# The sand and gravel resources of the country around Bury St Edmunds, Suffolk

## Description of 1 : 25 000 resource sheet TL 86

M. P. Hawkins

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.
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Report.

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# The sand and gravel resources of the country around Bury St Edmunds (Suffolk)

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### SUMMARY

The geological maps of the Institute of Geological Sciences, pre-existing borehole information and 78 boreholes specially drilled for the Industrial Minerals Assessment Unit form the basis of the assessment of sand and gravel resources of the country around Bury St Edmunds (Suffolk).

All deposits in the area which might be potentially workable for sand and gravel have been investigated and a simple statistical method has been used to estimate their 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 four resource blocks containing from 9.2 to 16.5 km$^2$ of sand and gravel; the deposits in each block are described. For all four blocks a statistical assessment of the sand and gravel resources is made and the mineral-bearing areas, the mean thickness of overburden and mineral and the mean grading are given.

The position of boreholes and data recorded from them, the geology and the outlines of the blocks are shown on the accompanying resource sheet.

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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, both the economic and the social factors used to decide whether a deposit may be workable in the future cannot 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; 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 one metre 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 BS sieve, about $\frac{1}{16}$ mm) should not exceed 40 per cent.

d  The deposit must 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.

For the particular needs of assessing sand and gravel resources, a grain-size classification based on the geometric scale $\frac{1}{16}$ mm, $\frac{1}{4}$ mm, 1 mm, 4 mm, 16 mm has been adopted. The boundaries between fines (that is, the clay and silt fractions) and sand, and between sand and
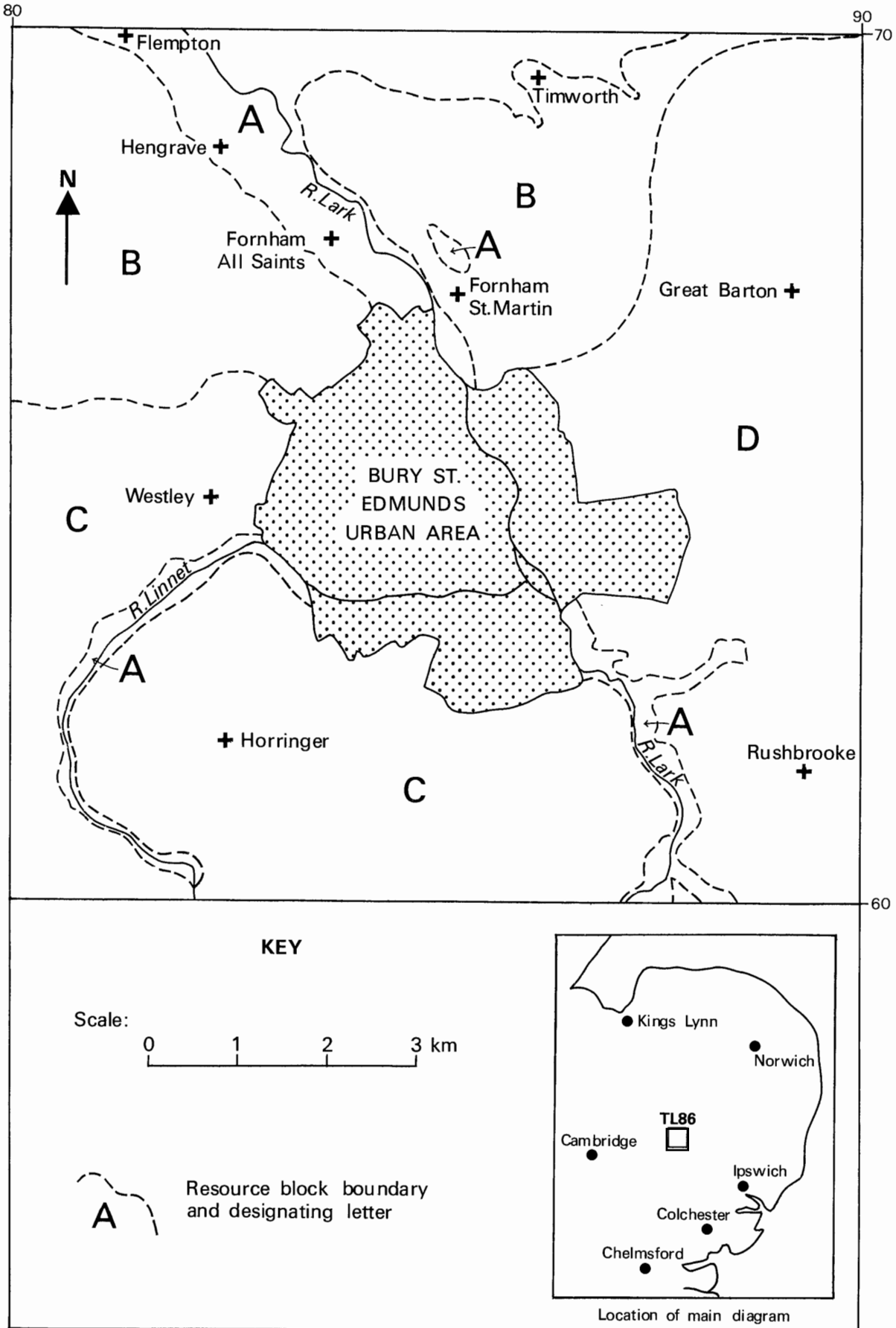
**Figure 1**  The location of the Bury St Edmunds resource sheet and of the resource block boundaries.
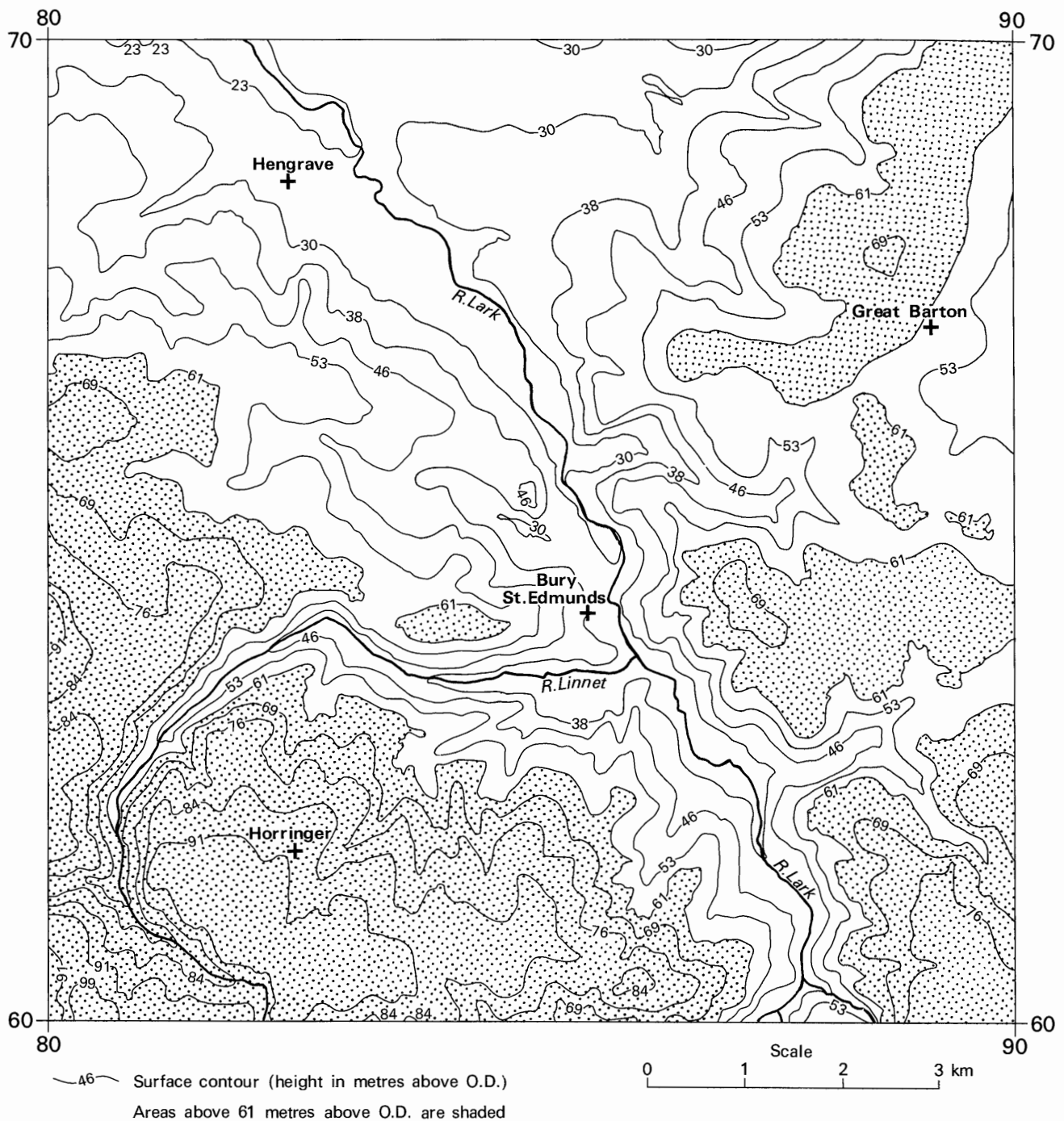
**Figure 2** The topography of the resource sheet area.

gravel grade material, are placed at $\frac{1}{16}$ mm and 4 mm respectively (see Appendix C).

The volume and other characteristics are assessed within resource blocks, each of which, ideally, contains approximately 10 km$^2$ of sand and gravel. No account is taken of any factors, for example, roads, villages and 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 the mineral in parts of a block, except in the immediate vicinity of the actual sample points.*

## DESCRIPTION OF THE RESOURCE SHEET

### GENERAL

This report gives an assessment of the sand and gravel resources of 100 km$^2$ of ground which includes the market town of Bury St Edmunds in Suffolk (Figure 1). The urban area of Bury St Edmunds has recently expanded and now occupies 13.4 km$^2$ of the resource sheet; no assessment has been made of the sand and gravel deposits within this built-up area. The surrounding countryside is mainly rich agricultural land, of which 44.5 km$^2$ is considered to be mineral-bearing, containing an estimated 255 million cubic metres of potentially workable gravel. These resources (described in resource blocks A, B, C and D) consist principally of Glacial Sand and Gravel, with smaller amounts of River Terrace Deposits, Crag, Cover Sand, Head and Head Gravel.

## TOPOGRAPHY

The principal topographic feature of the area (Figure 2) is the valley of the River Lark, which flows from south-east to north-west across the resource sheet area. Its flood-plain is flanked by river terraces which become more extensive towards the north. The country to the south of Bury St Edmunds forms an undulating plateau, divided by the valley of the River Lark and its associated narrow floodplain and remnant terraces. The plateau is highest in the south-west of the area, where the maximum recorded height (+98 m OD) is attained in Ickworth Park [8186 6108].

## GEOLOGY

The country around Bury St Edmunds was first surveyed at the scale of one inch to one mile by F. J. Bennett, J. H. Blake and W. Whitaker, and the descriptive memoir was published in 1886 (Bennett and Blake, 1886). The area has recently been remapped at the six inch scale by C. R. Bristow and B. S. P. Moorlock (in 1976–78). The mapped deposits of the area are classified in Table 1, and a brief account of the nature of each deposit is given below.

**Table 1**  Geological classification of the mapped deposits

| | |
|---|---|
| **DRIFT** | |
| *Recent and Pleistocene* | |
| Peat | Soft dark brown organic matter |
| Alluvium | Clay and silt, shelly and peaty in part |
| Head and Head Gravel | Gravel to sandy clay, of variable composition, mainly derived by solifluxion |
| River Terrace Deposits | Sand and gravel, locally clayey, composed mainly of flint |
| Cover Sand | Fine to medium-grained clayey sand with scattered flint pebbles |
| Lacustrine Deposits | Grey and buff silt and clay with shells and plant material |
| Glacial Silts | Grey and buff silt and clayey silt |
| Boulder Clay | Grey and brown clay and silty clay, with scattered chalk and flint pebbles |
| Glacial Sand and Gravel | Sand and gravel, locally clayey, consisting mainly of flint, occurring above, beneath and more rarely within the Boulder Clay |
| **SOLID** | |
| *Pleistocene* | |
| Crag | Yellow and orange clayey quartz sand and pebbly sand, pebbles consisting mainly of vein-quartz and flint |
| *Upper Cretaceous* | |
| Chalk | Soft white limestone with nodular flints |

### SOLID
### Chalk

The Chalk consists of massively bedded soft white limestone, with occasional bands of nodular flint. It crops out to the west of Bury St Edmunds and locally along the sides of river valleys, but it is present throughout the sheet area beneath the deposits of Drift and Crag. In some parts of the area, faunal evidence allows a distinction between the Middle Chalk which occurs mainly in the north of the area, and the Upper Chalk which occurs in the south. However, because of the general paucity of available information, the conjectural boundary between the two units is not shown on the resource map. In the past the Chalk has been worked both underground and in open pits within the sheet area. A deep drift-filled buried channel system is cut into the surface of the Chalk (Figure 3), and is approximately followed by the course of the present-day River Lark. A well sunk into this channel near Nowton Lodge Farm [870 611] proved chalk at a depth of 80.2 m (−30 m OD).

