trace | 0 |

**TL 93 SW 39** **9355 3146** **Wood Hall, Wormingford** **Block G**

Surface level +61.6 m
Water struck at +50.1 m
January 1977

Overburden 2.9 m
Mineral 12.9 m
Bedrock 1.1 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, silty, sandy, brown mottled grey | 0.7 | 1.0 |
| | Clay, silty, with some flint pebbles, grey mottled brown | 1.0 | 2.0 |
| | Clay, silty, with some flint and chalk pebbles, brown mottled grey | 0.9 | 2.9 |
| Glacial Sand and Gravel | **a** 'Very clayey' pebbly sand, with some discrete clay seams<br>Gravel: fine with coarse, angular to subrounded flint and rounded to well rounded quartz; with well rounded flint; with some rounded quartzite and subangular sandstone; with a trace of chalk<br>Sand: medium with some fine and coarse, predominantly quartz with a trace of angular coarse flint, orange brown | 5.0 | 7.9 |
| Kesgrave Sands and Gravels | **b** Clayey sand, pebbly at top with discrete thin clay seams<br>Gravel: fine and coarse subrounded to well rounded quartz and subangular to angular flint; with well rounded flint and rounded quartzite; with some subrounded sandstone<br>Sand: medium with fine and a trace of coarse, quartz, orange brown | 5.0 | 12.9 |
| Red Crag | **c** Pebbly sand<br>Gravel: fine with some coarse, well rounded and angular to subrounded flint with rounded quartz; with some subrounded to rounded quartzite; with a trace of ironstone and sandstone<br>Sand: medium with fine and coarse, rounded quartz with some angular flint red-brown | 2.9 | 15.8 |
| London Clay | Clay, silty, grey-brown mottled grey becoming dark grey | 1.1+ | 16.9 |



**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 | 63 | 17 | 2.9–3.9 | 29 | 12 | 28 | 6 | 17 | 8 | 0 |
| | | | | 3.9–4.9 | 22 | 9 | 42 | 7 | 13 | 7 | 0 |
| | | | | 4.9–5.9 | 17 | 11 | 51 | 5 | 10 | 6 | 0 |
| | | | | 5.9–6.9 | 16 | 17 | 59 | 5 | 3 | 0 | 0 |
| | | | | 6.9–7.9 | 13 | 5 | 46 | 13 | 17 | 6 | 0 |
| | | | | Mean | 20 | 11 | 45 | 7 | 12 | 5 | 0 |
| **b** | 12 | 84 | 4 | 7.9–8.9 | 12 | 7 | 62 | 5 | 7 | 7 | 0 |
| | | | | 8.9–9.9 | 2 | 15 | 78 | 2 | 1 | 2 | 0 |
| | | | | 9.9–10.9 | 31 | 13 | 55 | 1 | 0 | 0 | 0 |
| | | | | 10.9–11.9* | 11 | 29 | 59 | 1 | 0 | 0 | 0 |
| | | | | 11.9–12.9* | 4 | 40 | 50 | 5 | 1 | 0 | 0 |
| | | | | Mean | 12 | 21 | 60 | 3 | 2 | 2 | 0 |
| **c** | 4 | 87 | 9 | 12.9–13.9* | 4 | 24 | 58 | 9 | 4 | 1 | 0 |
| | | | | 13.9–14.9 | 3 | 30 | 46 | 11 | 7 | 3 | 0 |
| | | | | 14.9–15.9 | 6 | 22 | 23 | 37 | 10 | 2 | 0 |
| | | | | Mean | 4 | 26 | 43 | 18 | 7 | 2 | 0 |
| **a+b+c** | 13 | 77 | 10 | Mean | 13 | 18 | 51 | 8 | 7 | 3 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 46 | 20 | 26 | 4 | 4 | trace | 0 | 0 | 0 | 0 |
| **b** | 30 | 21 | 38 | 8 | 3 | 0 | 0 | 0 | 0 | 0 |
| **c** | 38 | 48 | 11 | 2 | trace | 0 | 1 | 0 | 0 | 0 |
| **a+b+c** | 41 | 27 | 25 | 4 | 3 | trace | trace | 0 | 0 | 0 |

**TL 93 SW 40** **9384 3040** **Rotchfords, Wormingford** **Block G**

Surface level +56.0 m
Water struck at +49.3 m
July 1977

Overburden 6.7 m
Mineral 4.3 m
Bedrock 0.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.2 | 0.2 |
| Boulder Clay | Clay, sandy, silty, with flint pebbles and chalk from 1.4 m, light brown becoming yellow brown | 3.4 | 3.6 |
| | Sand, very silty, clayey, light brown | 0.2 | 3.8 |
| | Clay, silty, sandy, with flint and chalk pebbles, light brown becoming grey-brown | 2.9 | 6.7 |
| Kesgrave Sands and Gravels | **a** Sandy gravel, with discrete clay pellets<br>Gravel: fine with coarse and cobbles, well rounded and angular to subrounded flint; with rounded to well rounded quartz and tabular ironstone; with some subrounded sandstone; with a trace of quartzite<br>Sand: medium with fine and coarse, predominantly rounded quartz with some angular coarse flint | 1.0 | 7.7 |
| Red Crag | **b** Pebbly sand<br>Gravel: coarse and fine, angular to subrounded and and well rounded flint; with rounded to well rounded quartz and tabular ironstone; with some subrounded sandstone; with a trace of quartzite<br>Sand: medium with fine and coarse, predominantly rounded quartz with some tabular ironstone, light grey brown | 3.3 | 11.0 |
| London Clay | Clay, silty, light grey mottled brown | 0.2 | 11.2 |
| | Clay, silty, with some pyrite nodules, blue-grey | 0.3+ | 11.5 |

**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** | 2 | 55 | 43 | 6.7-7.7* | 2 | 17 | 27 | 11 | 24 | 10 | 9 |
| **b** | 2 | 89 | 9 | 7.7-8.7* | 2 | 32 | 41 | 6 | 5 | 14 | 0 |
| | | | | 8.7-9.7* | 0 | 31 | 51 | 11 | 4 | 3 | 0 |
| | | | | 9.7-11.0* | 3 | 22 | 59 | 12 | 4 | 0 | 0 |
| | | | | Mean | 2 | 28 | 51 | 10 | 4 | 5 | 0 |
| **a + b** | 2 | 81 | 17 | Mean | 2 | 25 | 46 | 10 | 9 | 6 | 2 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 35 | 37 | 16 | 1 | 2 | 0 | 9 | 0 | 0 | 0 |
| **b** | 48 | 29 | 12 | 9 | 2 | 0 | 0 | 0 | 0 | 0 |
| **a + b** | 40 | 34 | 15 | 4 | 2 | 0 | 5 | 0 | 0 | 0 |



**TL 93 SW 41** **9462 3480** **Rickland Farm, Nayland-with-Wissington** **Block E**

Surface level +59.9
Water struck at +46.0 m
May 1977

Overburden 2.5 m
Mineral 17.0 m
Bedrock 0.9 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Boulder Clay | Clay, sandy, silty, with flint pebbles, dark brown becoming light brown, with grey mottling | 1.7 | 1.8 |
| | Clay, sandy, silty, with flint and chalk pebbles, light brown mottled grey | 0.5 | 2.3 |
| | Clay, very sandy, with flint pebbles and a trace of chalk pellets, orange-brown | 0.2 | 2.5 |
| Glacial Sand and Gravel | **a** 'Clayey' pebbly sand, with some discrete clay pellets<br>Gravel: fine and coarse, angular to subrounded flint and rounded to well rounded quartz with well rounded rounded quartz; with well rounded flint and rounded quartzite; with some subrounded sandstone; with a trace of igneous and metamorphics<br>Sand: medium with some coarse and fine, predominantly rounded quartz with a trace of angular coarse flint, light brown | 9.2 | 11.7 |
| Kesgrave Sands and Gravels | **b** Sand, with a trace of fine gravel<br>Gravel: fine, rounded to well rounded quartz and angular to subrounded flint; with rounded quartzite, subrounded sandstone and well rounded flint<br>Sand: fine with medium and a trace of coarse, quartz, yellow brown | 4.0 | 15.7 |
| Red Crag | Sand, becoming pebbly towards base with a seam of grey green clayey silt at 19.3 m<br>Gravel: fine, well rounded flint; with angular to subrounded flint, tabular ironstone to well rounded quartz and well rounded phosphatic nodules; with some rounded quartzite; with a trace of igneous and metamorphics<br>Sand: fine and medium with coarse, predominantly rounded quartz with some coarse angular flint and tabular ironstone, and fine to coarse tabular shell debris, rusty brown | 3.8 | 19.5 |
| London Clay | Clay, silty, with oxidized pyrite nodules, pinkish-grey mottled rusty brown | 0.4 | 19.9 |
| | Clay, silty, with pyrite nodules, dark grey | 0.5+ | 20.4 |

## 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 | 10 | 76 | 14 | 2.5-3.3 | 4 | 13 | 56 | 8 | 7 | 9 | 0 |
| | | | | 3.3-4.3 | 19 | 3 | 50 | 9 | 13 | 6 | 0 |
| | | | | 4.3-5.3 | 18 | 10 | 56 | 7 | 6 | 3 | 0 |
| | | | | 5.3-6.8 | 14 | 10 | 66 | 4 | 4 | 2 | 0 |
| | | | | 6.8-7.7 | 11 | 4 | 49 | 9 | 18 | 9 | 0 |
| | | | | 7.7-8.7 | 6 | 4 | 70 | 7 | 10 | 3 | 0 |
| | | | | 8.7-9.8 | 6 | 6 | 54 | 11 | 14 | 9 | 0 |
| | | | | 9.8-10.8 | 4 | 6 | 85 | 3 | 2 | 0 | 0 |
| | | | | 10.8-11.7 | 4 | 9 | 73 | 1 | 2 | 11 | 0 |
| | | | | Mean | 10 | 7 | 62 | 7 | 8 | 6 | 0 |
| b | 7 | 93 | 0 | 11.7-12.7 | 8 | 64 | 28 | 0 | 0 | 0 | 0 |
| | | | | 12.7-13.7 | 5 | 44 | 51 | 0 | 0 | 0 | 0 |
| | | | | 13.7-14.7* | 7 | 64 | 30 | 0 | 0 | 0 | 0 |
| | | | | 14.7-15.7* | 6 | 79 | 14 | 1 | 0 | 0 | 0 |
| | | | | Mean | 7 | 62 | 31 | 0 | 0 | 0 | 0 |
| c | 5 | 91 | 4 | 15.7-16.7* | 4 | 36 | 53 | 6 | 1 | 0 | 0 |
| | | | | 16.7-17.7* | 3 | 51 | 42 | 2 | 2 | 0 | 0 |
| | | | | 17.7-18.7* | 8 | 41 | 29 | 17 | 5 | 0 | 0 |
| | | | | 18.7-19.5* | 5 | 34 | 21 | 31 | 9 | 0 | 0 |
| | | | | Mean | 5 | 41 | 37 | 13 | 4 | 0 | 0 |
| a+b+c | 8 | 84 | 8 | Mean | 8 | 28 | 49 | 7 | 5 | 3 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 37 | 18 | 28 | 13 | 2 | 0 | 0 | 1 | 1 | 0 |
| b | 25 | 7 | 37 | 10 | 9 | 0 | 0 | 0 | 12 | 0 |
| c | 21 | 34 | 13 | 3 | 0 | 0 | 17 | trace | 1 | 11 |
| a+b+c | 36 | 19 | 27 | 12 | 2 | 0 | 1 | 1 | 1 | 1 |