### Crag

Sand classified as Crag is found in the southern part of the resource sheet area where it crops out near Sicklesmere [880 607] and near Blackthorpe [895 632]. It unconformably overlies the Upper Chalk, and is in turn overlain by Drift deposits. In assessment boreholes the Crag was proved to consist mainly of 'clayey' to 'very clayey' sand and pebbly sand (for nomenclature see Appendix C) varying in colour from yellow to orange-brown. It comprises mainly iron-stained, fine and medium quartz sand, with a fine gravel fraction composed of vein-quartz and flint, with some sandstone and quartzite pebbles. Its thickness, as proved in 6 assessment boreholes, varies from 1.9 m (in borehole SW 38) to 14.5 m (in borehole SE 179), and it has a mean thickness of 7.5 m. Three assessment boreholes (SW 38, SW 40, and SW 41) drilled near Horsecroft [842 618] proved Crag with a base level between 61.3 m (in borehole SW 40) and 62.3 m (in borehole SW 38). In contrast, lower base levels between 49.4 m (in borehole SE 179) and 54.4 m (in borehole SE 178) were found in the three assessment boreholes (SE 175, SE 178, and SE 179) drilled to the south-east of Bury St Edmunds.

### DRIFT
### Glacial Sand and Gravel

Deposits of Glacial Sand and Gravel occur in two main areas: in a belt extending from Little Horringer Hall [818 629], passing to the south of Bury St Edmunds, and then north-eastwards towards Great Barton [890 670]; and in an east–west belt between Brakey Pin [801 690] and Wadgate Plantation [877 699].

The assessment boreholes show that the Glacial Sand and Gravel generally occurs below the Boulder Clay (see cross-sections at foot of resource map). However, thin spreads of sand and gravel also occur at various levels within the Boulder Clay (for example in boreholes NE 86, 94, 95 and 100, and NW 103). Four assessment boreholes (NW 113, NE 86, NE 101 and SE 166) also proved Glacial Sand and Gravel at various levels within the Drift deposits of the buried channel system, where the sand and gravel has a mean thickness of 8.5 m and ranges from 1.2 m (in borehole NE 101) to 22.4 m (in borehole NE 86).

The Glacial Sand and Gravel in assessment boreholes ranges in thickness from 0.7 m (in borehole SW 38) to 22.4 m (in borehole NE 86); it has a mean thickness of 5.5 m. It is very variable in grain size, and ranges from sand, to gravel which is often 'clayey' or 'very clayey', but it shows no obvious regional variations. The fine gravel fraction consists mainly of flint with vein-quartz, sandstone, quartzite and some chalk.

Because of the difficulty in defining the lateral extent of individual bodies of Glacial Sand and Gravel, all of these deposits within the sheet area have been assessed as a single mineral deposit, rather than as separate upper or lower units as shown on the geological map (see the section on composition below).

### Boulder Clay

Boulder Clay covers much of the resource sheet area and was found in 56 assessment boreholes. The greatest thicknesses occur in the southern part of the sheet area,
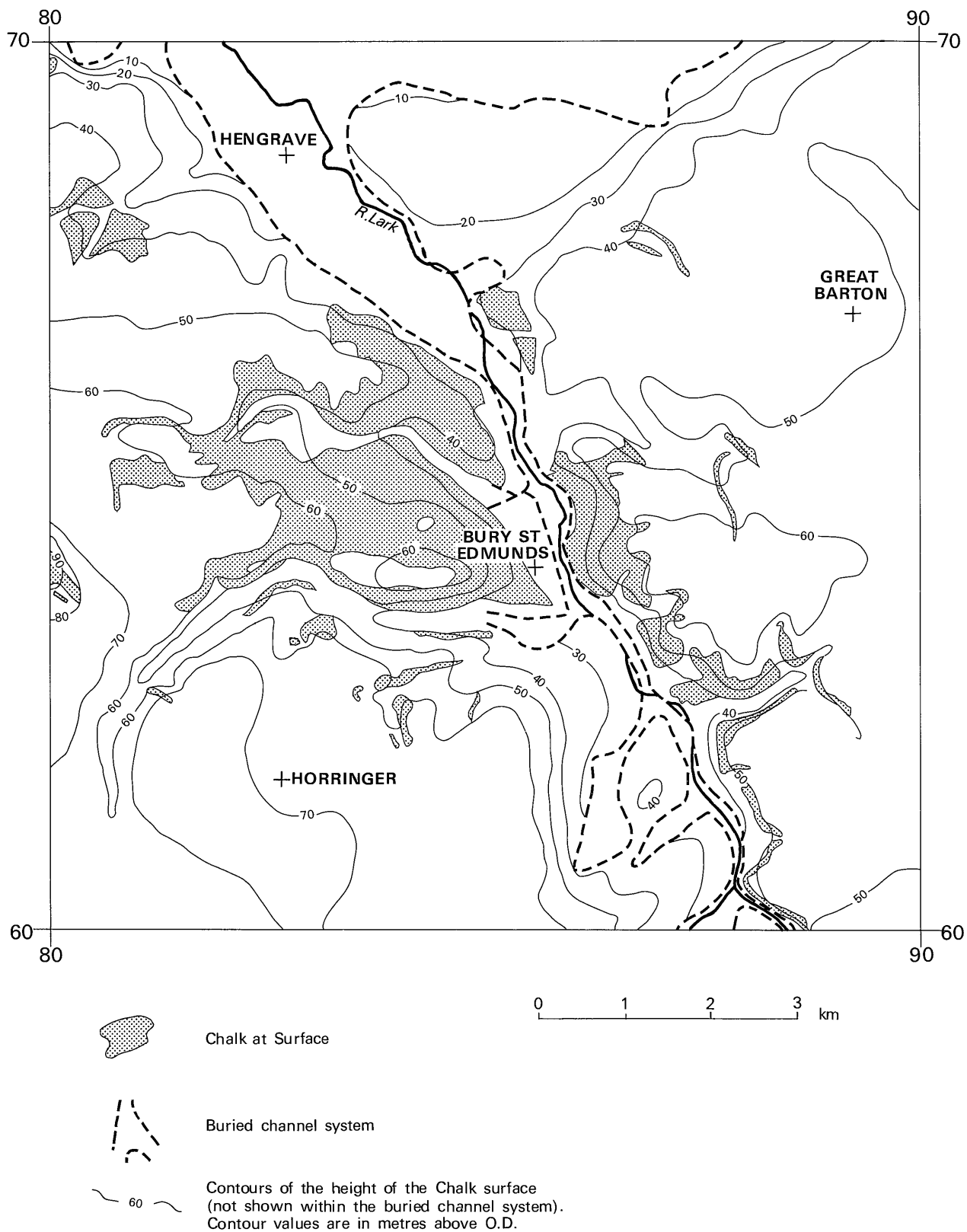
**Figure 3** Contour map of the surface of the Chalk.

where up to 35 m of Boulder Clay has been proved. Large thicknesses were also found near the margins of the buried channel system (in boreholes NW 101 and 114) and in the north-east corner of the sheet area (in borehole NE 97).

The Boulder Clay consists of clay or silty clay with pebbles of rounded to well-rounded chalk with sub-rounded to subangular flint, and traces of vein-quartz, sandstone, quartzite, red chalk, shale, limestone, calcite and various igneous rock types. Thin silty and sandy beds also occur locally within the sequence.

Where the Boulder Clay is exposed, the top few metres are generally weathered to a buff-brown colour, and the uppermost half metre may be completely decalcified. This weathered zone passes downwards, through a mottled brown and grey zone, to the typical grey or dark grey clay.

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### Glacial Silts

Although they occur only locally at the surface, the Glacial Silts are more extensive beneath the River Terrace Deposits of the Lark Valley, where they fill the buried channel system. They consist of bluish grey silt and silty clay, which is often finely laminated and contains thin beds of rounded to well rounded chalk sand. The unweathered deposit usually passes upwards into a weathered buff and brown sandy silt of variable thickness.

Most assessment boreholes drilled within the buried channel system did not reach the base of the silts, except boreholes NW 104 and NE 81, where the silts were found to overlie Boulder Clay.

Relatively thin sequences of Glacial Silts were also found in two assessment boreholes (NE 93 and 96) not drilled within the main buried channel system.

### Lacustrine Deposits

Lacustrine Deposits crop out near Sicklesmere [875 610] and near Nowton Court [869 620] and were proved in four assessment boreholes (NE 83, 101, SE 166 and 167). They consist of grey and buff silt and clay with occasional shells and plant material.

In borehole NE 101, 2.4 m of dark brownish green silt with shells and plant debris passes downwards into 4.5 m of bluish grey silt with lignitic fragments. In boreholes SE 166 and 167 the deposits consist of pale cream to orange-brown clay and silt, while in borehole NE 83, 0.9 m of pinkish-brown silty clay and dark grey sandy silt was proved within Glacial Sand and Gravel.

### Cover Sand

Deposits of Cover Sand occur over about 9.2 km² of the resource sheet area as thin discontinuous spreads overlying the Solid and Drift (Glacial Sand and Gravel and Boulder Clay) deposits. They consist mainly of an orange-brown 'clayey' to 'very clayey' pebbly sand with a fine gravel fraction consisting of patinated flint, chalk, sandstone, quartzite and vein-quartz pebbles.

The Cover Sand is mapped only where it reaches an average thickness of more than one metre. Sixteen assessment boreholes proved Cover Sand, ranging in thickness from 0.2 m (in borehole SW 38) to 2.2 m (in borehole NE 84) with a mean thickness of 1.2 m. Since the base of the Cover Sand is commonly involuted, recorded thicknesses may show wide variation.

### River Terrace Deposits

The largest spreads of River Terrace Deposits are found in the Lark Valley around Hengrave [826 687]; they extend eastwards between Dixon's Covert [827 697] and Wadgate Plantation [877 699]. Small patches also occur in the Lark Valley south of Bury St Edmunds and along the Linnet Valley. Three main terrace levels have been recognised.

The deposits consist of sand and gravel with variable fines contents; the gravel fraction is composed principally of subangular to subrounded flint with minor amounts of vein-quartz, sandstone and quartzite.

The mean thickness of these deposits, based upon data from 15 assessment boreholes, is 3.1 m, with a range from 0.2 m (in borehole NW 104) to 6.8 m (in borehole SE 170).

### Head and Head Gravel

Deposits of Head and Head Gravel, formed principally by solifluxion, occur near Vicarage Farm [899 680], along the sides of the Lark Valley and in many of the minor valleys. Their thickness, as proved in seven assessment boreholes, ranges from 0.8 m (in borehole SE 167) to 7.4 m (in borehole SW 31); they have a mean thickness of 4.8 m. This mean thickness value, however, is probably unrealistically large since the lower parts of the deposits recorded as Head and Head Gravel may in fact be River Terrace Deposits (in boreholes SW 29 and 31) or Glacial Sand and Gravel (in borehole NE 98).

The deposits are very variable, ranging from sandy clay to gravel. Two assessment boreholes (SE 166 and SE 167) proved only clay, while another five boreholes (SW 29, SW 32, NE 89, NE 98 and SE 173) proved mainly sand and gravel.

The fine gravel fraction of these deposits consists of subangular to subrounded flint, chalk, vein-quartz, sandstone and quartzite.

### Alluvium

Deposits of alluvium form the floodplain of the River Lark and of the minor valleys. They consist of silt and clay which is locally peaty and shelly. Alluvium was proved in four assessment boreholes (NW 109, NW 116, SW 31 and SE 168), to range in thickness from 0.4 m (in borehole NW 116) to 2.5 m (in borehole NW 109); it has a mean thickness of 1.3 m.

### Peat

Deposits of peat occur in the Lark Valley near Sicklesmere [876 600], Fornham All Saints [840 677] and Timworth [860 699], but they were not encountered in any assessment boreholes.

## COMPOSITION OF THE SAND AND GRAVEL

Five potentially workable sand and gravel deposits occur within the sheet area: Glacial Sand and Gravel, River Terrace Deposits, Crag, Cover Sand, and Head (including Head Gravel).

The mean grading characteristics of the Drift deposits as proved in assessment boreholes are shown in Table 2 and Figure 4, while the mean compositions are shown in Table 3. The full ranges of composition and grading results are shown in Figures 5 and 6 respectively.

### Crag

The mean grading of the Crag is fines 19 per cent, sand 74 per cent and gravel 7 per cent, and it is thus classified as a 'clayey' pebbly sand.

The fine gravel fraction is composed of subrounded to well rounded vein-quartz (41 per cent) and subangular to subrounded flint (36 per cent) with subangular to well rounded white to reddish brown sandstone and quartzite (20 per cent). Chalk was recorded in samples from one borehole (SW 41).

The sand fraction is composed mainly of iron-stained quartz and some flint; its mean grading is fine sand 40 per cent, medium sand 29 per cent and coarse sand 5 per cent.

### Glacial Sand and Gravel

The mean grading of the Glacial Sand and Gravel is fines 11 per cent, sand 61 per cent and gravel 28 per cent; it is classified as a 'clayey' sandy gravel. Since the stratigraphical relationships between the deposits of Glacial Sand and Gravel are not always clear, upper and lower deposits have not been distinguished for the purpose of mean grading and composition calculations.

The fine gravel fraction of these deposits is composed of angular to subrounded flint (67 per cent) with vein-quartz (15 per cent), sandstone and quartzite (10 per cent) and some chalk (4 per cent). In some boreholes, especially in

**Table 2**  Mean gradings of the mineral deposits

| Deposit | No. of samples | Mean grading percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | $-\frac{1}{16}$ mm | $+\frac{1}{16}-\frac{1}{4}$ mm | $+\frac{1}{4}-1$ mm | $+1-4$ mm | $+4-16$ mm | $+16-64$ mm | $+64$ mm |
| Head and Head Gravel | 21 | 17 | 35 | 21 | 7 | 12 | 8 | 0 |
| River Terrace Deposits | 38 | 12 | 26 | 18 | 9 | 21 | 14 | 0 |
| Cover Sand | 11 | 24 | 40 | 21 | 4 | 6 | 5 | 0 |
| Glacial Sand and Gravel | 124 | 11 | 21 | 32 | 8 | 14 | 13 | 1 |
| Crag | 40 | 19 | 40 | 29 | 5 | 4 | 2 | 1 |
| River Terrace Deposits (1st Terrace) | 8 | 7 | 9 | 14 | 12 | 33 | 24 | 1 |
| River Terrace Deposits (2nd Terrace) | 24 | 14 | 29 | 19 | 9 | 18 | 11 | 0 |
| River Terrace Deposits (3rd Terrace) | 6 | 13 | 36 | 18 | 7 | 16 | 10 | 0 |

*Note*  Samples with more than 40 per cent fines have not been included in the mean grading calculations.

**Table 3**  Mean composition of the fine gravel fraction of the mineral deposits

| Deposit | No. of samples | Flint (%) | Vein-quartz (%) | Sandstone (%) | Chalk (%) | Others (%) |
|---|---|---|---|---|---|---|
| Head and Head Gravel | 10 | 76 | 6 | 6 | 10 | 2 |
| River Terrace Deposits | 9 | 86 | 6 | 4 | 2 | 2 |
| Cover Sand | 5 | 76 | 5 | 7 | 8 | 4 |
| Glacial Sand and Gravel | 25 | 67 | 15 | 10 | 4 | 4 |
| Crag | 8 | 36 | 41 | 20 | 0 | 3 |

*Notes*
1  No attempt has been made in this study to distinguish chert from flint, or quartzite from sandstone.
2  The category 'Others' includes ironstone, shale, limestone, calcite and various metamorphic and igneous lithologies.
3  Pebbles count results from samples with less than 40 grams of $+4-16$ mm material have not been used in the calculation of mean compositions.

the northern part of the resource sheet, larger amounts of sandstone and quartzite occur, probably derived from the Bunter deposits of the Midlands, with a maximum 46 per cent recorded in one sample from assessment borehole NE 83.

The mean grading of the sand fraction is medium sand 32 per cent, fine sand 21 per cent and coarse sand 8 per cent.

*Cover Sand*
The mean grading of the Cover Sand is fines 24 per cent, sand 65 per cent and gravel 11 per cent and is therefore classified as a 'very clayey' pebbly sand. However, samples collected from some assessment boreholes (NW 102, NW 103, NW 108 and NW 121) contained more than 40 per cent fines; these have been classified as non-mineral, and have not been used in the assessment.

The fine gravel fraction is composed of angular to subrounded patinated flint (76 per cent) with some chalk (8 per cent), sandstone and quartzite (7 per cent) and vein quartz (5 per cent).

The mean grading of the sand fraction is fine sand 40 per cent, medium sand 21 per cent and coarse sand 4 per cent.

*River Terrace Deposits*
The mean grading of all of the River Terrace Deposits is fines 12 per cent, sand 53 per cent and gravel 35 per cent, which is classified as a 'clayey' sandy gravel. The fine gravel is composed of subangular to subrounded flint (86 per cent), vein quartz (6 per cent), and some sandstone and quartzite (4 per cent), and chalk (2 per cent).
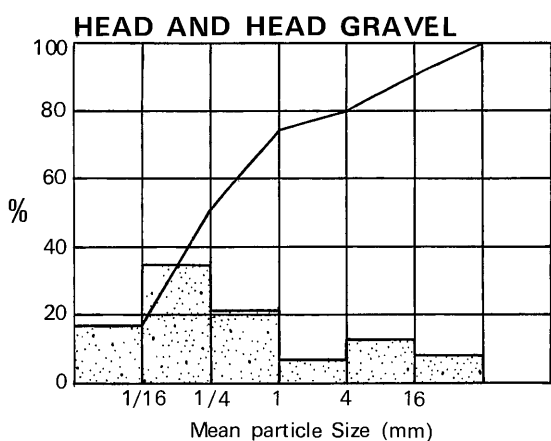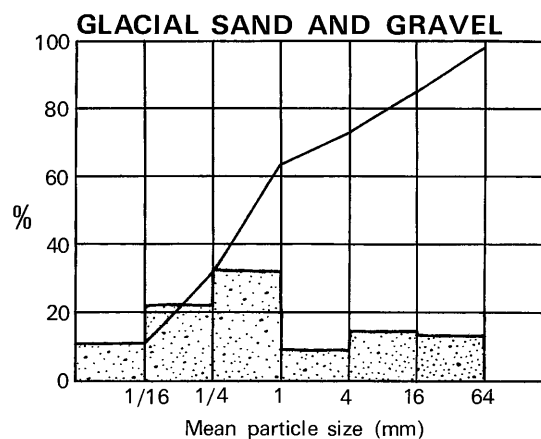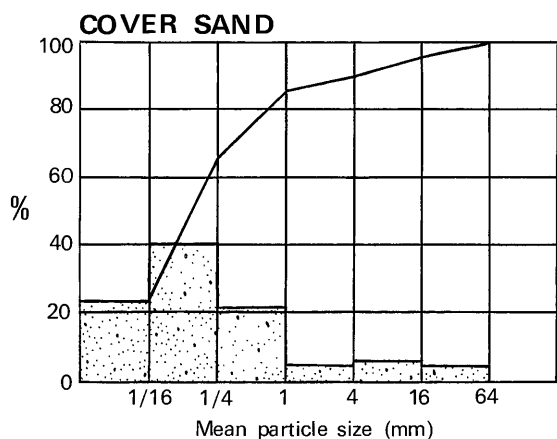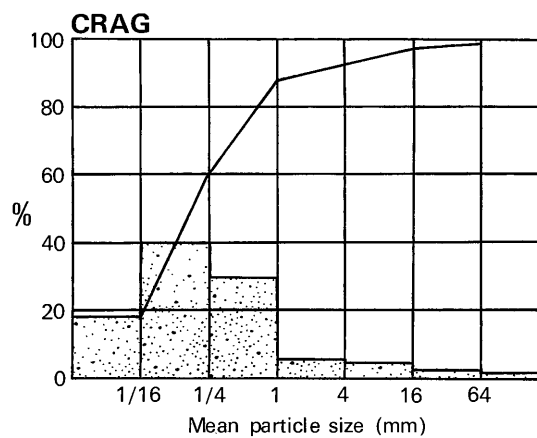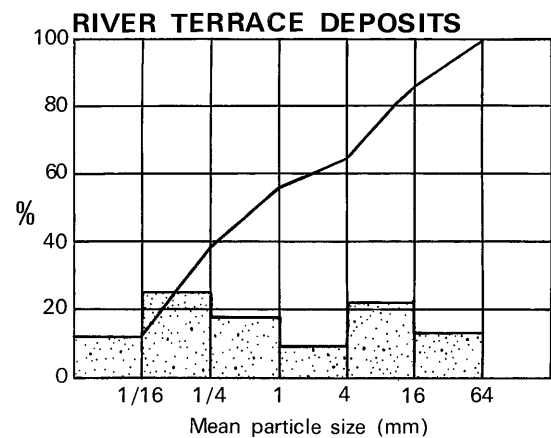
**Figure 4** Mean grading characteristics of the mineral deposits. The results are shown as histograms and cumulative frequency lines.

The mean grading of the sand fraction is fine sand 26 per cent, medium sand 18 per cent and coarse sand 9 per cent.

Separate mean grading figures for deposits from the three terrace levels are given in Table 2. While the deposits of the Second and Third Terrace deposits are classified as 'clayey' sandy gravels, the deposits of the First Terrace have a mean grading of fines 7 per cent, sand 35 per cent and gravel 58 per cent, which is classified as gravel. This difference in grading between the terraces may reflect the fact that the First Terrace deposits lie mainly below the water table and are therefore more often recovered by bailing techniques (which generally involve the loss of a certain amount of fines, see Note 11, Appendix D) than are the deposits of the Second and Third Terraces.
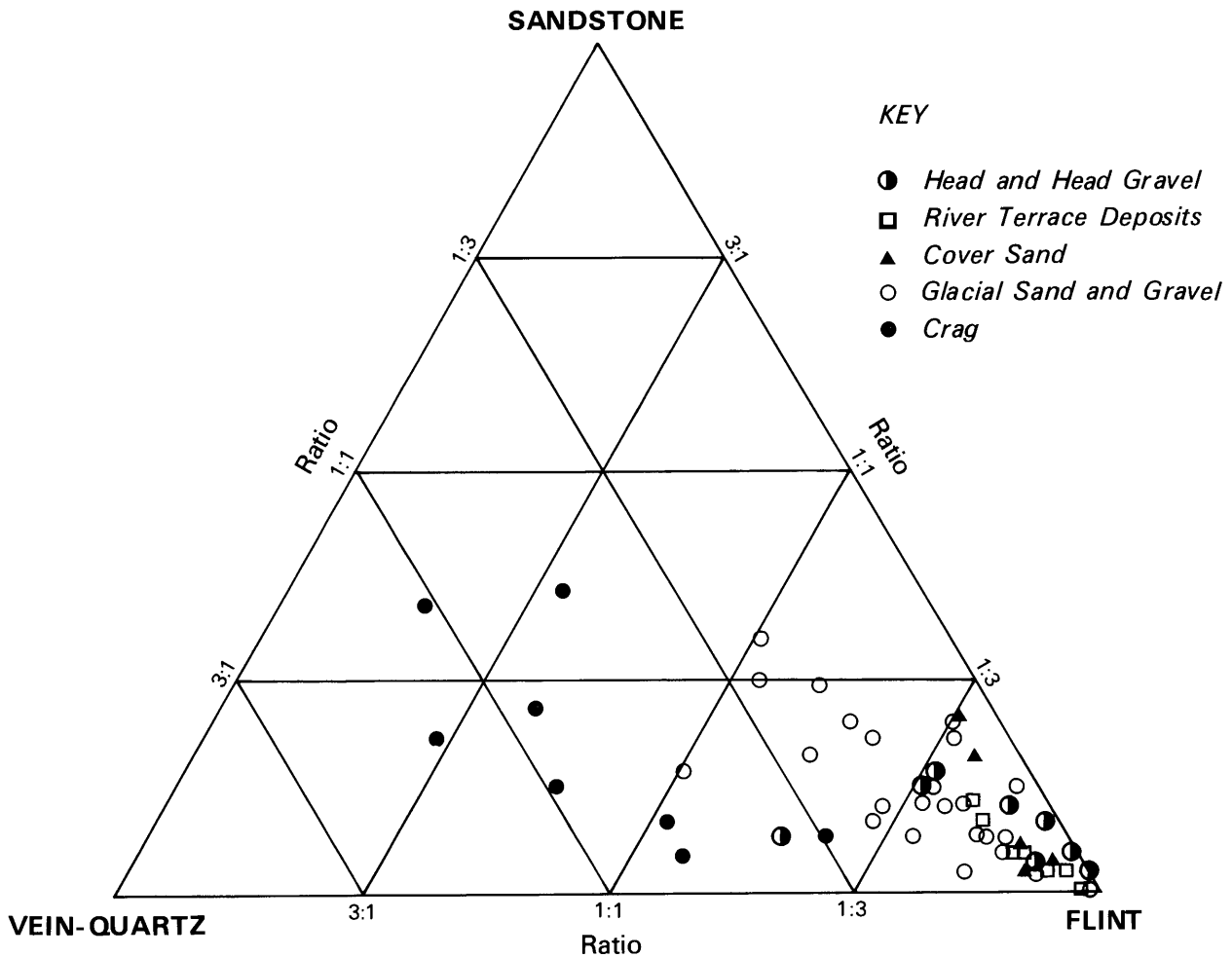
**Figure 5** Composition of the +4–16 mm fraction of selected samples.