**TL 93 SW 42** **9425 3306** **Bowdens, Wormingford** **Block F**

Surface level +16.2 m
Water struck at +13.6 m
July 1977

Overburden 1.6 m
Mineral 4.2 m
Bedrock 0.5 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.4 | 0.4 |
| Terrace 2 | Silt, sandy becoming very sandy, with some flint and quartz pebbles, light brown becoming grey | 1.2 | 1.6 |
| | Gravel, with discrete clay pellets in uppermost 1.0 m<br>Gravel: fine and coarse with some cobbles, angular to subrounded flint; with well rounded flint and rounded to well rounded quartzite and subrounded sandstone; with a trace of chalk and ironstone<br>Sand: medium with coarse and fine, predominantly subrounded quartz with some angular coarse flint and fine to coarse well rounded chalk, light brown | 4.2 | 5.8 |
| Lower London Tertiaries | Clay, silty, pinkish grey-brown with thin seams of blue grey and green-grey | 0.5+ | 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 |
| 3 | 33 | 64 | 1.6-2.6 | 9 | 23 | 25 | 7 | 19 | 17 | 0 |
| | | | 2.6-3.6* | 2 | 4 | 20 | 9 | 29 | 27 | 9 |
| | | | 3.6-4.6* | 1 | 3 | 14 | 10 | 35 | 37 | 0 |
| | | | 4.6-5.8* | 0 | 2 | 8 | 10 | 37 | 35 | 8 |
| | | | Mean | 3 | 8 | 16 | 9 | 30 | 29 | 5 |

## COMPOSITION

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 61 | 23 | 11 | 2 | 2 | 1 | trace | 0 | 0 | 0 |

**TL 93 SW 43** **9482 3271** **Garnons, Wormingford** **Block F**

Surface level +19.6 m
Water struck at +13.7 m
July 1977

Overburden 0.3 m
Mineral 6.4 m
Bedrock 0.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Terrace 2 | 'Clayey' gravel<br>Gravel: fine with coarse, angular to subrounded flint; with well rounded flint and rounded to well rounded quartz; with some subrounded sandstone; with a trace of quartzite and ironstone<br>Sand: medium with fine and coarse, predominantly rounded quartz with angular coarse flint, brown | 6.4 | 6.7 |
| Lower London Tertiaries | Clay, silty, pinkish brown with thin seams of blue-grey and grey green | 0.5+ | 7.2 |

**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 |
| 10 | 43 | 47 | 0.3-1.3 | 19 | 10 | 12 | 8 | 27 | 24 | 0 |
| | | | 1.3-2.3 | 15 | 11 | 19 | 11 | 28 | 16 | 0 |
| | | | 2.3-3.3 | 10 | 15 | 24 | 11 | 24 | 16 | 0 |
| | | | 3.3-4.3 | 6 | 13 | 20 | 10 | 31 | 20 | 0 |
| | | | 4.3-5.3 | 6 | 11 | 18 | 12 | 31 | 22 | 0 |
| | | | 5.3-5.9 | 17 | 19 | 29 | 9 | 17 | 9 | 0 |
| | | | 5.9-6.7* | 2 | 5 | 21 | 14 | 36 | 22 | 0 |
| | | | Mean | 10 | 12 | 20 | 11 | 28 | 19 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 66 | 24 | 7 | 1 | 2 | 0 | trace | 0 | 0 | 0 |



**TL 93 SW 44** **9433 3215** **Bottengoms Farm, Wormingford** **Block G**

Surface level +53.5 m
Water struck at +45.2 m
July 1977

Overburden 3.2 m
Mineral 6.8 m
Bedrock 0.4 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Boulder Clay | Silt, clayey, with some flint pebbles, dark grey | 0.3 | 0.4 |
| | Clay, very sandy, silty, with quartz and flint pebbles, light brown | 0.3 | 0.7 |
| | Clay, silty with flint and quartz pebbles light brown | 0.8 | 1.5 |
| | Clay, sandy, silty, becomes more sandy in lower 0.2 m, with pebbles of flint, chalk and quartz, light brown | 1.7 | 3.2 |
| Glacial Sand and Gravel | **a** 'Very clayey' sandy gravel<br>Gravel: fine with coarse, angular to subrounded flint; with well rounded chalk and flint, and rounded to well rounded quartz; with some subrounded sandstone rounded quartzite; with a trace of ironstone and fossil debris<br>Sand: fine and medium with coarse, predominantly rounded quartz with some coarse angular flint and well rounded chalk, brown | 1.0 | 4.2 |
| Kesgrave Sands and Gravels | **b** Gravel<br>Gravel: fine with coarse, angular to subrounded and well rounded flint; with rounded to well rounded quartz, well rounded chalk and rounded quartzite; with a trace of sandstone, igneous and metamorphics<br>Sand: medium coarse and fine, predominantly quartz with well rounded chalk and angular flint, yellow-brown | 2.8 | 7.0 |
| Red Crag | **c** Pebbly sand, clayey in uppermost 0.9 m<br>Gravel: fine with some coarse, well rounded and angular to subrounded flint; with rounded to well rounded quartzite; with some tabular ironstone and subangular igneous and metamorphics; with a trace of sandstone and quartzite<br>Sand: medium with fine and some coarse predominantly rounded quartz with some coarse angular flint, light brown becoming rusty-brown | 3.0 | 10.0 |
| London Clay | Clay, silty, light grey becoming blue-grey with depth | 0.4+ | 10.4 |

**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 | 41 | 30 | 3.2-4.2 | 29 | 19 | 14 | 8 | 19 | 11 | 0 |
| b | 9 | 39 | 52 | 4.2-5.0 | 8 | 18 | 19 | 10 | 32 | 13 | 0 |
| | | | | 5.0-6.0 | 12 | 7 | 16 | 14 | 31 | 20 | 0 |
| | | | | 6.0-7.0 | 8 | 8 | 14 | 11 | 34 | 25 | 0 |
| | | | | Mean | 9 | 11 | 16 | 12 | 32 | 20 | 0 |
| c | 8 | 85 | 7 | 7.0-7.9 | 15 | 11 | 48 | 12 | 11 | 3 | 0 |
| | | | | 7.9-8.9* | 4 | 34 | 42 | 14 | 5 | 1 | 0 |
| | | | | 8.9-10.0 | 5 | 24 | 53 | 15 | 3 | 0 | 0 |
| | | | | Mean | 8 | 23 | 48 | 14 | 6 | 1 | 0 |
| a+b+c | 12 | 59 | 29 | Mean | 12 | 17 | 30 | 12 | 19 | 10 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 71 | 7 | 6 | 2 | 2 | 12 | trace | 0 | trace | 0 |
| b | 53 | 27 | 8 | 5 | 1 | 6 | 0 | trace | 0 | 0 |
| c | 31 | 45 | 18 | 1 | 1 | 0 | 2 | 2 | 0 | 0 |
| a+b+c | 54 | 25 | 8 | 4 | 2 | 7 | trace | trace | trace | 0 |



**TL 93 SW 45** **9468 3161** **Cockrells Farm, Wormingford** **Block G**

Surface level +56.2 m
Water struck at +48.2 m
January 1977

Overburden 4.8 m
Mineral 5.0 m
Bedrock 0.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, silty, sandy, with some flint pebbles, dark brown | 0.9 | 1.2 |
| | Clay, silty, grey mottled brown, with chalk and flint pebbles | 2.2 | 3.4 |
| | Clay, sandy, pebbly, very chalky, light brown. | 1.4 | 4.8 |
| Kesgrave Sands and Gravels | a 'Very clayey' pebbly sand, with many discrete thin clay seams<br>Gravel: fine with coarse, angular to subrounded flint; with rounded to well rounded quartz and well rounded flint, with some subrounded to rounded quartzite and subangular sandstone; with a trace of tabular ironstone<br>Sand: medium with fine and some coarse, predominantly quartz, orange brown | 3.0 | 7.8 |
| Red Crag | b Sand, with a trace of pebbles in upper 1.0 m<br>Gravel: fine and coarse; angular to subrounded and well rounded flint; with rounded to subrounded quartz and quartzite, and subangular sandstone<br>Sand: fine and medium with some coarse, predominantly quartz with a trace of angular coarse flint, fawn brown | 2.0 | 9.8 |
| London Clay | Clay, sandy, silty, becoming micaceous, orange brown becoming grey | 0.5+ | 10.3 |

**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 |
| a | 23 | 64 | 13 | 4.8-5.8 | 20 | 23 | 36 | 5 | 11 | 5 | 0 |
| | | | | 5.8-6.8 | 26 | 32 | 28 | 4 | 7 | 3 | 0 |
| | | | | 6.8-7.8 | 23 | 33 | 29 | 4 | 8 | 3 | 0 |
| | | | | Mean | 23 | 29 | 31 | 4 | 9 | 4 | 0 |
| b | 7 | 90 | 3 | 7.8-8.8* | 6 | 24 | 50 | 13 | 5 | 2 | 0 |
| | | | | 8.8-9.8* | 8 | 58 | 31 | 3 | 0 | 0 | 0 |
| | | | | Mean | 7 | 41 | 41 | 8 | 2 | 1 | 0 |
| a+b | 16 | 75 | 9 | Mean | 16 | 34 | 35 | 6 | 6 | 3 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 53 | 19 | 20 | 5 | 3 | 0 | trace | 0 | 0 | 0 |
| b | 42 | 30 | 15 | 9 | 4 | 0 | 0 | 0 | 0 | 0 |
| a+b | 51 | 22 | 19 | 5 | 3 | 0 | trace | 0 | 0 | 0 |

**TL 93 SE 13** **9558 3477** **Smoky Farm, Nayland-with-Wissington** **Block E**

Surface level +57.5 m
Water struck at +44.3 m
May 1977

Overburden 3.7 m
Mineral 12.0 m
Bedrock 1.1 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Boulder Clay | Clay, sandy, silty, with angular to subangular fine and coarse flint gravel, pale yellow-brown | 1.1 | 1.3 |
| | Clay, sandy, silty, with angular to subangular flint and rounded chalk fine and coarse gravel, mid-brown | 2.2 | 3.5 |
| | Clay, very sandy, silty, with flint gravel | 0.2 | 3.7 |
| Glacial Sand and Gravel | **a** Sandy gravel, very sandy in uppermost 0.9 m<br>Gravel: fine and coarse, angular to subrounded flint and rounded to well rounded quartz; with well rounded flint and rounded quartzite; with some subrounded sandstone and subangular igneous and metamorphics; with a trace of limestone<br>Sand: medium with fine and coarse, yellow brown, subrounded to well rounded quartz with some angular to subrounded flint | 2.7 | 6.4 |
| Kesgrave Sands and Gravels | **b** Sand, with a trace of flint and quartz fine gravel<br>Sand: fine and medium with a trace of coarse, yellow brown, subrounded to well rounded quartz. | 2.0 | 8.4 |
| Red Crag | **c** Sand, with a 10 cm thick seam of light grey very silty clay, with a 2 cm ironpan at top, between 11.3 m and 11.4 m<br>Gravel: fine with some coarse, tabular ironstone, with well rounded flint; with some rounded to well rounded quartz and angular to subrounded flint; with a trace of sandstone<br>Sand; medium, with fine, with a trace of coarse, rusty brown | 7.3 | 15.7 |
| London Clay | Clay, silty, pale grey mottled orange-brown | 0.3 | 16.0 |
| | Clay, silty, dark grey with white comminuted shell debris | 0.8+ | 16.8 |