*Head and Head Gravel*

Based upon results from five assessment boreholes (SW 29, SW 31, NE 89, NE 98 and SE 173) the Head and Head Gravel deposits are classified as 'clayey' pebbly sand with a mean grading of fines 17 per cent, sand 63 per cent and gravel 20 per cent.

The fine gravel fraction is composed of angular to subrounded flint (76 per cent) with chalk (10 per cent), vein quartz (6 per cent), and sandstone and quartzite (6 per cent). The mean grading of the sand fraction is fine sand 35 per cent, medium sand 21 per cent and coarse sand 7 per cent.

The particularly quartz-rich deposit of Head found in assessment borehole SE 172, is probably derived from the Crag bedrock, which crops out nearby.

*THE MAP*

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

*Geological data* The geological boundary lines, symbols, etc., shown are taken from the geological map of this area recently surveyed at the scale of 1 : 10 560. Borehole data, which include the stratigraphic relations and mean particle size distribution of the sand and gravel samples collected during the assessment survey, are also shown.

The geological boundaries represent the best interpretation of the information available at the time of the survey. However, it is inevitable, particularly with Drift deposits which change rapidly both vertically and laterally, that local discrepancies may occur.

*Mineral resource information* The mineral-bearing ground is subdivided into resource blocks (see Appendix A). Within a resource block the mineral is subdivided into areas where it is 'exposed' and areas where it is present in continuous or almost continuous spreads beneath overburden. The mineral is identified as exposed where the overburden averages less than 1.0 m in thickness.

Areas where bedrock crops out and where boreholes indicate absence of sand and gravel (mineral) are uncoloured on the map. Areas of unassessed sand and gravel, for example in built-up areas, are indicated by a red stipple.

The area of the sand and gravel is measured, where possible, 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. Inferred boundaries have been inserted where sand and gravel beneath cover is interpreted to be not potentially workable or absent. These boundaries either follow geological lines, or are indicated with a distinctive zigzag symbol. Such boundaries are drawn primarily for the purpose of volume estimation. For the purpose of measuring areas the centre-line of the symbol is used.
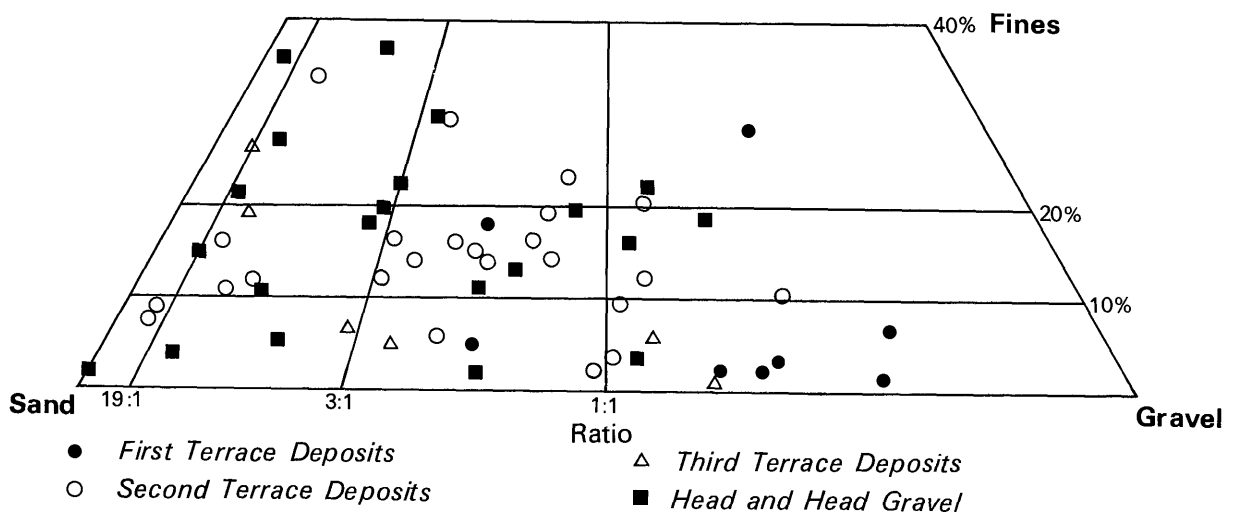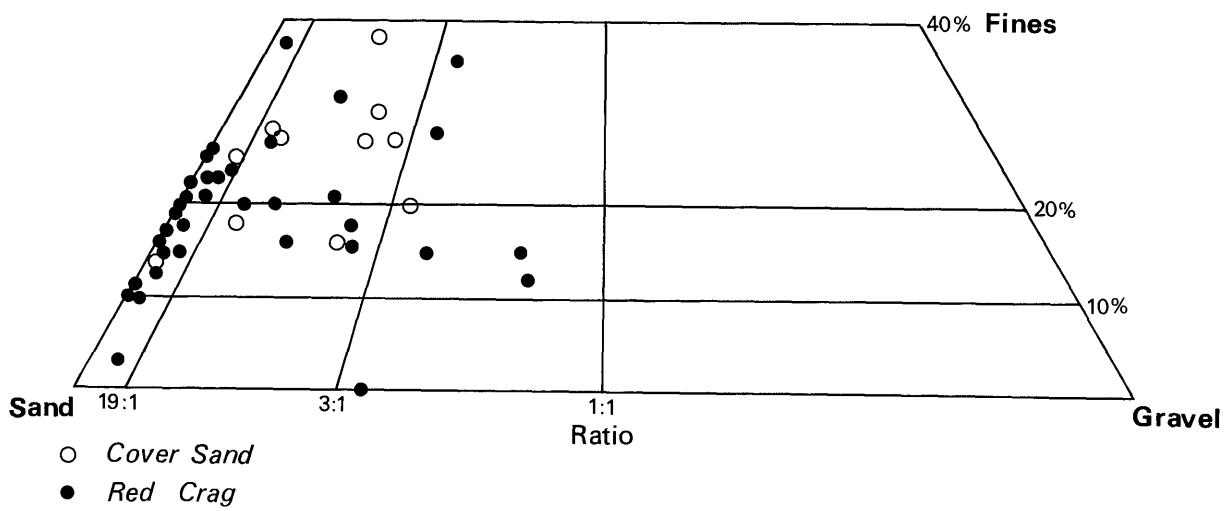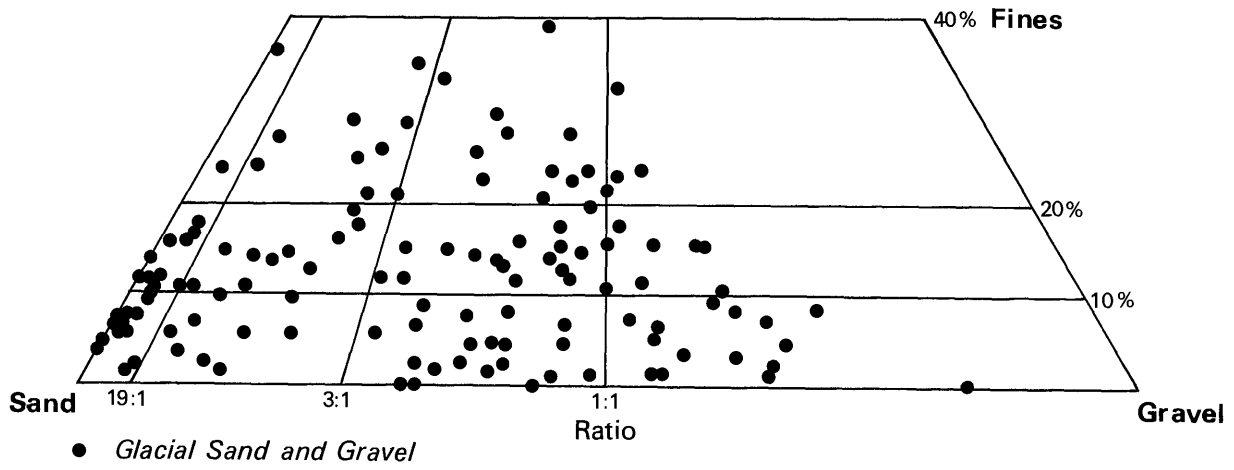
Figure 6    Grading results for samples from assessment boreholes.

## RESULTS

The statistical results are summarised in Table 4.

For the four resource blocks (A to D) the confidence limits at the symmetrical 95 per cent probability level (Table 4) vary between 32 per cent and 71 per cent (that is, it is probable that 19 times out of 20 the volumes present lie within these limits). However, the true values are more likely to be nearer the figures estimated than the 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 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 (255 million $m^3$) can be estimated to the limits of $\pm25$ per cent at the 95 per cent probability level, by a calculation based upon the data from 48 sample points spread across the four resource blocks.

However, it must be emphasised that the quoted volume of sand and gravel has no simple relationship to 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 RESOURCE BLOCKS

For the resource sheet area as a whole, the Cover Sand and Crag have been assessed both separately and together with the other mineral deposits (River Terrace Deposits, Glacial Sand and Gravel, Head and Head Gravel). In each of the four resource blocks (A to D) the mineral is assessed as only one single mineral unit and the mean grading for each block (as a whole) is given in Table 4.

In general, the Head deposits mapped within the sheet area are considered to be not potentially workable, since they are often less than one metre thick and contain more than 40 per cent fines. However, locally where there is evidence to suggest that the Head deposits are mineral (e.g. borehole SW 29), they have been included in the assessment of resources.

### Block A

The main mineral deposits in this block are the River Terrace Deposits which cover $9.5\,km^2$ of the total block area ($10.1\,km^2$). They occur mainly in the Lark and Linnet valleys and between Dixon's Covert [827 697] and Wadgate Plantation [877 699]. The block is divided into three parts by the urban area of Bury St Edmunds. To the north of the town lie the most extensive spreads of sand and gravel, comprising mainly the exposed River Terrace Deposits of the Second Terrace. Small patches of exposed First and Third Terrace deposits near Timworth Green [860 692], and a small area of Third Terrace near Fornham St Martin [850 675] are also included. The

**Table 4** Statistical assessment of the sand and gravel resources

| Resource block | Area | | Mean thickness | | Volume of mineral | Limits at 95% probability level | |
|---|---|---|---|---|---|---|---|
| | Block $km^2$ | Mineral $km^2$ | Overburden m | Mineral m | $10^6\,m^3$ | $\pm\%$ | $\pm$ volume $10^6\,m^3$ |
| A(19)* | 10.1 | 9.5 | 1.2 | 3.6 | 34 | 32 | 11 |
| B(8) | 23.1 | 9.3 | 2.9 | 8.9 | 83 | 71 | 59 |
| C(8) | 28.0 | 9.2 | 7.6 | 4.2 | 39 | 49 | 19 |
| D(13) | 25.4 | 16.5 | 2.9 | 6.0 | 99 | 48 | 48 |
| TOTAL (A to D) (48) | 86.6 | 44.5 | 3.1 | 5.7 | 255 | 25 | 64 |
| Cover Sand (10) | – | 9.2 | 0.5 | 1.2 | 11 | 33 | 4 |
| Crag (6) | – | 5.5 | 7.5 | 7.6 | 42 | 71 | 30 |

| Resource block | Mean grading percentages | | | | | | |
|---|---|---|---|---|---|---|---|
| | Fines | Sand | | | Gravel | | |
| | $-\frac{1}{16}$ mm | $+\frac{1}{16}-\frac{1}{4}$ mm | $+\frac{1}{4}-1$ mm | $+1-4$ mm | $+4-16$ mm | $+16-64$ mm | $+64$ mm |
| A(19)* | 12 | 27 | 22 | 8 | 18 | 13 | 0 |
| B(8) | 10 | 27 | 33 | 6 | 13 | 11 | 0 |
| C(8) | 19 | 27 | 28 | 6 | 10 | 10 | 0 |
| D(13) | 17 | 29 | 27 | 7 | 10 | 9 | 1 |
| TOTAL (A to D) (48) | 14 | 27 | 28 | 7 | 13 | 11 | 0 |
| Cover Sand (10) | 24 | 40 | 21 | 4 | 6 | 5 | 0 |
| Crag (6) | 19 | 40 | 29 | 5 | 4 | 2 | 1 |

* Figures in parentheses show the total number of sample points used in the statistical assessment of resources

River Terrace Deposits show no obvious regional variations in composition or grading. Locally, the terrace sand and gravel is overlain by peat and alluvium.

In two assessment boreholes (NW 113 and NE 82) the River Terrace Deposits overlie deposits of Glacial Sand and Gravel which have been assessed as mineral. Exposed deposits of Head and Head Gravel near Timworth Hall [871 696] and Knightsdale's Grove [869 699] are also included within the resource block assessment.

To the south of Bury St Edmunds, River Terrace Deposits of the Second Terrace are exposed near Sicklesmere [876 605] and near Southgate Bridge [867 630]. Deposits of Head, generally comprising over one metre of sand and gravel, are exposed along the valleys of the Lark and a tributary stream to the north of North Hill Covert [880 625], and are locally covered by alluvium.

To the west of Bury St Edmunds in the Linnet Valley, the resource assessment includes the 'clayey' sand and gravel (mapped as Head) which is also locally overlain by alluvium. However, the thin and clayey Head deposits [820 605] to the south of Ickworth House have not been assessed.

The 0.2 m of sand and gravel proved in borehole NW 104, and the 0.8 m proved in borehole SE 168 indicate that the thickness of the River Terrace Deposits varies considerably.

The mean mineral thickness for the block as a whole is 3.6 m; it ranges in thickness from 0.2 m (in borehole NW 104) to 10.1 m (in borehole NE 82). Overburden, which comprises silts and clays, has a mean thickness of 1.2 m.

The estimated volume of mineral, using data from 19 sample points is 34 million $m^3 \pm 32$ per cent at the 95 per cent probability level.

The mean grading for the deposits in this block is fines 12 per cent, sand 57 per cent, and gravel 31 per cent.

The River Terrace Deposits of the Lark Valley have been worked near Kingsbury Wood [833 689] but there are currently no active workings in this block.

*Block B*
Glacial Sand and Gravel and Cover Sand form the 9.3 km² of mineral in Block B. The block is divided into two parts by the deposits of the Lark Valley (Block A).

Most of the mineral consists of the Glacial Sand and Gravel, which is found along the northern part of the block on both sides of the Lark Valley where it rests on benches (cut in the Chalk surface) marginal to the buried channel system. Although locally exposed, the mineral is commonly concealed by spreads of Boulder Clay, Cover Sand and Head. Towards the south, the Glacial Sand and Gravel thins out rapidly beneath the Boulder Clay, and, south of the inferred boundary lines shown on the resource map at [819 679] and [870 689], Boulder Clay rests directly on Chalk, as proved in assessment boreholes NW 111 and NE 90. Patches of Glacial Sand and Gravel also occur above the Boulder Clay to the east of the Lark Valley. Glacial Sand and Gravel was proved in assessment boreholes to range in thickness from 1.9 m (in borehole NE 87) to 22.4 m (in borehole NE 86) and have a mean thickness of 8.4 m.

Spreads of Cover Sand, which are also classified as exposed mineral, occur on both sides of the Lark Valley. Three assessment boreholes proved Cover Sand, in areas where it has been mapped, to range in thickness from 1.1 m (in borehole NW 102) to 2.2 m (in borehole NE 84)

and to have a mean thickness of 1.7 m. Unmapped spreads of Cover Sand also occur within the block as shown by boreholes NW 103 and 106, but they are thought to be too thin and discontinuous to be potentially workable and therefore have not been used in the assessment.

All of the deposits of Head mapped within the block are thin and 'clayey' and are therefore regarded as non-mineral and have not been assessed.

Overburden comprising Boulder Clay and Head has a mean thickness of 2.9 m, and ranges from 0.1 m (in borehole NE 87) to 8.1 m (in borehole NW 121).

The mean mineral thickness for all the deposits in the block is 8.9 m and their mean grading is: fines 10 per cent, sand 66 per cent and gravel 24 per cent.

The volume of mineral in Block B using data from 8 sample points is estimated to be 83 million $m^3 \pm 71$ per cent at the 95 per cent probability level. These particularly large confidence limits reflect the variability of the mineral thickness in this block (from 1.1 m in borehole NW 102 to 22.4 m in borehole NE 86).

Glacial Sand and Gravel has been worked in two areas, at Fornham Park [842 684] and Stanchil's Farm [812 683], but neither working is currently active.

*Block C*
The assessed mineral deposits comprise Cover Sand, Glacial Sand and Gravel and Crag which together cover 9.2 km² of the block area (28.0 km²).

Crag does not crop out within the block but has been proved in three assessment boreholes (SW 38, 40 and 41) to the south of Bury St Edmunds, where it rests on the nearly horizontal Chalk surface. Its thickness ranges from 1.9 m (in borehole SW 38) to 8.3 m (in borehole SW 41) and has a mean value of 5.2 m. The deposit is everywhere overlain either by Glacial Sand and Gravel (in borehole SW 38) or by Boulder Clay (in boreholes SW 40 and 41), and its sub-Drift extent has therefore been inferred, as shown by the distinctive symbol on the map.

Glacial Sand and Gravel is found as an almost continuous belt along the southern margin of the Bury St Edmunds urban area, where numerous small patches are exposed. Elsewhere it is overlain by Head, Cover Sand, Lacustrine Deposits and Boulder Clay. Towards the south, the Glacial Sand and Gravel thins out and to the south of the inferred boundary line shown on the resource map at [830 622], Boulder Clay rests directly on Chalk bedrock as shown in boreholes SW 32, 35, 40 and 41. The Glacial Sand and Gravel proved in five assessment boreholes (NW 108, SW 34, 37 and 38 and SE 166) has a thickness ranging from 0.7 m in borehole SW 38 to 6.7 m in borehole SE 166; it has a mean thickness of 3.1 m.

Spreads of exposed Cover Sand occur near Honeyhill Farm [802 646], and near Greenpit Plantation [826 633]; assessment boreholes NW 108 and SW 26 proved 2.0 m and 1.7 m respectively of Cover Sand. Unmapped spreads of Cover Sand also occur within the block as shown by boreholes SW 37 and SW 38, but they are thought to be too thin and discontinuous to be potentially workable and have not therefore been used in the assessment.

All the deposits of Head within this block are generally too thin and clayey to be potentially workable and have not been assessed.

The mean mineral thickness for all the deposits in the block is 4.2 m with a mean overburden thickness of 7.6 m. The mean grading for the mineral is fines 19 per cent, sand 61 per cent and gravel 20 per cent. The volume of mineral

in Block C is estimated, using data from 8 sample points, to be 39 million m³ ± 49 per cent at the 95 per cent probability level.

*Block D*
Deposits of Cover Sand, Glacial Sand and Gravel, and Crag make up the 16.5 km² of mineral-bearing ground within the total block area of 25.4 km².

Exposed Crag is mapped near Sicklesmere [880 607] and near Blackthorpe [895 632] and is considered to extend beneath the Boulder Clay over much of the south-eastern part of the block. However, assessment boreholes SE 174, 180 and 181, drilled near Rushbrooke, indicate excessive thicknesses of overburden, and the Crag is therefore considered to be potentially workable in only two areas: near Park Barn [888 606] where assessment borehole SE 175 proved 12.0 m of Crag; and to the north of Rushbrooke [895 625], where assessment boreholes SE 178 and 179 proved 3.0 m and 14.5 m respectively.

The Glacial Sand and Gravel within this block occurs above, below and within the Boulder Clay. It is locally exposed, and its extent beneath overburden has been inferred from the results of assessment boreholes. The Glacial Sand and Gravel proved in 9 assessment boreholes within the area assessed as mineral, ranges in thickness from nil (in boreholes NE 97 and SE 181) to 8.4 m (in borehole NE 94); it has a mean thickness of 4.0 m.

Deposits of Cover Sand extend over a large area to the east of Bury St Edmunds, and also occur as smaller patches spread throughout the resource block. Mapped Cover Sand was proved in four assessment boreholes to have a thickness ranging from 0.9 m in borehole SE 177 to 1.1 m in borehole NE 96, and a mean thickness of 1.0 m. A thickness of 0.3 m recorded in borehole NE 93 where the Cover Sand has not been mapped, has not been used in the resource calculations since it is not considered to be representative of the areas of mapped Cover Sand.

The substantial thickness (5.1 m) of sand and gravel mapped as Head Gravel, which occurs near Vicarage Farm [899 680] has been included within the assessment, but other deposits of Head within this block are thin and clayey and are regarded as being non-mineral; therefore they have not been assessed.

Overburden, comprising Boulder Clay, Glacial Silt and Head, has a mean thickness of 2.9 m.

The mean thickness of mineral in the block as a whole is 6.0 m; it has a mean grading of: fines 17 per cent, sand 63 per cent and gravel 20 per cent.

The volume of mineral is estimated, using data from 13 sample points, to be 99 million m³ ± 48 per cent at the 95 per cent probability level.

## 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, 10 km², 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.

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 is 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 at a diameter of about 200 mm 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 depth. The samples, each weighing between 25 and 45 kg, are despatched in heavy duty polythene bags to a laboratory for grading. The grading procedure is based on British Standard 1377 (1967). Random checks on 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 F.

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

## APPENDIX B

### STATISTICAL PROCEDURE

*Statistical assessment*

1   A statistical assessment is made of an area of mineral greater than 2 km², if there is a minimum of 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. Conventional symmetrical confidence limits are calculated for the 95 per cent probability level, that is, there is a 5 per cent or one in twenty chance of a result falling outside the stated limits.

3   The volume estimate $(V)$ for the mineral in a given block is the product of the 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

$$S_V = \sqrt{(S_A{}^2 + S_{\bar{l}_m}{}^2)} \quad . \tag{1}$$

4   The above relationship may be transposed such that

$$S_V = S_{\bar{l}_m} \sqrt{(1 + S_A{}^2/S_{\bar{l}_m}{}^2)} \quad . \tag{2}$$

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 mean 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 $l_{m_1}, l_{m_2}, ..., l_{m_n}$, then the best estimate of mean thickness, $\bar{l}_m$, is given by

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

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 $l_m$.

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 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 $S_A/S_{\bar{l}_m} \leqslant \frac{1}{3}$ is assumed in all cases. It follows from equation [2] that

$$S_{\bar{l}_m} \leqslant S_V \leqslant 1.05 \, S_{\bar{l}_m}. \tag{3}$$

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).

**Block calculation** 1 : 25 000 ⎫
⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀Block ⎬ Fictitious
⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⎭

*Area*
Block:⠀⠀⠀⠀⠀⠀⠀11.08 km$^2$
Mineral:⠀⠀⠀⠀⠀8.32 km$^2$

*Mean thickness*
Overburden:⠀⠀2.5 m
Mineral:⠀⠀⠀⠀6.5 m

*Volume*
Overburden:⠀⠀21 million m$^3$
Mineral:⠀⠀⠀⠀54 million m$^3$

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 m$^3$

*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 | |
| SE 18 | 1 | 3.3 | 3.3 | 5.8 | 5.8 | |
| SE 20 | 1 | nil | – | 6.9 | 6.9 | IMAU |
| SE 22 | 1 | 0.7 | 0.7 | 6.4 | 6.4 | boreholes |
| SE 23 | 1 | 6.2 | 6.2 | 4.1 | 4.1 | |
| SE 24 | 1 | 4.3 | 4.3 | 6.4 | 6.4 | |
| SE 17 | $\frac{1}{2}$ | 1.2 ⎫ 1.6 | | 9.8 ⎫ 7.2 | | Hydrogeology |
| 123/45 | $\frac{1}{2}$ | 2.0 ⎭ | | 4.6 ⎭ | | Unit record |
| 1 | $\frac{1}{4}$ | 2.7 ⎫ | | 7.3 ⎫ | | Close group |
| 2 | $\frac{1}{4}$ | 4.5 ⎪ 2.6 | | 3.2 ⎪ 5.8 | | of four |
| 3 | $\frac{1}{4}$ | 0.4 ⎪ | | 6.8 ⎪ | | boreholes |
| 4 | $\frac{1}{4}$ | 2.8 ⎭ | | 5.9 ⎭ | | (commercial) |
| 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*

| $wl_m$ | $\|(wl_m - \overline{wl_m})\|$ | $(wl_m - \overline{wl_m})^2$ |
|---|---|---|
| 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

$$1.05 \, (t/\overline{wl_m}) \, \sqrt{[\Sigma (wl_m - \overline{wl_m})^2/n(n-1)]} \times 100$$
$$= 1.05 \times (2.365/6.5) \sqrt{[15.82/(8 \times 7)]} \times 100$$