## 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 |
| **a** | 5 | 61 | 34 | 3.7-4.6 | 6 | 17 | 47 | 8 | 13 | 9 | 0 |
| | | | | 4.6-5.6 | 4 | 7 | 40 | 8 | 22 | 19 | 0 |
| | | | | 5.6-6.4 | 4 | 8 | 37 | 13 | 23 | 15 | 0 |
| | | | | Mean | 5 | 11 | 41 | 9 | 19 | 15 | 0 |
| **b** | 4 | 96 | 0 | 6.4-7.4 | 5 | 63 | 32 | 0 | 0 | 0 | 0 |
| | | | | 7.4-8.4 | 3 | 46 | 50 | 1 | 0 | 0 | 0 |
| | | | | Mean | 4 | 54 | 41 | 1 | 0 | 0 | 0 |
| **c** | 7 | 89 | 4 | 8.4-9.4 | 9 | 32 | 53 | 5 | 1 | 0 | 0 |
| | | | | 9.4-10.4 | 6 | 28 | 59 | 6 | 1 | 0 | 0 |
| | | | | 10.4-11.3 | 11 | 21 | 44 | 12 | 9 | 3 | 0 |
| | | | | 11.4-12.4 | 8 | 33 | 50 | 4 | 4 | 1 | 0 |
| | | | | 12.4-13.4* | 7 | 28 | 59 | 3 | 3 | 0 | 0 |
| | | | | 13.4-14.4* | 6 | 46 | 47 | 1 | 0 | 0 | 0 |
| | | | | 14.4-15.7* | 5 | 47 | 47 | 1 | 0 | 0 | 0 |
| | | | | Mean | 7 | 34 | 51 | 4 | 3 | 1 | 0 |
| **a+b+c** | 6 | 84 | 10 | Mean | 6 | 32 | 47 | 5 | 6 | 4 | 0 |

## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 40 | 19 | 25 | 9 | 4 | 0 | 0 | 2 | 1 | 0 |
| **b** | 36 | 25 | 29 | 5 | 5 | 0 | 0 | 0 | 0 | 0 |
| **c** | 2 | 10 | 3 | 0 | trace | 0 | 85 | 0 | 0 | 0 |
| **a+b+c** | 35 | 18 | 22 | 7 | 4 | 0 | 11 | 2 | trace | 0 |

**TL 93 SE 14** **9580 3353** **Millhouse, Nayland-with-Wissington** **Block F**

Surface level +14.9 m
Water struck at +13.1 m
May 1977

Overburden 1.1 m
Mineral 6.6 m
Bedrock 1.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Terrace 1 - 2 | Clay, sandy, silty, with pebbles of subangular flint, dark grey brown | 0.3 | 0.4 |
| | Clay, sandy, silty, with subangular fine and coarse flint gravel, yellow brown mottled light grey | 0.7 | 1.1 |
| | Gravel, 'clayey' in uppermost 1.6 m<br>Gravel: fine with coarse, angular to subrounded with well rounded flint; with some rounded quartzite, rounded sandstone; with a trace of igneous, metamorphics, calcareous siltstone and chalk<br>Sand: medium with coarse and fine, predominantly quartz with some coarse angular flint, pale brown becoming grey | 6.6 | 7.7 |
| Lower London Tertiaries | Silt, clayey, dark grey | 1.8+ | 9.5 |

**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 |
| 7 | 44 | 49 | 1.1-1.7 | 16 | 25 | 27 | 10 | 18 | 4 | 0 |
| | | | 1.7-2.7* | 13 | 19 | 23 | 9 | 25 | 11 | 0 |
| | | | 2.7-3.7* | 3 | 7 | 29 | 11 | 29 | 21 | 0 |
| | | | 3.7-4.7* | 8 | 14 | 27 | 13 | 27 | 11 | 0 |
| | | | 4.7-5.7* | 4 | 6 | 17 | 8 | 32 | 33 | 0 |
| | | | 5.7-6.7* | 2 | 4 | 19 | 14 | 44 | 17 | 0 |
| | | | 6.7-7.7* | 3 | 3 | 20 | 18 | 42 | 14 | 0 |
| | | | Mean | 7 | 10 | 22 | 12 | 32 | 17 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 81 | 8 | 3 | 4 | 2 | trace | 0 | 1 | 1 | 0 |



**TL 93 SE 15** **9563 3283** **0.5 km west of Creaks Grove, Little Horkesley** **Block F**

Surface level +13.7 m
Water struck at +12.0 m
July 1977

Overburden 1.7 m
Mineral 5.0 m
Bedrock 1.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.3 | 0.3 |
| Alluvium | Silt, sandy, clayey, with some subrounded flint pebbles, dark grey | 0.8 | 1.1 |
| | Peat, silty, sandy from 1.4 m, with some rounded quartz pebbles, dark brown | 0.6 | 1.7 |
| | Gravel, very clean<br>Gravel: fine with coarse, angular to subrounded flint; with well rounded flint and rounded to well rounded quartz; with some subrounded sandstone and a trace of quartzite ironstone and fossils<br>Sand: medium with coarse and a trace of fine, predominantly subrounded to rounded quartz with some coarse angular flint, pale brown | 5.0 | 6.7 |
| Lower London Tertiaries | Clay, silty, pale greyish-brown with blue grey and pink seams | 0.4 | 7.1 |
| | Sand, silty, fine subangular quartz with glauconite, pinkish brown becoming light grey-green from 8.1 m | 1.4+ | 8.5 |

**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 |
| 1 | 40 | 59 | 1.7-2.7* | 0 | 1 | 19 | 12 | 40 | 28 | 0 |
| | | | 2.7-3.7* | 0 | 3 | 23 | 11 | 37 | 27 | 0 |
| | | | 3.7-4.7* | 1 | 4 | 32 | 24 | 30 | 9 | 0 |
| | | | 4.7-5.7* | 0 | 2 | 18 | 12 | 34 | 34 | 0 |
| | | | 5.7-6.7* | 4 | 2 | 20 | 15 | 36 | 23 | 0 |
| | | | Mean | 1 | 2 | 23 | 15 | 35 | 24 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 69 | 20 | 8 | 1 | 2 | 0 | trace | 0 | trace | 0 |

**TL 93 SE 16** **9528 3227** **0.5 km north-east of Malting Farm, Little Horkesley** **Block H**

Surface level +44.9 m
Water struck at +41.9 m
July 1977

Overburden 0.3 m
Mineral 4.9 m
Bedrock 1.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| | Subsoil, clayey, silt with fine subangular flint pebbles, pale brown | 0.1 | 0.3 |
| Kesgrave Sands and Gravels | a Sandy gravel, 'clayey' in uppermost 1.0 m<br>Gravel: fine and coarse with some cobbles, angular to subrounded flint, with well rounded flint and rounded to well rounded quartz; with some subrounded sandstone; with a trace of quartzite, igneous and metamorphics<br>Sand: medium, with coarse and fine predominatly subrounded quartz, brown | 2.1 | 2.4 |
| Red Crag | b Sand, becoming more pebbly towards base<br>Gravel: fine, well rounded and angular to subrounded flint; with rounded to well rounded quartz; with some subrouded sandstone; with a trace of ironstone<br>Sand: medium, with fine, with a trace of coarse; quartz, rusty brown | 2.8 | 5.2 |
| London Clay | Clay, silty, pale brown | 0.7 | 5.9 |
| | Clay, silty, dark grey | 0.3+ | 6.2 |

**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 | 9 | 46 | 45 | 0.3-1.3 | 13 | 11 | 14 | 7 | 20 | 24 | 11 |
| | | | | 1.3-2.4 | 5 | 5 | 41 | 12 | 25 | 12 | 0 |
| | | | | Mean | 9 | 8 | 28 | 10 | 22 | 18 | 5 |
| b | 3 | 96 | 1 | 2.4-3.4 | 2 | 26 | 69 | 2 | 1 | 0 | 0 |
| | | | | 3.4-4.4 | 3 | 44 | 51 | 2 | 0 | 0 | 0 |
| | | | | 4.4-5.2 | 4 | 39 | 50 | 4 | 3 | 0 | 0 |
| | | | | Mean | 3 | 36 | 57 | 3 | 1 | 0 | 0 |
| a + b | 2 | 75 | 20 | Mean | 5 | 24 | 45 | 6 | 10 | 8 | 2 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 74 | 13 | 7 | 1 | 4 | 0 | 0 | 1 | 0 | 0 |
| b | 33 | 47 | 14 | 0 | 5 | 0 | 1 | 0 | 0 | 0 |
| a+b+c | 72 | 14 | 8 | 1 | 4 | 0 | trace | 1 | 0 | 0 |



**TL 93 SE 17** **9558 3134** **Hay Farm, Little Horkesley** **Block H**

Surface level +53.6 m
Water struck at +51.3 m, +49.2 m and +46.6 m
July 1977

Overburden 8.0 m
Mineral 1.8 m
Bedrock 0.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, sandy, silty, with angular to subangular flint, pale brown. Numerous subangular orange brown quartz sand bands throughout | 2.1 | 2.4 |
| | Clay, sandy, silty, with flint and chalk pebbles, yellow brown | 2.1 | 4.5 |
| | Silt, clayey, sandy, with flint and chalk pellets, pale yellow brown | 0.1 | 4.6 |
| | Clay, sandy, silty, with flint and chalk pebbles, yellow brown | 0.6 | 5.2 |
| | Clay, sandy, silty, with flint and chalk pebbles, dark grey | 2.8 | 8.0 |
| Glacial Sand and Gravel | Gravel, very sandy in lowermost 0.9 m<br>Gravel: coarse and fine, well rounded and angular to subrounded flint; with rounded to well rounded quartz, rounded quartzite and tabular ironstone; with some subangular igneous and metamorphics, subrounded sandstone and well rounded chalk; with a trace of limestone<br>Sand: medium with coarse, with some fine, quartz, grey brown | 1.8 | 9.8 |
| London Clay | Clay, silty, with some pyrite nodules, dark blue-grey | 0.5+ | 10.3 |

**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 |
| 3 | 44 | 53 | 8.0-8.9 | 1 | 2 | 10 | 10 | 35 | 42 | 0 |
| | | | 8.9-9.8 | 5 | 7 | 40 | 19 | 16 | 13 | 0 |
| | | | Mean | 3 | 5 | 25 | 14 | 26 | 27 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 25 | 36 | 15 | 10 | 2 | 2 | 6 | 4 | trace | 0 |

**TL 93 SE 18** **9578 3059** **Vinesse Farm, Little Horkesley** **Block H**

Surface level +51.9 m
Water struck at +49.0 m and +47.9 m
July 1977

Overburden 4.0 m
Mineral 1.2 m
Waste 0.5 m
Mineral 3.3 m
Bedrock 0.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Clay, sandy, silty, with fine and coarse pebbles of flint; with some fine silty sand seams | 1.7 | 2.0 |
| | Clay, sandy, silty, with angular flint and well rounded chalk pebbles, yellow brown | 0.8 | 2.8 |
| Glacial Sand and Gravel | Very pebbly and sandy clay, with fine and coarse flint and quartz gravel, yellow brown mottled grey brown | 1.2 | 4.0 |
| | a 'Clayey', sandy gravel<br>Gravel: fine with coarse, angular to subrounded and well rounded flint; with rounded to well rounded quartz; with some rounded quartzite and subrounded sandstone<br>Sand: medium with fine and coarse, yellow brown | 1.2 | 5.2 |
| | Clay, sandy, silty, dark grey with pockets of reddish brown | 0.5 | 5.7 |
| Kesgrave Sands and Gravels | b Gravel<br>Gravel: fine and coarse with a trace of cobbles, angular to subrounded and well rounded flint; with rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone; with a trace of igneous, metamorphics and chalk<br>Sand: medium with coarse and a trace of fine, subangular to rounded quartz with a trace of angular flint, pale yellow-brown | 3.3 | 9.0 |
| London Clay | Clay, silty, pale grey becoming dark grey from 9.4 m, with some pyrite nodules | 0.8+ | 9.8 |