$$= 20.3$$

$$\simeq 20 \text{ per cent}$$

**Figure 7**⠀Example of resource block assessment: calculation and results.
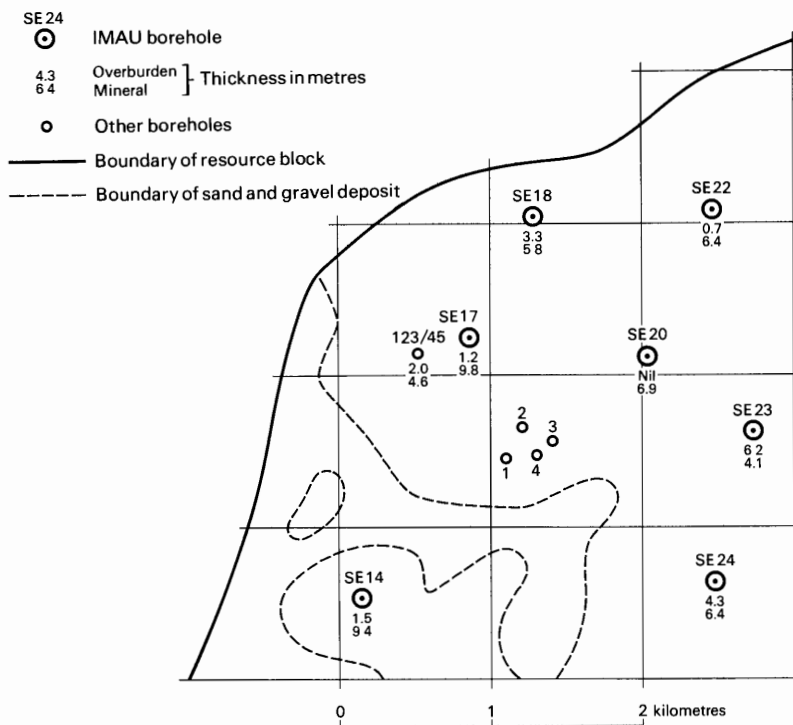


**Figure 8**⠀Example of resource block assessment: map of a fictitious block.

15

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, 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:
$$L_{\bar{l}_m} \leqslant L_V \leqslant 1.05\, L_{\bar{l}_m}$$

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

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

and when $n$ is greater than 20, as

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

11 The application of this procedure to a fictitious area is illustrated in Figures 7 and 8.

*Inferred assessment*

12 If the sampled area of mineral in a resource block is between 0.25 km² and 2 km² an assessment is inferred, based on 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 km².

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 need 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 within the zone as the weighting factor.

## 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 (less than $\frac{1}{16}$ mm) and coarser than pebbles (more than 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 not considered to be 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 Figure 9). The procedure is as follows:
1 Classify according to ratio of sand to gravel.
2 Describe 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 Note 10, Appendix D).

Many differing proposals exist 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 (Table 5), which is used in this 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 $(+\frac{1}{16} - \frac{1}{4}\text{ mm})$, medium $(+\frac{1}{4} - 1\text{ mm})$ and coarse $(+1 - 4\text{ mm})$. The boundary at 16 mm distinguishes a range of finer gravel $(+4 - 16\text{ mm})$, 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

Standard 1377: 1967). In this report the grading is tabulated on the borehole record sheets (Appendix F), 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 very approximate 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 constituents are referred to as 'trace'.

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

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

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

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

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

Well-rounded: no 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.

**Table 5** Classification of gravel, sand and fines

| Size limits | Grain size description | Qualification | Primary classification |
|---|---|---|---|
| 64 mm – | Cobble | | |
| | | 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 |

I Gravel

II 'Clayey' gravel

III 'Very clayey' gravel

IV Sandy gravel

V 'Clayey' sandy gravel

VI 'Very clayey' sandy gravel

VII Pebbly sand

VIII 'Clayey' pebbly sand

IX 'Very clayey' pebbly sand

X Sand

XI 'Clayey' sand

XII 'Very clayey' sand
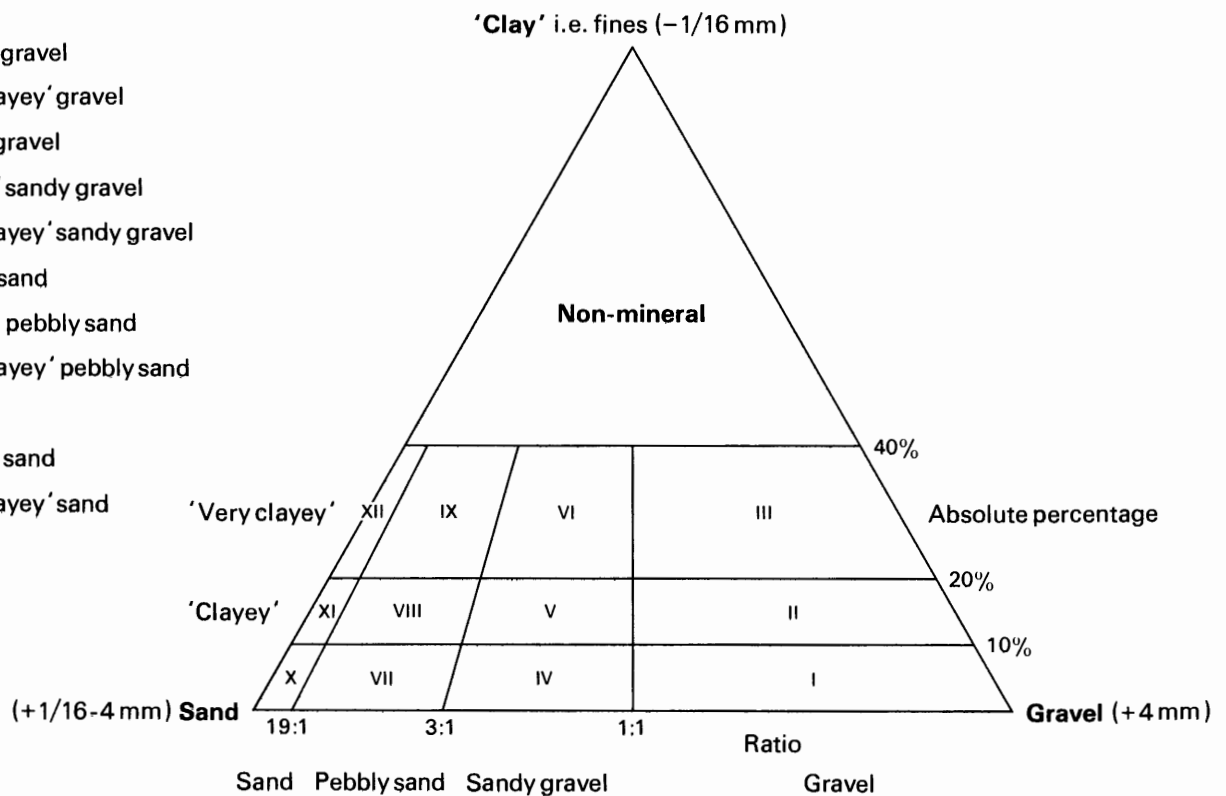


**Figure 9** Diagram to show the descriptive categories used in the classification of sand and gravel.

# APPENDIX D

## EXPLANATION OF THE BOREHOLE RECORDS

### ANNOTATED EXAMPLE

TL 86 NW 108[1]    8102 6551[2]    **Near Old Warren Wood, Fornham All Saints**[3]

Surface level + 63.0 m ( + 207 ft)[4]

Water not struck[5]

Shell and auger 152 mm diameter[6]

October 1978

**Block C**

Overburden[7] 0.7 m

Mineral 1.0 m

Waste 1.0 m

Mineral 2.4 m

Bedrock 0.4 + m[8]

### LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional subangular to subrounded flint pebbles | 0.7 | 0.7 |
| Cover Sand | **a** 'Very clayey' pebbly sand<br>Gravel: fine and coarse, angular to subrounded flint<br>Sand: fine and medium with coarse, quartz with flint, orange/brown | 1.0 | 1.7 |
| Head | Clay, silty, sandy, pebbly, orange/brown, with occasional flint pebbles and some flint sand | 1.0 | 2.7 |
| Glacial Sand and Gravel | **b** 'Very clayey' sandy gravel<br>Gravel: coarse and fine, dark grey to white flint, with sandstone and some vein-quartz and chalk<br>Sand: fine and medium with coarse, orange/brown | 2.4 | 5.1 |
| Chalk | Chalk | 0.4 + | 5.5 |

### GRADING

| | Mean for deposit<br>*percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| **a** | 30 | 56 | 14 | 0.7–1.7 | 30 | 34 | 17 | 5 | 9 | 5 | 0 |
| **b** | 25 | 47 | 28 | 2.7–3.7 | 29 | 22 | 19 | 5 | 10 | 15 | 0 |
| | | | | 3.7–4.7 | 25 | 23 | 20 | 7 | 9 | 16 | 0 |
| | | | | 4.7–5.1 | 19 | 14 | 21 | 7 | 12 | 27 | 0 |
| | | | | Mean | 25 | 21 | 20 | 6 | 10 | 18 | 0 |

### COMPOSITION

| Depth below surface (m) | *Percentage by weight in + 4–16 mm fraction* | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 4.7–5.1 | 80 | 3 | 12 | 4 | 1 |

18

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

1   Borehole Registration Number
Each Industrial Minerals Assessment Unit (IMAU) borehole is identified by a Registration Number. This consists of two statements.
    1   The number of the 1 : 25 000 sheet on which the borehole lies, for example TL 86.
    2   The quarter of the 1 : 25 000 sheet on which the borehole lies and the number of the borehole in a series for that quarter, for example NW 108.
Thus the full Registration Number is TL 86 NW 108.
Usually this is abbreviated to NW 108 in the text.

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

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

4   Surface level
The surface level at the borehole site is given in metres and feet above Ordnance Datum. All measurements were made in metres; approximate conversions in feet are given in brackets.

5   Groundwater conditions
If groundwater was present the level at which it was encountered is normally given (in metres above OD).

6   Type of drill and date of drilling
Unless otherwise stated, all boreholes were drilled by a shell and auger rig using 6-inch casing. The month and year of completion of the hole are stated.

7   Overburden, mineral, waste and bedrock
Mineral is sand and gravel which, as part of a deposit, falls within the arbitrary definition of potentially workable material (see p. 2). Bedrock is the 'formation', 'country rock' or 'rock head' below which potentially workable sand and gravel will not be found. Waste is any material other than bedrock or mineral. Where waste occurs between the surface and mineral it is classified as overburden.

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

9   Geological classification
The geological classification (p. 6) is given whenever possible.

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

11   Grading data
A continuous series of bulk samples is taken throughout the thickness of sand and gravel. A new sample is commenced whenever there is an appreciable lithological change or at every 1 m of depth.
    For each bulk sample the percentages of fines ($-\frac{1}{16}$ mm), fine sand ($+\frac{1}{16}-\frac{1}{4}$ mm), medium sand ($+\frac{1}{4}-1$ mm), coarse sand ($+1-4$ mm), fine gravel ($+4-16$ mm) and coarse gravel ($+16$ mm) are stated. The mean grading of groups of samples making up an identified mineral horizon are also given in detail and, to the left, in summary. Where necessary in calculating the mean grading, data for individual samples are weighted by the thickness represented.
    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 may be lower.

12   Composition
Details of the composition of the gravel fraction of selected samples or grouped samples may be given. Where appropriate the calculated weighted mean composition of grouped samples may be indicated. The category 'Others' includes those rock types not separately specified. All sample fractions for which results are given had a total weight of at least 40 grams, and most weighed more than 100 grams.