**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 |
| a | 10 | 59 | 31 | 4.0-5.2* | 10 | 17 | 30 | 12 | 21 | 10 | 0 |
| b | 1 | 45 | 54 | 5.7-6.7* | 1 | 3 | 35 | 15 | 30 | 16 | 0 |
| | | | | 6.7-7.7* | 1 | 1 | 24 | 11 | 22 | 33 | 8 |
| | | | | 7.7-9.0* | 1 | 2 | 31 | 13 | 25 | 28 | 0 |
| | | | | Mean | 1 | 2 | 30 | 13 | 26 | 26 | 2 |
| a + b | 3 | 49 | 48 | Mean | 3 | 6 | 30 | 13 | 24 | 22 | 2 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 45 | 27 | 22 | 4 | 2 | 0 | 0 | 0 | 0 | 0 |
| b | 35 | 34 | 20 | 7 | 3 | trace | 0 | 1 | 0 | 0 |
| a + b | 36 | 33 | 20 | 7 | 3 | trace | 0 | 1 | 0 | 0 |



**TL 93 SE 19** **9681 3330** **300 m north-east of Lower Dairy Farm, Little Horkesley** **Block H**

Surface level +22.5 m
Water seeping at +15.1 m
July 1977

Overburden 0.9 m
Mineral 6.7 m
Bedrock 1.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Head | Silt, sandy, with some subangular to subrounded flints, fawn brown | 0.8 | 0.9 |
| Glacial Sand and Gravel | a 'Clayey' pebbly sand, with a sandy, silty clay seam with angular to subangular flint pebbles between 1.9 m and 2.4 m<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint and rounded to well rounded quartz; with some subrounded sandstone and rounded quartzite; with a trace of ironstone<br>Sand: medium with fine and some coarse, predominantly sub-rounded quartz with some coarse angular flint | 4.2 | 5.1 |
| Kesgrave Sands and Gravels | b Gravel, with discrete clay pellets increasing with depth<br>Gravel: fine with coarse, angular to subrounded flint; with well rounded flint and rounded to well rounded quartz; with some rounded quartzite and subrounded sandstone; with a trace of ironstone, igneous and metamorphics | 2.5 | 7.6 |
| London Clay | Clay, silty, with oxidised pyrite nodules, pale brown | 1.2 | 8.8 |
| | Clay, very silty, with some pyrite nodules, blue grey | 0.3+ | 9.1 |

**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 | 13 | 68 | 19 | 0.9-1.9 | 19 | 36 | 27 | 4 | 5 | 9 | 0 |
| | | | | 2.4-3.0 | 37 | 22 | 27 | 3 | 3 | 8 | 0 |
| | | | | 3.0-4.1 | 4 | 10 | 46 | 8 | 19 | 13 | 0 |
| | | | | 4.1-5.1 | 4 | 24 | 50 | 6 | 11 | 5 | 0 |
| | | | | Mean | 13 | 23 | 39 | 6 | 10 | 9 | 0 |
| b | 4 | 43 | 53 | 5.1-6.1 | 3 | 6 | 27 | 13 | 28 | 23 | 0 |
| | | | | 6.1-7.1 | 4 | 4 | 24 | 13 | 34 | 21 | 0 |
| | | | | 7.1-7.6 | 7 | 5 | 21 | 16 | 31 | 20 | 0 |
| | | | | Mean | 4 | 5 | 25 | 13 | 31 | 22 | 0 |
| a + b | 10 | 57 | 33 | Mean | 10 | 15 | 33 | 9 | 19 | 14 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 64 | 22 | 10 | 2 | 2 | 0 | trace | 0 | 0 | 0 |
| b | 75 | 12 | 9 | 2 | 2 | 0 | trace | trace | 0 | 0 |
| a + b | 72 | 15 | 9 | 2 | 2 | 0 | trace | trace | 0 | 0 |

**TL 93 SE 20** **9651 3309** **Lower Dairy Farm, Little Horkesley** **Block F**

Surface level +20.9 m
Water not struck
July 1977

Overburden 0.7 m
Mineral 2.1 m
Bedrock 4.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| | Silt, sandy, with some flints, pale brown | 0.4 | 0.7 |
| Terrace 3 | 'Very clayey' sandy gravel<br>Gravel: coarse and fine, angular to subrounded and well rounded flint; with rounded to well rounded quartz; with some rounded quartzite and subrounded sandstone; with a trace of ironstone<br>Sand: fine with medium and some coarse, predominantly sub-rounded to rounded quartz with some angular flint | 2.1 | 2.8 |
| London Clay | Silt, clayey, becoming silty clay with oxidised pyrite nodules, yellow brown becoming pale brown | 4.0 | 6.8 |
| | Clay, very silty, dark grey | 0.5+ | 7.3 |

**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 |
| 23 | 56 | 21 | 0.7-1.7 | 27 | 38 | 23 | 2 | 4 | 6 | 0 |
| | | | 1.7-2.3 | 19 | 22 | 23 | 5 | 15 | 16 | 0 |
| | | | Mean | 23 | 30 | 23 | 3 | 10 | 11 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 49 | 35 | 11 | 3 | 2 | 0 | trace | 0 | 0 | 0 |



**TL 93SE 21** **9630 3250** **Josselyns, Little Horkesley** **Block H**

Surface level +42.7 m
Water not struck
July 1977

Overburden 0.5 m
Mineral 1.9 m
Bedrock 1.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Boulder Clay | Silt, sandy, with fine subangular flint pebbles, pale brown | 0.2 | 0.5 |
| Kesgrave Sands and Gravels | Gravel, 'clayey' and coarse at base<br>Gravel: coarse with fine with some cobbles, angular to subrounded flint, with well rounded flint and rounded to well rounded quartz; with a trace of sandstone, quartzite, igneous, metamorphics and ironstone<br>Sand: medium with coarse with some fine, predominantly subrounded quartz with some angular flint | 1.9 | 2.4 |
| London Clay | Clay, silty, brown mottled yellow brown | 0.8 | 3.2 |
| | Clay, silty, dark grey | 0.5+ | 3.7 |

**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 |
| 9 | 29 | 62 | 0.5-1.5 | 7 | 4 | 19 | 8 | 23 | 25 | 14 |
| | | | 1.5-2.4 | 12 | 4 | 14 | 8 | 18 | 44 | 0 |
| | | | Mean | 9 | 4 | 17 | 8 | 21 | 34 | 7 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 72 | 19 | 6 | 1 | 1 | 0 | trace | 1 | 0 | 0 |

**TL 93 SE 22** **9682 3142** **Crabbs Farm, Great Horkesley** **Block H**

Surface level +55.9 m
Water struck at +53.8 m
June 1977

Overburden 1.7 m
Mineral 4.8 m
Bedrock 0.7 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Glacial Sand and Gravel | Silt, sandy, clayey, with flint pebbles, pale grey-brown | 0.5 | 0.6 |
| | Clay, sandy, very silty, with fine and some coarse subangular flints, orange-brown becoming pale brown | 1.1 | 1.7 |
| Kesgrave Sands and Gravels | Pebby sand, 'very clayey' in uppermost 0.5 m with some discrete clay seams and pellets throughout<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint, rounded to well rounded quartz sub-rounded sandstone and subangular igneous and metamorphics; with a trace of ironstone<br>Sand: medium with some fine and coarse, predominantly rounded quartz with some angular coarse flint | 4.8 | 6.5 |
| London Clay | Clay, silty, with oxidised pyrite nodules, pale grey mottled and streaked orange-brown | 0.4 | 6.9 |
| | Clay, silty, pale grey becoming dark grey with depth | 0.3+ | 7.2 |

**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 |
| 6 | 71 | 23 | 1.7-2.2* | 20 | 22 | 36 | 5 | 13 | 4 | 0 |
| | | | 2.2-3.2* | 3 | 9 | 57 | 12 | 15 | 4 | 0 |
| | | | 3.2-4.2* | 9 | 17 | 54 | 8 | 8 | 4 | 0 |
| | | | 4.2-5.2* | 5 | 15 | 41 | 9 | 16 | 14 | 0 |
| | | | 5.2-6.5* | 2 | 11 | 47 | 10 | 13 | 17 | 0 |
| | | | Mean | 6 | 14 | 48 | 9 | 13 | 10 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 53 | 17 | 16 | 7 | 3 | 0 | 1 | 2 | 1 | 0 |



**TL 93 SE 23** **9658 3060** **Knights Farm, Great Horkesley** **Block H**

Surface level +53.4 m
Water struck at +50.4 m
June 1977

Overburden 1.1 m
MIneral 1.0 m
Waste 0.9 m
Mineral 4.4 m
Bedrock 0.6 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Boulder Clay | Silt, sandy, clayey, with fine flint pebbles and chalk pellets, yellow brown | 0.4 | 0.5 |
| | Clay, very silty, sandy, with some flint pebbles, grey mottled orange brown | 0.6 | 1.1 |
| Glacial Sand and Gravel | **a** 'Very clayey' pebbly sand<br>Gravel: fine and coarse, well rounded and angular to sub-rounded flint; with rounded to well rounded quartz and a trace of ironstone<br>Sand: fine and medium with a trace of coarse, quartz, pale brown | 1.0 | 2.1 |
| | Clay, sandy, silty, with fine and coarse subangular flint and rounded quartz, pale brown mottled blue grey | 0.9 | 3.0 |
| Kesgrave Sands and Gravels | **b** Sandy gravel: very sandy in lowermost 0.4 m<br>Gravel: fine and coarse, angular to subrounded and well rounded quartz and rounded quartzite: with some subrounded sandstone, a trace of igneous and metamorphics<br>Sand: medium with coarse and fine, predominantly rounded quartz with some coarse angular flint | 4.4 | 7.4 |
| London Clay | Clay, silty. pale brown | 0.3 | 7.7 |
| | Clay, silty, with pyrite nodules, dark blue-grey | 0.3+ | 8.0 |

**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** | 37 | 56 | 7 | 1.1-2.1 | 37 | 32 | 22 | 2 | 4 | 3 | 0 |
| **b** | 1 | 51 | 48 | 3.0-4.0* | 1 | 7 | 32 | 13 | 25 | 22 | 0 |
| | | | | 4.0-5.0* | 3 | 9 | 35 | 11 | 18 | 24 | 0 |
| | | | | 5.0-6.0* | 0 | 3 | 19 | 10 | 33 | 35 | 0 |
| | | | | 6.0-7.0* | 0 | 6 | 25 | 17 | 29 | 23 | 0 |
| | | | | 7.0-7.4* | 1 | 33 | 52 | 5 | 5 | 4 | 0 |
| | | | | Mean | 1 | 9 | 30 | 12 | 24 | 24 | 0 |
| **a + b** | 8 | 51 | 41 | Mean | 8 | 13 | 28 | 10 | 21 | 20 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 37 | 51 | 11 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| **b** | 39 | 31 | 17 | 8 | 4 | 0 | 0 | 1 | 0 | 0 |
| **a + b** | 39 | 31 | 17 | 8 | 4 | 0 | trace | 1 | 0 | 0 |