# APPENDIX E

## LIST OF BOREHOLES USED IN
## THE ASSESSMENT OF RESOURCES

| Borehole* | Grid reference | Borehole* | Grid reference | Borehole* | Grid reference |
|-----------|---------------|-----------|---------------|-----------|---------------|
| 1 INDUSTRIAL MINERALS ASSESSMENT UNIT BOREHOLES | | TL 86 SW | TL | 2 OTHER BOREHOLES (in Land Survey Division archive only) | |
| | | 26 | 8067 6420 | | |
| | | 27 | 8068 6322 | | |
| TL 86 NW | TL | 28 | 8024 6176 | TL 86 NE | |
| 101 | 8031 6987 | 29 | 8070 6129 | 68 | 8925 6649 |
| 102 | 8035 6866 | 30 | 8200 6449 | 69 | 8958 6623 |
| 103 | 8014 6617 | 31 | 8118 6292 | TL 86 SE | |
| 104 | 8175 6973 | 32 | 8162 6265 | 113b | 8732 6234 |
| 105 | 8161 6898 | 33 | 8186 6169 | 119 | 8834 6038 |
| 106 | 8116 6694 | 34 | 8266 6343 | | |
| 107 | 8142 6618 | 35 | 8243 6209 | | |
| 108 | 8102 6551 | 36 | 8306 6092 | | |
| 109 | 8247 6944 | 37 | 8315 6272 | | |
| 110 | 8238 6910 | 38 | 8404 6188 | | |
| 111 | 8219 6769 | 39 | 8341 6013 | | |
| 112 | 8232 6656 | 40 | 8465 6121 | | |
| 113 | 8309 6981 | 41 | 8492 6172 | | |
| 114 | 8382 6914 | | | | |
| 115 | 8291 6841 | TL 86 SE | TL | | |
| 116 | 8326 6851 | 163 | 8531 6129 | | |
| 117 | 8328 6783 | 164 | 8564 6050 | | |
| 118 | 8393 6728 | 165 | 8687 6478 | | |
| 119 | 8377 6669 | 166 | 8618 6193 | | |
| 120 | 8414 6976 | 167 | 8690 6200 | | |
| 121 | 8494 6839 | 168 | 8706 6265 | | |
| | | 169 | 8698 6108 | | |
| TL 86 NE | TL | 170 | 8754 6044 | | |
| 81 | 8520 6977 | 171 | 8839 6468 | | |
| 82 | 8590 6923 | 172 | 8788 6387 | | |
| 83 | 8537 6913 | 173 | 8829 6288 | | |
| 84 | 8539 6844 | 174 | 8896 6171 | | |
| 85 | 8561 6715 | 175 | 8877 6062 | | |
| 86 | 8672 6916 | 176 | 8901 6459 | | |
| 87 | 8658 6854 | 177 | 8951 6416 | | |
| 88 | 8644 6754 | 178 | 8908 6273 | | |
| 89 | 8708 6946 | 179 | 8961 6252 | | |
| 90 | 8722 6831 | 180 | 8976 6119 | | |
| 91 | 8797 6761 | 181 | 8962 6069 | | |
| 92 | 8736 6675 | | | | |
| 93 | 8800 6589 | | | | |
| 94 | 8823 6931 | | | | |
| 95 | 8869 6865 | | | | |
| 96 | 8898 6589 | | | | |
| 97 | 8975 6972 | | | | |
| 98 | 8984 6807 | | | | |
| 99 | 8968 6662 | | | | |
| 100 | 8993 6527 | | | | |
| 101 | 8504 6747 | | | | |
| 102 | 8516 6612 | | | | |

* No. by sheet quadrant

**TL 86 NW 101**    **8031 6987**    **Near Crabrow Barn, Lackford**                               **Block A**

Surface level +25.4 m (+83 ft)                                                        Waste 17.8 + m
Water struck at +20.4 m
Shell and auger 152 mm diameter
October 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, dark brown, with occasional flint pebbles | 0.6 | 0.6 |
| Boulder Clay | Clay, silty, sandy, mottled pale grey and buff, with occasional subrounded to rounded chalk pebbles and some chalk sand, with traces of flint pebbles | 1.4 | 2.0 |
| | Clay, grey, with occasional subrounded to rounded chalk pebbles and some chalk sand, with traces of flint pebbles. Particularly rich in subrounded to rounded chalk pebbles from 5.0 m to 6.1 m | 15.8+ | 17.8 |

**TL 86 NW 102**    **8035 6866**    **Near Brakey Pin, Flempton**                               **Block B**

Surface level +41.3 m (+135 ft)                                                    Overburden 1.0 m
Water not struck                                                                    Mineral 1.1 m
Shell and auger 152 mm diameter                                                    Waste 4.2 m
October 1978                                                                        Mineral 1.9 m
                                                                                   Waste 0.2 m
                                                                                   Mineral 2.1 m
                                                                                   Waste 0.4 m
                                                                                   Bedrock 1.5 + m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| Cover Sand | Clay, sandy, pebbly, orange/brown, with fine to medium sand and occasional flint pebbles | 1.0 | 1.0 |
| | a 'Very clayey' sand<br>Gravel: fine and coarse subangular to subrounded flint<br>Sand: fine with medium and some coarse, quartz, orange/brown | 1.1 | 2.1 |
| Boulder Clay | Clay, mottled buff and grey, with subrounded chalk pebbles and some chalk sand | 2.6 | 4.7 |
| | Clay, silty, sandy, pale orange/brown, with occasional flint and a trace of sandstone pebbles | 1.4 | 6.1 |
| | Clay, orange/brown, with subrounded to rounded chalk pebbles and some chalk sand, with traces of subangular to subrounded flint pebbles | 0.2 | 6.3 |
| Glacial Sand and Gravel | b 'Clayey' sandy gravel<br>Gravel: coarse and fine, angular to subrounded, dark grey to white flint, with vein quartz, some chalk and subrounded to well-rounded sandstone<br>Sand: medium with fine and coarse, quartz with flint, orange/brown | 1.9 | 8.2 |
| | Clay, sandy, orange/brown, with occasional flint pebbles | 0.2 | 8.4 |
| | c 'Very clayey' pebbly sand; with silty clay laminae from 9.0 to 9.2 m<br>Gravel: fine and coarse, flint<br>Sand: fine and medium with some coarse, quartz, orange/brown | 2.1 | 10.5 |
| | Clay, silty, sandy, micaceous, laminated, with occasional flint pebbles | 0.4 | 10.9 |
| Chalk | Chalk, with flints | 1.5+ | 12.4 |

# GRADING

| | Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| a | 25 | 72 | 3 | 1.0–2.1 | 25 | 54 | 17 | 1 | 2 | 1 | 0 |
| b | 11 | 51 | 38 | 6.3–7.3 | 11 | 12 | 29 | 7 | 17 | 24 | 0 |
| | | | | 7.3–8.2 | 11 | 11 | 37 | 5 | 12 | 24 | 0 |
| | | | | Mean | 11 | 12 | 33 | 6 | 14 | 24 | 0 |
| c | 21 | 72 | 7 | 8.4–9.2 | 36 | 49 | 13 | 1 | 1 | 0 | 0 |
| | | | | 9.2–10.0 | 10 | 36 | 41 | 2 | 5 | 6 | 0 |
| | | | | 10.0–10.5 | 14 | 27 | 44 | 2 | 8 | 5 | 0 |
| | | | | Mean | 21 | 39 | 31 | 2 | 4 | 3 | 0 |
| b + c | 16 | 62 | 22 | Mean | 16 | 26 | 32 | 4 | 9 | 13 | 0 |

# COMPOSITION

| | Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | | |
| | | Flint | Vein-quartz | Sandstone | Others | Chalk |
|---|---|---|---|---|---|---|
| b | 7.3–8.2 | 72 | 15 | 5 | 3 | 5 |

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**TL 86 NW 103      8014 6617      Near Rectory, Risby**                                        **Block B**

Surface level +70.6 m (+232 ft)                                        Waste 11.1 m
Water not struck                                                             Bedrock 1.0 + m
Shell and auger 152 mm diameter
October 1978

# LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional subangular flint pebbles | 0.5 | 0.5 |
| Cover Sand | Clay, sandy, pebbly, orange/brown, with fine and medium sand, some coarse sand and fine and coarse subangular to subrounded flint gravel | 0.9 | 1.4 |
| Boulder Clay | Clay, pale buff, with chalk pebbles, some chalk sand, and a trace of flint pebbles | 5.4 | 6.8 |
| | Clay, silty, sandy, buff/orange, with chalk pebbles, some chalk sand, and with a trace of flint pebbles | 0.4 | 7.2 |
| | Clay, buff/brown, with chalk pebbles and some chalk sand | 0.5 | 7.7 |
| | Clay, silty, sandy, orange/brown | 0.1 | 7.8 |
| Glacial Sand and Gravel | Gravel<br>    Gravel: fine and coarse, subangular to well-rounded chalk, with flint<br>    Sand: coarse, medium and fine, quartz with flint, orange/brown | 2.2 | 10.0 |
| Boulder Clay | Clay, silty, sandy, orange/brown, with subrounded to subangular chalk and subangular to angular flint pebbles | 1.1 | 11.1 |
| Chalk | Chalk, soft | 1.0+ | 12.1 |

## GRADING

| Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | | $+4-16$ | $+16-64$ | $+64$ |
| 7 | 44 | 49 | 7.8–10.0 | 7 | 13 | 15 | 16 | | 26 | 23 | 0 |

## COMPOSITION

| Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 0.5–1.4 | 73 | 6 | 1 | 4 | 16 |

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**TL 86 NW 104**      **8175 6973**      **Near School, Flempton**                **Block A**

Surface level $+22.8$ m $(+75$ ft$)$                                    Waste $18.4 +$ m
Water struck at $+6.6$ m
Shell and auger 152 mm diameter
October 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine to medium sand, brown, with occasional subangular to subrounded flint pebbles and some coarse flint sand | 0.7 | 0.7 |
| River Terrace Deposits (2nd Terrace) | Clayey medium sand, pebbly, orange/yellow, with occasional subangular to subrounded flint pebbles, and a trace of organic material | 0.2 | 0.9 |
| Glacial Silt | Silt, mottled orange/brown and grey, becoming grey at 4.5 m, laminated from 2.0 m to 5.5 m, with subrounded fine chalk gravel and some chalk sand, with some subangular to subrounded fine flint gravel and flint sand from 6.0 m to 8.0 m | 15.1 | 16.0 |
| Boulder Clay | Clay, orange/brown, with subrounded fine chalk gravel, some chalk sand, and a trace of flint and red chalk | 2.4+ | 18.4 |

Surface level +30.3 m (+99 ft)
Water not struck
Shell and auger 152 mm diameter
October 1978

Overburden 0.5 m
Mineral 3.0 m
Waste 3.5 m
Bedrock 2.3 +m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
|  | Soil; clayey fine sand, brown, with occasional subangular to subrounded flint pebbles | 0.5 | 0.5 |
| Glacial Sand and Gravel | 'Very clayey' pebbly sand; fines occurring mainly as thin silty clay laminae<br>Gravel: coarse and fine, angular to subrounded, dark grey to white flint, with vein-quartz, sandstone and some chalk<br>Sand: fine and medium with coarse, quartz with flint, pale brown to pale orange/brown | 3.0 | 3.5 |
|  | Clay, sandy, pebbly, with silty laminae, orange/brown, with some subangular to subrounded flint pebbles and fine to medium sand | 3.5 | 7.0 |
| Chalk | Chalk, soft | 2.3 + | 9.3 |

## GRADING

| Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | |
|  |  |  |  | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 23 | 59 | 18 | 0.5–1.5 | 17 | 44 | 18 | 3 | 8 | 10 | 0 |
|  |  |  | 1.5–2.5 | 20 | 36 | 18 | 6 | 11 | 9 | 0 |
|  |  |  | 2.5–3.5 | 33 | 31 | 15 | 3 | 5 | 13 | 0 |
|  |  |  | Mean | 23 | 38 | 17 | 4 | 8 | 10 | 0 |

## COMPOSITION

| Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | | |
|---|---|---|---|---|---|
|  | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 0.5–1.5 | 77 | 11 | 9 | 1 | 2 |
| 2.5–3.5 | 74 | 6 | 17 | 1 | 2 |
| Mean | 76 | 9 | 12 | 1 | 2 |

Surface level + 53.9 m (+ 177 ft)                                    Overburden 0.7 m
Water not struck                                                     Mineral 1.1 m
Shell and auger 152 mm diameter                                      Waste 4.5 m
October 1978                                                         Bedrock 0.9 + m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional subangular to subrounded flint pebbles | 0.7 | 0.7 |
| Cover Sand | 'Very clayey' pebbly sand<br>Gravel: fine with coarse, subangular to subrounded pale grey to white flint, with sandstone, chalk, and some vein-quartz and ironstone<br>Sand: fine with medium and coarse, quartz with flint, orange/brown | 1.1 | 1.8 |
| Boulder Clay | Clay, with occasional thin sandy beds, buff, becoming pale brown at 4.0 m | 3.0 | 4.8 |
| | Clay, silty, sandy, laminated, orange/brown | 1.5 | 6.3 |
| Chalk | Chalk, with flints | 0.9 + | 7.2 |

## GRADING

| Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Fines | Sand | | | Gravel | | |
| Fines | Sand | Gravel | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 38 | 52 | 10 | 0.7–1.8 | 38 | 35 | 12 | 5 | 8 | 2 | 0 |

## COMPOSITION

| Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 0.7–1.8 | 63 | 4 | 17 | 6 | 10 |

Surface level + 66.4 m (+ 218 ft)                                    Waste 8.3 m
Water not struck                                                     Bedrock 2.7 + m
Shell and auger 152 mm diameter
October 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, dark brown, with subangular to subrounded flint and some rounded sandstone pebbles | 1.0 | 1.0 |
| Boulder Clay | Clay, silty, sandy, orange/brown, with occasional subangular to subrounded flint pebbles, some chalk sand, and a trace of ironstone | 1.0 | 2.0 |
| | Clay, buff/pale brown, with orange/brown sub-vertical partings, with subrounded to rounded chalk pebbles, subangular to subrounded flint pebbles and some chalk sand | 6.3 | 8.3 |
| Chalk | Chalk | 2.7 + | 11.0 |