**TL 93 SE 24** **9754 3487** **Shaddelows Farm, Stoke-by-Nayland** **Block E**

Surface level + 47.4 m
Water struck at +41.0 m
April 1977

Overburden 0.5 m
Mineral 8.3 m
Bedrock 0.7 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.5 | 0.5 |
| Glacial Sand and Gravel | **a** 'Clayey' gravel<br>Gravel: fine with coarse, angular to subrounded flint, with well rounded quartz and rounded quartzite with some subrounded sandstone and a trace of ironstone, igneous and metamorphics<br>Sand: medium with coarse and some fine, quartz, pale brown becoming rusty orange brown | 1.9 | 2.4 |
| Kesgrave Sands and Gravels | **b** Sand, with a trace of gravel, thin clay seams throughout<br>Gravel: fine platy ironstone; with well rounded and angular to subrounded flint, and rounded to well rounded quartz, with a trace of igneous, metamorphics and sandstone<br>Sand: fine with medium and a trace of coarse, predominantly rounded quartz with a trace of angular coarse flint | 6.4 | 8.8 |
| London Clay | Clay, silty, extensively iron-stained with abundant oxidized pyrite nodules, grey | 0.2 | 9.0 |
| | Clay, silty, slightly micaceous with race nodules and pyrite nodules up to 10 cm across, dark grey | 0.3+ | 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** | 11 | 42 | 47 | 0.5-1.5 | 10 | 6 | 18 | 14 | 35 | 17 | 0 |
| | | | | 1.5-2.4 | 12 | 8 | 25 | 13 | 24 | 18 | 0 |
| | | | | Mean | 11 | 7 | 21 | 14 | 30 | 17 | 0 |
| **b** | 7 | 92 | 1 | 2.4-3.4 | 7 | 56 | 33 | 3 | 1 | 0 | 0 |
| | | | | 3.4-4.4 | 7 | 56 | 35 | 1 | 1 | 0 | 0 |
| | | | | 4.4-5.4 | 6 | 61 | 29 | 4 | 0 | 0 | 0 |
| | | | | 5.4-6.4 | 10 | 52 | 35 | 3 | 0 | 0 | 0 |
| | | | | 6.4-7.4* | 6 | 51 | 39 | 4 | 0 | 0 | 0 |
| | | | | 7.4-8.8* | 7 | 51 | 34 | 7 | 1 | 0 | 0 |
| | | | | Mean | 7 | 54 | 34 | 4 | 1 | 0 | 0 |
| **a + b** | 8 | 81 | 11 | Mean | 8 | 44 | 31 | 6 | 7 | 4 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 58 | 20 | 11 | 5 | 4 | 0 | 1 | 1 | 0 | 0 |
| **b** | 15 | 23 | 8 | 0 | 1 | 0 | 52 | 1 | 0 | 0 |
| **a + b** | 57 | 20 | 11 | 5 | 4 | 0 | 2 | 1 | 0 | 0 |



**TL 93 SE 25** **9734 3398** **Pop's Bridge, Great Horkesley** **Block F**

Surface level +12.4 m
Water struck at +10.4 m
June 1977

Overburden 1.2 m
Mineral 2.9 m
Bedrock 3.0 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.3 | 0.3 |
| Alluvium | Clay, sandy, silty, with some fine subangular flint pebbles, organic traces throughout, dark grey mottled dark brown | 0.9 | 1.2 |
| | Gravel: becoming coarser with depth<br>Gravel: fine and coarse with some cobbles, angular to subrounded flint; with well rounded flint, rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone; with a trace of chalk igneous, metamorphics and limestone<br>Sand: medium and coarse with a trace of fine, rounded quartz with angular flint, pale brown | 2.9 | 4.1 |
| Lower London Tertiaries | Clay, silty, reddish-brown mottled pale grey-green | 1.1 | 5.2 |
| | Silt, very clayey, dark blue grey mottled red brown | 0.5 | 5.7 |
| | Silt, clayey, pale green with red-brown mottling | 1.4+ | 7.1 |

**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 |
| 1 | 33 | 66 | 1.2-2.0 | 2 | 3 | 32 | 11 | 32 | 20 | 0 |
| | | | 2.0-3.0* | 0 | 3 | 15 | 18 | 43 | 21 | 0 |
| | | | 3.0-4.1* | 0 | 1 | 8 | 12 | 34 | 38 | 7 |
| | | | Mean | 1 | 2 | 17 | 14 | 36 | 27 | 3 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 65 | 18 | 7 | 6 | 2 | 1 | 0 | 1 | trace | 0 |

**TL 93 SE 26** **9796 3350** **0.5 km north of Whitepark Farm, Great Horkesley** **Block F**

Surface level +19.7 m
Water not struck
June 1977

Overburden 1.0 m
Mineral 3.2 m
Bedrock 2.8 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Head | Silt, sandy, clayey, with trace of subrounded flint and rounded quartz pebbles, pale brown | 0.7 | 1.0 |
| | Sandy gravel: with discrete light grey clay pellets<br>Gravel: coarse and fine, angular to subrounded flint; with well rounded flint, rounded quartzite and subangular igneous and metamorphics; with a trace of chalk and ironstone<br>Sand: medium with coarse and fine, predominantly rounded quartz with some coarse subangular flint | 3.2 | 4.2 |
| London Clay | Silt, sandy, yellow-brown stained brown in pockets | 1.8 | 6.0 |
| | Silt, fine sandy, clayey, grey-brown with dark green glauconite | 1.0+ | 7.0 |

**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 |
| 6 | 53 | 41 | 1.0-2.0 | 9 | 10 | 35 | 10 | 22 | 14 | 0 |
| | | | 2.0-3.0 | 1 | 22 | 30 | 12 | 22 | 13 | 0 |
| | | | 3.0-4.2 | 7 | 5 | 20 | 18 | 36 | 14 | 0 |
| | | | Mean | 6 | 12 | 28 | 13 | 27 | 14 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 67 | 9 | 8 | 9 | 4 | 1 | trace | 2 | trace | 0 |



**TL 93 SE 27** **9736 3262** **The Chantry, Great Horkesley** **Block H**

Surface level +57.7 m
Water struck at +47.7 m
June 1977

Overburden 0.3 m
Mineral 7.7 m
Bedrock 1.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Glacial Sand and Gravel | **a** 'Clayey' pebbly sand, gravelly in uppermost 2.1 m, with discrete clay pellets with clay seams in lowermost 2.6 m<br>Gravel: fine with coarse, angular to subrounded flint; with well rounded flint, rounded to well rounded quartz and rounded sandstone and subangular igneous and metamorphics; with a trace of ironstone<br>Sand: medium with fine and some coarse, quartz, with some angular flint, orange-brown becoming yellow brown | 4.7 | 5.0 |
| Kesgrave Sands and Gravels | **b** Gravel, iron cemented from 6.5 m with clay pellets in lowermost 1.0 m, coarser with depth<br>Gravel: fine with coarse, angular to subrounded; with rounded to well rounded flint and quartz and rounded quartzite with some subrounded sandstone and a trace of igneous and metamorphics<br>Sand: medium with coarse and some fine, quartz, with some angular coarse flint, fawn brown | 3.0 | 8.0 |
| London Clay | Clay, silty, reddish brown | 1.1 | 9.1 |
| | Clay, silty, dark blue grey | 0.4+ | 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** | 15 | 67 | 18 | 0.3-1.3 | 14 | 16 | 29 | 7 | 18 | 16 | 0 |
| | | | | 1.3-2.4 | 12 | 11 | 39 | 8 | 16 | 14 | 0 |
| | | | | 2.4-3.1 | 7 | 28 | 60 | 2 | 3 | 0 | 0 |
| | | | | 3.1-4.1 | 26 | 33 | 32 | 3 | 6 | 0 | 0 |
| | | | | 4.1-5.0 | 15 | 28 | 41 | 5 | 10 | 1 | 0 |
| | | | | Mean | 15 | 23 | 39 | 5 | 11 | 7 | 0 |
| **b** | 1 | 35 | 64 | 5.0-6.0 | 2 | 6 | 28 | 12 | 35 | 17 | 0 |
| | | | | 6.0-7.0 | 0 | 2 | 19 | 11 | 38 | 30 | 0 |
| | | | | 7.0-8.0 | 1 | 2 | 15 | 11 | 36 | 35 | 0 |
| | | | | Mean | 1 | 3 | 21 | 11 | 37 | 27 | 0 |
| **a + b** | 10 | 54 | 36 | Mean | 10 | 15 | 32 | 7 | 21 | 15 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 58 | 15 | 15 | 5 | 3 | 0 | 1 | 3 | 0 | 0 |
| **b** | 50 | 16 | 19 | 11 | 3 | 0 | 0 | 1 | trace | 0 |
| **a + b** | 52 | 16 | 18 | 9 | 3 | 0 | trace | 2 | trace | 0 |

**TL 93 SE 28** **9781 3157** **Nevards Farm, Great Horkesley** **Block H**

Surface level +52.2 m
Water struck at +49.0 m
June 1977

Overburden 0.8 m
Mineral 9.3 m
Bedrock 0.3 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| | Silt, sandy, clayey, with fine subrounded flint pebbles, pale yellow brown | 0.5 | 0.8 |
| Glacial Sand and Gravel | **a** 'Very clayey' sand<br>Gravel: fine and coarse angular to subrounded flint; with well rounded flint and rounded to well rounded quartz; with some rounded quartzite and subrounded sandstone; with a trace of igneous metamorphics, ironstone and limestone<br>Sand: fine and medium with some coarse, quartz, orange brown | 2.4 | 3.2 |
| Kesgrave Sands and Gravels | **b** Sandy gravel, with discrete clay pellets<br>Gravel: coarse and fine with a trace of cobbles, angular to subrounded with well rounded flint, rounded to well rounded quartz, rounded quartzite and subrounded sandstone; with some subangular igneous and metamorphics with a trace of micaceous siltstone.<br>Sand: medium with some fine and coarse, predominantly rounded quartz with a trace of angular flint, yellow-brown | 3.0 | 6.2 |
| Red Crag | **c** Sand, pebbly at base<br>Gravel: fine, well rounded and angular to subrounded flint; with rounded to well rounded quartz and tabular ironstone; with some subrounded sandstone; with a trace of phosphatic nodules<br>Sand: fine with medium and some coarse, subrounded to rounded quartz with some coarse angular flints and subrounded dark brown iron cemented sandstones, rusty brown | 3.9 | 10.1 |
| London Clay | Clay, silty, dark blue grey | 0.3 + | 10.4 |

**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** | 30 | 60 | 10 | 0.8-1.8 | 31 | 27 | 24 | 5 | 9 | 4 | 0 |
| | | | | 1.8-3.2 | 30 | 28 | 30 | 4 | 4 | 4 | 0 |
| | | | | Mean | 30 | 28 | 28 | 4 | 6 | 4 | 0 |
| **b** | 1 | 53 | 46 | 3.2-4.2* | 1 | 10 | 38 | 6 | 23 | 22 | 0 |
| | | | | 4.2-5.2* | 2 | 5 | 25 | 9 | 27 | 26 | 6 |
| | | | | 5.2-6.2* | 1 | 13 | 46 | 8 | 12 | 20 | 0 |
| | | | | Mean | 1 | 9 | 36 | 8 | 21 | 23 | 2 |
| **c** | 3 | 95 | 2 | 6.2-7.2* | 2 | 44 | 42 | 11 | 1 | 0 | 0 |
| | | | | 7.2-8.2* | 4 | 68 | 23 | 4 | 1 | 0 | 0 |
| | | | | 8.9-9.2* | 2 | 51 | 36 | 8 | 3 | 0 | 0 |
| | | | | 9.2-10.1* | 3 | 49 | 36 | 10 | 2 | 0 | 0 |
| | | | | Mean | 3 | 53 | 34 | 8 | 2 | 0 | 0 |
| **a+b+c** | 10 | 72 | 18 | Mean | 10 | 32 | 33 | 7 | 9 | 8 | 1 |



**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 59 | 20 | 13 | 4 | 3 | 0 | trace | 1 | trace | 0 |
| **b** | 39 | 19 | 15 | 14 | 8 | 0 | 0 | 4 | 1 | 0 |
| **c** | 30 | 41 | 14 | 0 | 2 | 0 | 11 | 0 | 1 | 1 |
| **a+b+c** | 40 | 19 | 16 | 13 | 7 | 0 | trace | 4 | trace | trace |

**TL 93 SE 29** **9746 3207** **400 m south of New Barns, Great Horkesley** **Block H**

Surface level +53.3 m
Water struck at +49.2 m
June 1977

Overburden 2.5 m
Mineral 5.8 m
Bedrock 0.4 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 0.4 | 0.4 |
| Boulder Clay | Clay, silty, sandy, with some angular to subrounded flint and subrounded quartz pebbles, orange-brown mottled light grey | 2.1 | 2.5 |
| Glacial Sand and Gravel | **a** 'Very clayey' pebbly sand<br>Gravel: fine and coarse, angular to subrounded flint; with rounded to well rounded quartz and well rounded flint; with some rounded quartzite and a trace of sandstone<br>Sand: medium with fine and some coarse, quartz, orange-brown mottled light grey | 1.0 | 3.5 |
| Kesgrave Sands and Gravels | **b** Sandy gravel, 'clayey' at top, with cobbles at base, and discrete clay seams and pellets<br>Gravel: coarse and fine with some cobbles, angular to subrounded and well rounded flint; with rounded to well rounded quartz, rounded quartzite and subrounded sandstone; with some angular igneous and metamorphics<br>Sand: medium with coarse and fine, predominantly quartz with some subangular coarse flint | 3.6 | 7.1 |
| Red Crag | **c** Sand, with iron-cemented seams throughout<br>Gravel: fine, angular to subrounded flint; with well rounded flint, rounded to well rounded quartz, tabular ironstone and subangular igneous and metamorphics; with some subrounded sandstone<br>Sand: fine with medium and a trace of coarse, rounded quartz; brown becoming rusty brown | 1.2 | 8.3 |
| London Clay | Clay, silty, dark grey mottled brown | 0.3 | 8.6 |
| | Clay, silty, dark blue-grey | 0.1+ | 8.7 |

**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 |
| a | 32 | 54 | 14 | 2.5-3.5 | 32 | 20 | 31 | 3 | 7 | 7 | 0 |
| b | 4 | 62 | 34 | 3.5-4.1* | 11 | 7 | 40 | 7 | 17 | 8 | 0 |
| | | | | 4.1-5.1* | 3 | 5 | 37 | 8 | 20 | 27 | 0 |
| | | | | 5.1-6.1* | 3 | 3 | 52 | 17 | 14 | 11 | 0 |
| | | | | 6.1-7.1* | 3 | 24 | 37 | 7 | 7 | 13 | 9 |
| | | | | Mean | 4 | 10 | 42 | 10 | 14 | 17 | 3 |
| c | 3 | 94 | 3 | 7.1-8.3* | 3 | 60 | 28 | 6 | 3 | 0 | 0 |
| a+b+c | 9 | 67 | 24 | Mean | 9 | 22 | 37 | 8 | 11 | 12 | 1 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| a | 67 | 13 | 17 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| b | 37 | 27 | 16 | 11 | 7 | 0 | 0 | 2 | trace | 0 |
| c | 46 | 23 | 13 | 0 | 3 | 0 | 9 | 6 | 0 | 0 |
| a+b+c | 40 | 26 | 16 | 10 | 6 | 0 | trace | 2 | trace | 0 |



**TL 93 SE 30** **9870 3440** **Stanch Hole, Boxted** **Block F**

Surface level +9.9 m
Water struck at +8.7 m
June 1977

Overburden 1.2 m
Mineral 3.1 m
Bedrock 1.7 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| Alluvium | Silt, clayey, slightly sandy, with fine and some coarse subangular flint and subrounded quartz pebbles; with pockets and seams of peat, dark brown becoming yellowish-brown | 1.1 | 1.2 |
| | Gravel, with discrete grey clay pellets<br>Gravel: fine with coarse, angular to subrounded flint; with rounded quartzite, well rounded flint, and rounded to well rounded quartz; with some well rounded chalk and subrounded sandstone; with a trace of igneous, metamorphics, ironstone and fossils<br>Sand: medium with coarse and some fine, predominantly subrounded to rounded quartz, with some subangular coarse flint and well rounded coarse medium and fine chalk, pale grey-brown | 3.1 | 4.3 |
| Lower London Tertiaries | Silt, sandy, with glauconite, dark olive-green | 0.9 | 5.2 |
| | Silt, clayey, greenish blue-grey mottled yellow brown in pockets | 0.8+ | 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 |
| 1 | 47 | 52 | 1.2-2.2* | 3 | 3 | 20 | 15 | 40 | 19 | 0 |
| | | | 2.2-3.2* | 0 | 7 | 38 | 10 | 30 | 15 | 0 |
| | | | 3.2-4.3* | 1 | 6 | 26 | 17 | 39 | 11 | 0 |
| | | | Mean | 1 | 5 | 28 | 14 | 37 | 15 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 71 | 8 | 6 | 9 | 3 | 3 | trace | trace | trace | 0 |

**TL 93 SE 31** **9857 3243** **Potter Farm, Great Horkesley** **Block H**

Surface level +49.7 m
Water struck at +47.1 m
June 1977

Overburden 0.4 m
Mineral 7.1 m
Bedrock 0.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.4 | 0.4 |
| Glacial Sand and Gravel | **a** 'Clayey' sand<br>Gravel: fine, angular to subrounded and well rounded flint; with rounded to well rounded quartz; with some tabular ironstone and a trace of sandstone<br>Sand: fine with medium and a trace of coarse, rounded quartz, orange-brown | 1.4 | 1.8 |
| Kesgrave Sands and Gravels | **b** Sandy gravel, 'clayey' at top with discrete clay pellets throughout<br>Gravel: fine and coarse, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint and rounded quartzite; with some subrounded sandstone; with a trace of igneous and metamorphics<br>Sand: medium with coarse and fine, predominantly rounded quartz with angular coarse flint, pale yellow brown becoming orange brown | | 3.0 |
| Red Crag | **c** Sand<br>Gravel: fine, well rounded flint; with angular to subrounded flint and rounded to well rounded quartz with some subangular igneous and metamorphics; with a trace of sandtone, ironstone and quartzite<br>Sand: medium with fine and coarse, subrounded to rounded quartz, brown | 2.7 | 7.5 |
| London Clay | Clay, silty, dark blue-grey | 0.5+ | 8.0 |

**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** | 18 | 81 | 1 | 0.4-1.8* | 18 | 51 | 28 | 2 | 1 | 0 | 0 |
| **b** | 4 | 59 | 37 | 1.8-2.8* | 10 | 15 | 24 | 9 | 25 | 17 | 0 |
| | | | | 2.8-3.8* | 2 | 4 | 50 | 16 | 18 | 10 | 0 |
| | | | | 3.8-4.8* | 1 | 7 | 41 | 11 | 17 | 23 | 0 |
| | | | | Mean | 4 | 9 | 38 | 12 | 20 | 17 | 0 |
| **c** | 2 | 94 | 4 | 4.8-5.8* | 3 | 22 | 58 | 14 | 3 | 0 | 0 |
| | | | | 5.8-6.8* | 2 | 24 | 52 | 18 | 4 | 0 | 0 |
| | | | | 6.8-7.5* | 2 | 31 | 52 | 11 | 4 | 0 | 0 |
| | | | | Mean | 2 | 25 | 54 | 15 | 4 | 0 | 0 |
| **a+b+c** | 6 | 77 | 17 | Mean | 6 | 23 | 43 | 11 | 10 | 7 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 61 | 25 | 10 | 0 | 1 | 0 | 3 | 0 | 0 | 0 |
| **b** | 43 | 19 | 23 | 12 | 2 | 0 | 0 | 1 | trace | 0 |
| **c** | 22 | 58 | 15 | 1 | 1 | 0 | 1 | 2 | trace | 0 |
| **a+b+c** | 42 | 22 | 22 | 11 | 2 | 0 | trace | 1 | trace | 0 |



**TL 93 SE 32** **9876 3160** **Holly Lodge, Great Horkesley** **Block H**

Surface level +47.2 m
Water struck at +45.3 m
June 1977

Overburden 1.9 m
Mineral 1.4 m
Bedrock 0.7 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| | Silt, fine sandy, clayey, with some subrounded fine flint pebbles, pale yellow grey | 1.6 | 1.9 |
| Kesgrave Sands and Gravels | 'Clayey' sandy gravel<br>Gravel: fine with coarse, rounded to well rounded quartz and angular to subrounded flint; with well rounded flint and rounded quartzite; with some subrounded sandstone and subangular igneous and metamorphics with a trace of ironstone<br>Sand: fine with medium and coarse, predominantly rounded quartz with subangular coarse flint, yellow brown | 1.4 | 3.3 |
| London Clay | Clay, silty, pale brown | 0.2 | 3.5 |
| | Clay, silty, dark blue grey | 0.5+ | 4.0 |

**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 |
| 10 | 56 | 34 | 1.9-3.3* | 10 | 27 | 19 | 10 | 20 | 14 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 31 | 21 | 33 | 9 | 4 | 0 | trace | 2 | trace | 0 |

**TL 93 SE 33** **9856 3076** **Redhouse Farm, Boxted** **Block H**

Surface level +49.9 m
Water struck at +47.8 m
June 1977

Overburden 0.4 m
Mineral 6.2 m
Bedrock 0.4 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| | Silt, sandy, clayey, with flints, yellow brown | 0.1 | 0.4 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel, with discrete clay pellets<br>Gravel: fine with coarse, angular to subrounded flint with rounded to well rounded quartz, well rounded flint, rounded quartzite and subrounded sandstone; with some subangular igneous and metamorphics<br>Sand: medium with fine and some coarse, rounded quartz, pale orange-brown | 1.8 | 2.2 |
| Kesgrave Sands and Gravels | **b** Gravel, with cobbles at top<br>Gravel: fine and coarse with some cobbles, angular to subrounded flint; with well rounded flint, rounded quartz and rounded quartzite; with some subrounded sandstone and subangular igneous and metamorphics<br>Sand: medium with coarse and some fine, predominantly rounded quartz with angular coarse flint, fawn brown | 2.1 | 4.3 |
| Red Crag | **c** Pebbly sand<br>Gravel: fine, well rounded flint; with tabular ironstone angular to subrounded flint, and rounded to well rounded quartz, with some rounded quartzite and well rounded phosphatic nodules; with a trace of igneous and metamorphics<br>Sand: medium with coarse and fine, quartz, rusty brown | 2.3 | 6.6 |
| London Clay | Clay, silty, with some pyrite nodules, dark blue-grey | 0.4+ | 7.0 |

**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** | 18 | 54 | 28 | 0.4-1.4 | 21 | 16 | 22 | 9 | 18 | 14 | 0 |
| | | | | 1.4-2.2 | 14 | 23 | 31 | 9 | 15 | 8 | 0 |
| | | | | Mean | 18 | 19 | 26 | 9 | 17 | 11 | 0 |
| **b** | 1 | 34 | 65 | 2.2-3.2* | 2 | 3 | 20 | 14 | 36 | 14 | 11 |
| | | | | 3.2-4.3* | 0 | 3 | 17 | 11 | 29 | 40 | 0 |
| | | | | Mean | 1 | 3 | 19 | 12 | 32 | 28 | 5 |
| **c** | 1 | 87 | 12 | 4.3-5.3* | 2 | 19 | 44 | 22 | 13 | 0 | 0 |
| | | | | 5.3-6.1* | 0 | 13 | 49 | 26 | 12 | 0 | 0 |
| | | | | Mean | 1 | 16 | 47 | 24 | 12 | 0 | 0 |
| **a+b+c** | 6 | 59 | 35 | Mean | 6 | 12 | 31 | 16 | 20 | 13 | 2 |



**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 39 | 16 | 23 | 13 | 6 | 0 | 0 | 2 | 1 | 0 |
| **b** | 47 | 18 | 17 | 11 | 4 | 0 | 0 | 2 | 1 | 0 |
| **c** | 19 | 44 | 13 | 3 | trace | 0 | 19 | trace | 0 | 2 |
| **a+b+c** | 44 | 19 | 18 | 11 | 4 | 0 | 1 | 2 | 1 | trace |

**TL 93 SE 34** **9964 3498** **Hall Farm, Stoke-by-Nayland** **Block F**

Surface level +9.7 m
Water struck at +9.1 m
March 1977

Overburden 0.5 m
Mineral 5.7 m
Bedrock 0.6 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| | Clay, silty, with subangular flints, dark grey-brown | 0.3 | 0.5 |
| Terrace 1-3 | Gravel<br>Gravel: fine and coarse, angular to subrounded flint; with well rounded flint and rounded to well rounded quartz; with some rounded quartzite and subrounded sandstone; with a trace of chalk, igneous, metamorphics and limestone<br>Sand: medium with coarse and a trace of fine, predominantly rounded quartz with rounded chalk and some angular coarse flint | 5.7 | 6.2 |
| London Clay | Clay, very silty, micaceous, soft, dark grey clay | 0.6+ | 6.8 |

**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 |
| 2 | 37 | 61 | 0.5-1.5* | 2 | 4 | 17 | 17 | 41 | 19 | 0 |
| | | | 1.5-2.5* | 0 | 1 | 16 | 13 | 41 | 29 | 0 |
| | | | 2.5-3.5* | 2 | 3 | 16 | 10 | 31 | 38 | 0 |
| | | | 3.5-4.5* | 2 | 4 | 20 | 11 | 36 | 28 | 0 |
| | | | 4.5-5.5* | 3 | 3 | 32 | 14 | 31 | 17 | 0 |
| | | | 5.5-6.2* | 0 | 2 | 30 | 17 | 24 | 27 | 0 |
| | | | Mean | 2 | 3 | 21 | 13 | 35 | 26 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 70 | 14 | 9 | 3 | 3 | 1 | 0 | trace | trace | 0 |

**TL 93 SE 35** **9922 3411** **700 m south-east of Stanch Hole, Boxted** **Block F**

Surface level +10.6 m
Water struck at +8.9 m
June 1977

Overburden 0.9 m
Mineral 3.8 m
Bedrock 3.5 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.2 | 0.2 |
| Head | Silt, sandy, with some subangular flint pebbles, pale brown | 0.7 | 0.9 |
| | **a** Sandy gravel<br>Gravel: fine with some coarse, angular to subrounded flint; with well rounded flint, rounded to well rounded flint, rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone and subangular igneous and metamorphics; with a trace of chalk, ironstone and fossils<br>Sand: medium and fine with coarse, predominantly rounded quartz with well rounded chalk and some angular coarse flint, pale brown | 1.8 | 2.7 |
| Lower London Tertiaries | **b** Sand, contaminated with a trace of pebbles from above<br>Sand: fine with some medium and a trace of coarse, subrounded to rounded quartz with some glauconite, pale greyish brown | 2.0 | 4.7 |
| | Silt, sandy, micaceous, with glauconite, pale brownish green becoming dark greenish grey | 2.5 | 7.2 |
| | Silt, clayey, grey-green with grey silt seams | 0.6 | 7.8 |
| | Clay, silty, micaceous, pinkish grey | 0.4+ | 8.2 |

**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** | 4 | 48 | 48 | 0.9-1.7 | 7 | 16 | 20 | 10 | 30 | 17 | 0 |
| | | | | 1.7-2.7* | 1 | 19 | 17 | 14 | 33 | 16 | 0 |
| | | | | Mean | 4 | 18 | 18 | 12 | 32 | 16 | 0 |
| **b** | 6 | 93 | 1 | 2.7-3.7* | 4 | 79 | 15 | 1 | 1 | 0 | 0 |
| | | | | 3.7-4.7* | 7 | 82 | 10 | 1 | 0 | 0 | 0 |
| | | | | Mean | 6 | 80 | 12 | 1 | 1 | 0 | 0 |
| **a + b** | 5 | 72 | 23 | Mean | 5 | 51 | 15 | 6 | 15 | 8 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamorphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 60 | 16 | 12 | 7 | 2 | 1 | trace | 2 | trace | 0 |
| **b** | 57 | 6 | 10 | 2 | 0 | 0 | 25 | 0 | 0 | 0 |
| **a + b** | 60 | 16 | 12 | 7 | 2 | 1 | trace | 2 | trace | 0 |



**TL 93 SE 36** **9932 3285** **300 m south of Boxted Hall, Boxted** **Block H**

Surface level +49.7 m
Water struck at +45.1 m
June 1977

Overburden 0.6 m
Mineral 7.9 m
Bedrock 0.7 m+

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.1 | 0.1 |
| | Silt, sandy, with some subangular flints, grey-brown | 0.5 | 0.6 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel, with discrete clay pellets<br>Gravel: fine with coarse, angular to subrounded flint; with rounded to well rounded quartz, well rounded flint and rounded quartzite; with some subrounded sandstone and subangular igneous and metamorphics<br>Sand: medium with some coarse and fine, quartz, pale brown | 2.9 | 3.5 |
| Kesgrave Sands and Gravels | **b** Pebbly sand, 'clayey' at top<br>Gravel: fine with coarse, angular to subrounded with well rounded flint; rounded to well rounded quartz and rounded quartzite; with some subrounded sandstone and a trace of igneous and metamorphics<br>Sand: medium with fine and some coarse predominantly rounded quartz with some coarse angular flint, yellow brown | 5.0 | 8.5 |
| London Clay | Clay, silty, grey-brown | 0.2 | 8.7 |
| | Clay, silty, with some pyrite nodules, dark blue-grey | 0.5+ | 9.2 |

**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** | 13 | 50 | 37 | 0.6-1.6 | 17 | 18 | 29 | 6 | 17 | 13 | 0 |
| | | | | 1.6-2.6 | 11 | 6 | 29 | 11 | 25 | 18 | 0 |
| | | | | 2.6-3.5 | 10 | 6 | 31 | 15 | 26 | 12 | 0 |
| | | | | Mean | 13 | 10 | 30 | 10 | 23 | 14 | 0 |
| **b** | 4 | 87 | 9 | 3.5-4.5 | 10 | 8 | 60 | 13 | 7 | 2 | 0 |
| | | | | 4.5-5.5* | 3 | 25 | 43 | 9 | 12 | 8 | 0 |
| | | | | 5.5-6.5* | 3 | 35 | 51 | 5 | 5 | 1 | 0 |
| | | | | 6.5-7.5* | 0 | 33 | 53 | 7 | 5 | 2 | 0 |
| | | | | 7.5-8.5* | 1 | 40 | 50 | 7 | 2 | 0 | 0 |
| | | | | Mean | 4 | 28 | 51 | 8 | 6 | 3 | 0 |
| **a + b** | 7 | 74 | 19 | Mean | 7 | 22 | 43 | 9 | 12 | 7 | 0 |

**COMPOSITION**

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamorphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 45 | 18 | 20 | 11 | 4 | 0 | 0 | 2 | trace | 0 |
| **b** | 46 | 23 | 17 | 8 | 4 | 0 | 0 | 1 | 1 | 0 |
| **a + b** | 46 | 19 | 19 | 10 | 4 | 0 | 0 | 2 | trace | 0 |

**TL 93 SE 37** **9963 3152** **Noakes Farm, Boxted** **Block H**

Surface level +49.5 m
Water struck at +45.8 m
June 1977

Overburden 1.1 m
Mineral 10.5 m
Bedrock 0.5 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| | Silt, sandy, clayey, grey brown stained dark brown in spots | 0.3 | 0.6 |
| | Clay, sandy, silty, with subangular fine flints and subrounded fine quartz, orange-brown mottled light grey | 0.5 | 1.1 |
| Glacial Sand and Gravel | **a** 'Clayey' pebbly sand<br>Gravel: fine and coarse, angular to subrounded flint and rounded to well rounded quartz; with well rounded quartzite; with some subrounded sandstone<br>Sand: fine and medium with a trace of coarse quartz pale brown | 0.8 | 1.9 |
| Kesgrave Sands and Gravels | **b** Sandy gravel, discrete clay pellets in uppermost 2.0 m<br>Gravel: fine and coarse, angular to subrounded flint with well rounded flint, rounded to well rounded quartz, rounded quartzite and subrounded sandstone with a trace of igneous and metamorphics<br>Sand: medium with some coarse and fine, predominantly rounded quartz with some angular coarse flint, pale grey brown | 5.8 | 7.7 |
| Red Crag | **c** Pebbly sand<br>Gravel: fine with some coarse, well rounded flint; with tabular ironstone, angular to subrounded flint and rounded to well rounded quartz; with some rounded quartzite; with a trace of igneous, metamorphics and sandstone<br>Sand: medium with fine and some coarse, predominantly subrounded to rounded quartz, rusty brown | 3.9 | 11.6 |
| London Clay | Clay, silty, with some pyrite nodules, dark blue-grey | 0.5+ | 12.1 |

## 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** | 14 | 82 | 4 | 1.1-1.9 | 14 | 44 | 37 | 1 | 3 | 1 | 0 |
| **b** | 3 | 49 | 48 | 1.9-2.9 | 9 | 9 | 26 | 8 | 22 | 26 | 0 |
| | | | | 2.9-3.7 | 7 | 5 | 33 | 6 | 26 | 23 | 0 |
| | | | | 3.7-4.7* | 3 | 1 | 25 | 10 | 25 | 36 | 0 |
| | | | | 4.7-5.7* | 0 | 2 | 38 | 21 | 27 | 12 | 0 |
| | | | | 5.7-6.7* | 0 | 1 | 33 | 11 | 27 | 28 | 0 |
| | | | | 6.7-7.7* | 0 | 13 | 46 | 7 | 17 | 17 | 0 |
| | | | | Mean | 3 | 5 | 33 | 11 | 24 | 24 | 0 |
| **c** | 2 | 91 | 7 | 7.7-8.7* | 2 | 28 | 67 | 2 | 1 | 0 | 0 |
| | | | | 8.7-9.7* | 2 | 25 | 60 | 6 | 6 | 1 | 0 |
| | | | | 9.7-10.7* | 2 | 19 | 54 | 12 | 9 | 4 | 0 |
| | | | | 10.7-11.6* | 3 | 14 | 46 | 29 | 7 | 1 | 0 |
| | | | | Mean | 2 | 22 | 57 | 12 | 6 | 1 | 0 |
| **a+b+c** | 4 | 66 | 30 | Mean | 4 | 14 | 42 | 10 | 16 | 14 | 0 |



## COMPOSITION

percentages by weight in gravel fraction

| | Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 44 | 10 | 36 | 5 | 4 | 0 | 0 | 0 | 1 | 0 |
| **b** | 43 | 24 | 16 | 9 | 7 | 0 | 0 | 1 | trace | 0 |
| **c** | 16 | 54 | 10 | 2 | trace | 0 | 18 | trace | trace | 0 |
| **a+b+c** | 42 | 25 | 16 | 8 | 7 | 0 | 1 | 1 | trace | 0 |

**TL 93 SE 38** **9948 3038** **County Council Small Holdings, Boxted** **Block H**

Surface level +49.8 m
Water struck at +47.9 m
June 1977

Overburden 1.7 m
Mineral 5.4 m
Bedrock 0.5 m+

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Topsoil | 0.3 | 0.3 |
| Glacial Sand and Gravel | Silt, clayey, sandy, with subrounded flint, pale grey to dark brown | 0.4 | 0.7 |
| | Clay, sandy, silty, with fine subangular flint with rounded quartz, pale orange brown mottled light grey | 1.0 | 1.7 |
| Kesgrave Sands and Gravels | Gravel, clayey at top becoming coarser with depth<br>Gravel: fine and coarse with a trace of cobbles, angular to subrounded flint; with rounded quartzite and rounded to well rounded quartz; with some subrounded sandstone and subangular igneous and metamorphics<br>Sand: medium with some coarse and fine, predominantly rounded quartz with some coarse angular flint, fawn brown | 5.4 | 7.1 |
| London Clay | Clay, silty, rusty orange brown | 0.2 | 7.3 |
| | Clay, silty, dark blue-grey | 0.3+ | 7.6 |

## 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 | 42 | 55 | 1.7-2.7* | 11 | 16 | 29 | 7 | 24 | 13 | 0 |
| | | | 2.7-3.7* | 1 | 9 | 16 | 12 | 40 | 22 | 0 |
| | | | 3.7-4.7* | 2 | 7 | 23 | 7 | 27 | 27 | 7 |
| | | | 4.7-5.7* | 0 | 2 | 29 | 9 | 23 | 37 | 0 |
| | | | 5.7-7.1* | 0 | 4 | 32 | 10 | 23 | 22 | 9 |
| | | | Mean | 3 | 7 | 26 | 9 | 27 | 24 | 4 |

## COMPOSITION

percentages by weight in gravel fraction

| Angular flint | Well rounded flint | Quartz | Quartzite | Sandstone | Chalk | Iron-stone | Igneous and Metamporphic | Others | Phosphatic nodules |
|---|---|---|---|---|---|---|---|---|---|
| 37 | 22 | 14 | 21 | 3 | 0 | 0 | 2 | 1 | 0 |

The following records of IGS-registered boreholes were also used in the assessment of resources:
TL 93 NW 1, 2, 4, 9, 10; NE 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 19, 20, 21, 22, 24, 25; SW 3, 4, 6, 7, 8, 10, 14; SE 1, 2, 3, 5, 7, 9, 10.

## APPENDIX F

### LIST OF WORKINGS

Only one site [963 390], 1 km south-east of Hagmore Green, has been worked on any substantial scale for agregate on Sheet TL 93. It has now been reclaimed and restored to agriculture.

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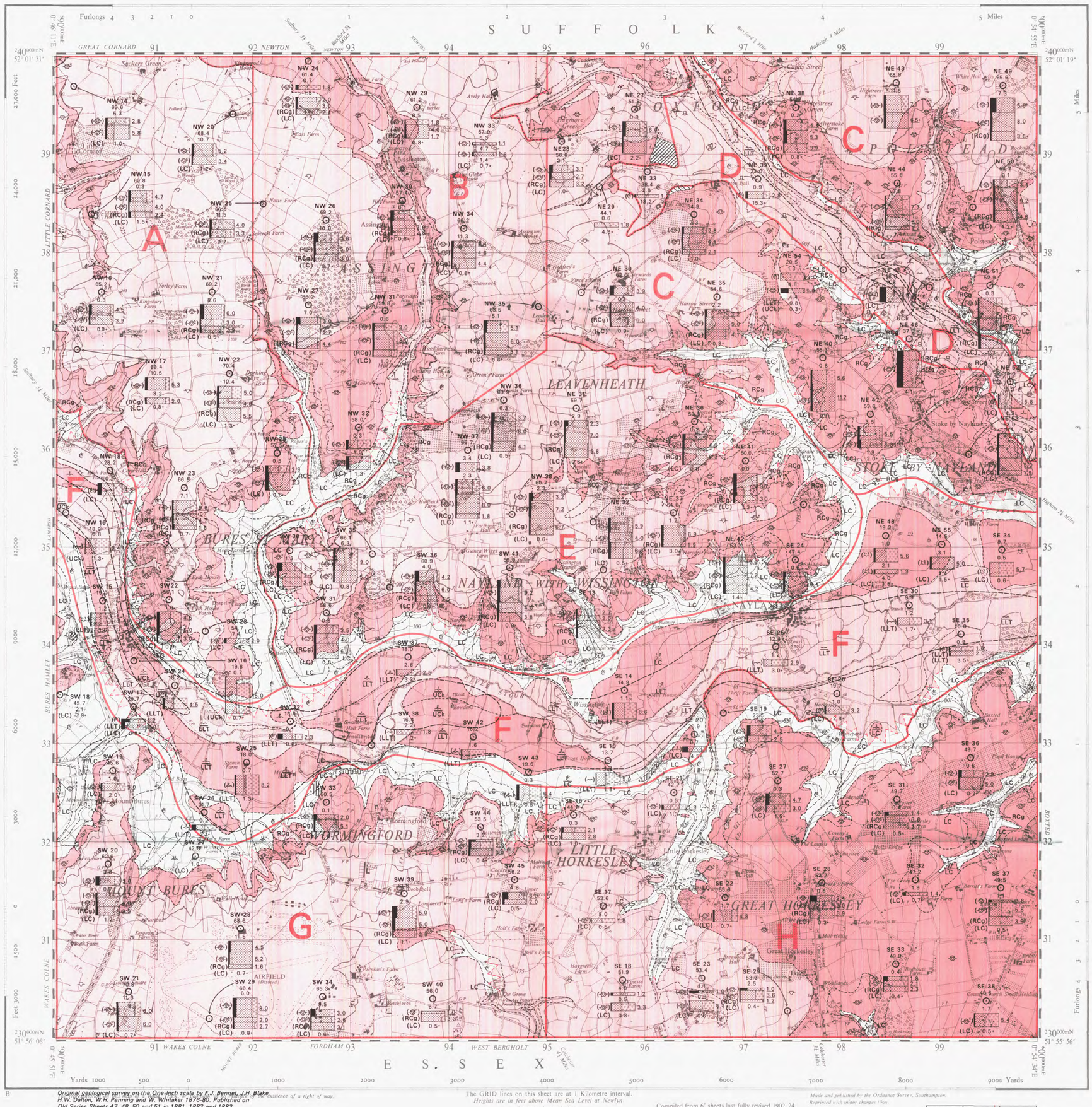
INSTITUTE OF GEOLOGICAL SCIENCES

INDUSTRIAL MINERALS ASSESSMENT UNIT

# THE SAND AND GRAVEL RESOURCES OF SHEET TL 93 (NAYLAND, SUFFOLK)

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

ORDNANCE SURVEY
SHEET TL 93
PROVISIONAL EDITION




*Original geological survey on the One-inch scale by F.J. Bennet, J.H. Blake, H.W. Dalton, W.H. Pennring and W. Whitaker 1876-80. Published on Old Series Sheets 47, 48, 50 and 51 in 1881, 1882 and 1883.*

*Surveyed on the six-inch scale by S.R. Mills and R. Ellison 1974-75; W.A. Read, District Geologist.*

*Sand and Gravel survey by P.M. Hopson, D.W. Lewis, and R.W. Gatliff in 1977. R.G. Thurrell, Head, Industrial Minerals Assessment Unit.*

*Sand and Gravel Resource Sheet published in 1981.*

G.M. Brown, D.Sc., F.R.S., *Director, Institute of Geological Sciences.*

Drawn and printed for the Institute of Geological Sciences by Cook, Hammond & Kell Ltd., Mitcham and Westminster.

The GRID lines on this sheet are at 1 Kilometre interval.
*Heights are in feet above Mean Sea Level at Newlyn*
*Contours subsequent to 1955.*

*1 square inch on this map represents 99.639 acres on the ground.*

*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.*

Compiled from 6" sheets last fully revised 1902-24. Other partial systematic revision 1938-54 has been incorporated.
Major roads revised 1965.

*Made and published by the Ordnance Survey, Southampton. Reprinted with minor changes 1969.*

| | | |
|---|---|---|
| TL 84 206 | TL 94 | TM 04 207 |
| TL 83 223 | TL 93 | TM 03 224 |
| TL 73 | TL 92 | TM 02 |

*Diagram showing the relation of the National Grid 1:25000 sheets with the*

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

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## EXPLANATION OF SYMBOLS AND ABBREVIATIONS

**Landslip** L-1

DRIFT

RIVER TERRACE DEPOSITS

**Peat** - soft black partially decomposed organic matter P-2

**Alluvium** - silty and sandy clays and thin seams of silty sand A-56

**First to Third Terraces** - mainly sand and gravel with some clay (differentiated where possible) 1T-32

**Undifferentiated Terrace** - pebbly silty clay UT-8

**Head** - soliflucted clayey, pebbly silts and sands. H-35

**Glacial Silts** - laminated silty clays and silty chalky sands GSI-6

**Boulder Clay** - bluish grey weathering brown silty, chalky, pebbly clay BC-32

**Glacial Sand and Gravel** - silty and clayey sandy gravel GS-59

**Kesgrave Sands and Gravels** - fine and medium sands with pebbles K-4

RECENT AND PLEISTOCENE

SOLID

RCg **Red Crag** - orange brown sands with some shell debris RC-5

PLEISTOCENE

LC **London Clay** - stiff bluish grey silty clay

LLT **Lower London Tertiaries** - greenish grey clayey silty fine sand

EOCENE AND PALAEOCENE

UCk **Upper Chalk** - soft white well-jointed and well-bedded limestone with flint bands

UPPER CRETACEOUS

**Worked-out Ground** (sand and gravel) WO-4

**Made Ground** MG-2

### BOUNDARY LINES

Geological boundary, Drift

Geological boundary, Solid

Inferred boundary between recognised categories of deposits

Resource Block boundary

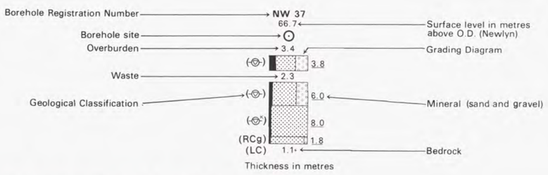
Broken lines denote uncertainty

### BOREHOLE DATA

#### SITE LOCATIONS

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

#### I.M.A.U. BOREHOLES




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, e.g. NW 37. The letters refer to the quarter sheet and the figures to the I.G.S. serial number for that quarter. The unique designation for borehole NW 37 is TL 93 NW 37.

#### Grading Diagrams

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

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

The height of the diagram is proportional to the mineral thickness

The widths of the divisions shows the proportions of **Fines, Sand** and **Gravel,** but small amounts of **Gravel** may be omitted or exaggerated.

### CATEGORIES OF DEPOSITS

**Exposed mineral, assessed** CAT-E2

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

**Sand and gravel either not potentially workable (see Report) or absent** CAT-A2

Where appropriate on other sheets the categories, 'discontinuous spreads of minerals beneath overburden' and 'sand and gravel not assessed' are recognised.

### RESOURCE BLOCKS

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

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