Surface level +63.0 m (+207 ft)
Water not struck
Shell and auger 152 mm diameter
October 1978

Overburden 0.7 m
Mineral 1.0 m
Waste 1.0 m
Mineral 2.4 m
Bedrock 0.4 + m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional subangular to subrounded flint pebbles | 0.7 | 0.7 |
| Cover Sand | **a** 'Very clayey' pebbly sand<br>    Gravel: fine and coarse, angular to subrounded flint<br>    Sand: fine and medium with coarse, quartz with flint, orange/brown | 1.0 | 1.7 |
| Head | Clay, silty, sandy, pebbly, orange/brown, with occasional flint pebbles and some flint sand | 1.0 | 2.7 |
| Glacial Sand and Gravel | **b** 'Very clayey' sandy gravel<br>    Gravel: coarse and fine, dark grey to white flint, with<br>        sandstone and some vein-quartz and chalk<br>    Sand: fine and medium with coarse, orange/brown | 2.4 | 5.1 |
| Chalk | Chalk | 0.4 + | 5.5 |

## GRADING

| | Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| **a** | 30 | 56 | 14 | 0.7–1.7 | 30 | 34 | 17 | 5 | 9 | 5 | 0 |
| **b** | 25 | 47 | 28 | 2.7–3.7 | 29 | 22 | 19 | 5 | 10 | 15 | 0 |
| | | | | 3.7–4.7 | 25 | 23 | 20 | 7 | 9 | 16 | 0 |
| | | | | 4.7–5.1 | 19 | 14 | 21 | 7 | 12 | 27 | 0 |
| | | | | Mean | 25 | 21 | 20 | 6 | 10 | 18 | 0 |

## COMPOSITION

| | Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | | |
|---|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others | Chalk |
| **b** | 4.7–5.1 | 80 | 3 | 12 | 4 | 1 |

Surface level +19.8 m (+65 ft)
Water struck at +17.3 m
Shell and auger 152 mm diameter
October 1978

Overburden 2.5 m
Mineral 1.7 m
Waste 12.6+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| Alluvium | Silt, organic-rich, peaty, dark brown, with gastropod and lamellibranch shells, with a trace of subangular flint pebbles | 2.5 | 2.5 |
| River Terrace Deposits (1st Terrace) | 'Clayey' gravel; fines increasing with depth<br>Gravel: fine and coarse, subangular to rounded, grey to white flint, with vein-quartz and some chalk<br>Sand: coarse and medium, with fine, quartz with flint. | 1.7 | 4.2 |
| Glacial Silt | Silt, blue/grey, with a trace of chalk and flint sand | 4.4 | 8.6 |
|  | Silt, sandy, grey, with a trace of chalk sand | 3.0 | 11.6 |
|  | Silt, clayey, blue/grey, laminated from 14.0 m to 15.0 m and from 15.9 m, with a trace of chalk sand from 15.0 m to 15.9 m | 5.2+ | 16.8 |

## GRADING

| Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 15 | 20 | 65 | 2.5–3.5 | 6 | 3 | 7 | 10 | 44 | 30 | 0 |
| | | | 3.5–4.2 | 28 | 4 | 10 | 8 | 27 | 23 | 0 |
| | | | Mean | 15 | 3 | 8 | 9 | 37 | 28 | 0 |

## COMPOSITION

| Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 3.5–4.2 | 89 | 6 | 0 | 4 | 1 |

Surface level +22.5 m (+74 ft)
Water struck at +5.5 m
Shell and auger 152 mm diameter
October 1978

Overburden 0.9 m
Mineral 1.9 m
Waste 17.5+ m

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; fine sand, organic-rich, dark brown, with occasional subangular to subrounded flint pebbles | 0.9 | 0.9 |
| River Terrace Deposits (2nd Terrace) | 'Clayey' sandy gravel; with thin organic-rich layers at 1.0 m, with rolled inclusions of silty clay near base<br>    Gravel: coarse and fine, subangular to subrounded flint<br>    Sand: fine and medium with coarse, quartz with flint, buff/orange | 1.9 | 2.8 |
| Glacial Silt | Clay, silty, grey, with traces of subrounded to rounded coarse to fine chalk sand, and subrounded black flint pebbles | 3.7 | 6.5 |
| | Silt, clayey, grey, laminated in part, with occasional chalk pebbles and some chalk sand, with a trace of flint pebbles | 13.8+ | 20.3 |

**GRADING**

| Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 15 | 55 | 30 | 0.9–2.1 | 15 | 31 | 18 | 6 | 14 | 16 | 0 |

Surface level +36.6 m (+120 ft)
Water not struck
Shell and auger 152 mm diameter
October 1978

Waste 2.8 m
Bedrock 0.5+ m

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional subangular to subrounded flint pebbles | 0.9 | 0.9 |
| Boulder Clay | Clay, silty, buff, with orange/brown sandy partings, with chalk pebbles and some chalk sand | 1.9 | 2.8 |
| Chalk | Chalk | 0.5+ | 3.3 |

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Surface level + 56.8 m (+ 186 ft)                                                Waste 4.4 m
Water not struck                                                                  Bedrock 0.9 + m
Shell and auger 152 mm diameter
September 1978

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, dark brown, with occasional subangular to subrounded fine flint pebbles and some coarse chalk sand | 0.4 | 0.4 |
| ? Boulder Clay | Clay, sandy, pebbly, pale brown to orange/buff, with subrounded to rounded chalk pebbles and subangular to subrounded flint pebbles | 4.0 | 4.4 |
| Chalk | Chalk, with flints | 0.9 + | 5.3 |

Surface level +23.9 m (+78 ft)
Water struck at +17.4 m
Shell and auger 152 mm diameter
October 1978

Overburden 0.8 m
Mineral 1.7 m
Waste 4.0 m
Mineral 3.6 m
Bedrock 1.9 + m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; fine to medium sand, brown, with occasional subangular to subrounded flint pebbles | 0.8 | 0.8 |
| River Terrace Deposits (2nd Terrace) | **a** 'Clayey' pebbly sand; fines increasing with depth<br>    Gravel: fine and coarse, subangular to subrounded, dark grey to white flint, and subrounded chalk, with some vein-quartz and sandstone<br>    Sand: fine with medium and some coarse, quartz, yellow/brown | 1.7 | 2.5 |
| Boulder Clay | Clay, buff/brown, becoming grey/brown at 4.5 m and dark grey at 6.0 m, with occasional sandy partings, with subrounded to rounded chalk pebbles, subangular to subrounded flint pebbles, some chalk sand, and a trace of subrounded to rounded sandstone pebbles | 4.0 | 6.5 |
| Glacial Sand and Gravel | **b** Sandy gravel; gravel fraction increasing with depth<br>    Gravel: coarse and fine, subangular to subrounded, dark grey to white flint, with subrounded to rounded sandstone, subrounded to rounded vein-quartz, and subrounded to rounded chalk; Sandstone and vein-quartz increasing with depth | 3.6 | 10.1 |
| Chalk | Chalk | 1.9 + | 12.0 |

## GRADING

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| **a** | 19 | 77 | 4 | 0.8–1.8 | 8 | 66 | 22 | 1 | 2 | 1 | 0 |
| | | | | 1.8–2.5 | 34 | 47 | 11 | 2 | 3 | 3 | 0 |
| | | | | Mean | 19 | 58 | 18 | 1 | 2 | 2 | 0 |
| **b** | 6 | 60 | 34 | 6.5–7.5 | 5 | 5 | 58 | 7 | 10 | 15 | 0 |
| | | | | 7.5–8.5 | 11 | 3 | 55 | 8 | 6 | 17 | 0 |
| | | | | 8.5–9.5 | 4 | 5 | 47 | 9 | 15 | 20 | 0 |
| | | | | 9.5–10.1 | 3 | 4 | 24 | 8 | 25 | 36 | 0 |
| | | | | Mean | 6 | 4 | 48 | 8 | 13 | 21 | 0 |

## COMPOSITION

| | Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | | |
|---|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others | Chalk |
| **a** | 1.8–2.5 | 70 | 5 | 3 | 0 | 22 |
| **b** | 7.5–8.5 | 76 | 8 | 9 | 2 | 5 |
| | 9.5–10.1 | 55 | 15 | 21 | 2 | 7 |
| **b** | Mean | 61 | 13 | 18 | 2 | 6 |

Surface level  + 30.8 m ( + 101 ft)                                                          Waste 18.0 + m
Water not struck
Shell and auger 152 mm diameter
September 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with subangular to subrounded flint pebbles and some flint sand | 0.4 | 0.4 |
| Cover Sand | Clayey fine sand, orange/brown, with subrounded to rounded chalk pebbles, and some chalk sand and flint pebbles | 0.6 | 1.0 |
| Boulder Clay | Clay, silty near top, mottled pale grey and brown, becoming dark grey at 3 m, with subrounded to rounded chalk pebbles and some chalk sand, with traces of flint and red chalk | 17.0 + | 18.0 |

Surface level  + 25.2 m ( + 83 ft)                                                          Overburden 0.3 m
Water struck at  + 22.0 m                                                                    Mineral 5.0 m
Shell and auger 152 mm diameter                                                              Waste 2.7 + m
September 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; sand, brown, with occasional subangular flint pebbles | 0.3 | 0.3 |
| River Terrace Deposits (2nd Terrace) | 'Clayey' sandy gravel; sand fraction increasing with depth to 3.2 m and then decreasing<br>Gravel: fine and coarse, subangular to subrounded, dark grey to white flint, with sandstone, vein-quartz and chalk<br>Sand: fine and medium, with coarse quartz with flint, orange/yellow/pale/brown | 5.0 | 5.3 |
| Glacial Silt | Silt, grey, with occasional flint pebbles at top | 2.7 + | 8.0 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 11 | 63 | 26 | 0.3–1.3 | 16 | 27 | 20 | 9 | 19 | 9 | 0 |
| | | | 1.3–2.2 | 12 | 56 | 17 | 4 | 9 | 2 | 0 |
| | | | 2.2–3.2 | 9 | 63 | 23 | 2 | 2 | 1 | 0 |
| | | | 3.2–4.2 | 16 | 20 | 16 | 13 | 30 | 5 | 0 |
| | | | 4.2–5.3 | 4 | 13 | 17 | 17 | 31 | 18 | 0 |
| | | | Mean | 11 | 35 | 19 | 9 | 19 | 7 | 0 |

## COMPOSITION

| Depth below surface (m) | Percentage by weight in + 4–16 mm fraction | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 0.3–1.3 | 98 | 1 | 0 | 1 | 0 |
| 4.2–5.3 | 74 | 8 | 9 | 2 | 7 |
| Mean | 83 | 5 | 6 | 2 | 4 |

Surface level + 22.8 m (+ 75 ft)

Water struck at + 21.6 m

Shell and auger 152 mm diameter

November 1978

Overburden 0.4 m

Mineral 3.8 m

Waste 8.3 + m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| Alluvium | Silt, peaty, dark brown, with some flint pebbles | 0.4 | 0.4 |
| River Terrace Deposits (1st Terrace) | Gravel<br>Gravel: fine with coarse, angular to subrounded dark grey, brown and white flint, with sandstone, vein-quartz and some chalk<br>Sand: medium, fine and coarse, quartz with flint | 3.8 | 4.2 |
| Glacial Silt | Silt, brown/grey, becoming grey | 8.3 + | 12.5 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 6 | 46 | 48 | 0.4–1.2 | 18 | 20 | 23 | 9 | 23 | 7 | 0 |
| | | | 1.2–2.1 | 5 | 29 | 24 | 7 | 18 | 17 | 0 |
| | | | 2.1–4.2 | 2 | 9 | 16 | 13 | 38 | 22 | 0 |
| | | | Mean | 6 | 16 | 19 | 11 | 30 | 18 | 0 |

## COMPOSITION

| Depth below surface (m) | Percentage by weight in + 4–16 mm fraction | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 1.2–2.1 | 82 | 8 | 7 | 2 | 1 |
| 2.1–4.2 | 91 | 4 | 3 | 1 | 1 |
| Mean | 89 | 5 | 4 | 1 | 1 |

Surface level +26.7 m (+88 ft)
Water struck at +23.9 m
Shell and auger 152 mm diameter
September 1978

Overburden 0.6 m
Mineral 3.2 m
Waste 16.4+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; sand, dark brown, with occasional subangular flint pebbles | 0.6 | 0.6 |
| River Terrace Deposits (2nd Terrace) | 'Clayey' sandy gravel<br>    Gravel: fine and coarse, subangular to subrounded pale grey to white flint, with vein-quartz and some rounded to subrounded sandstone<br>    Sand: fine and medium with coarse, yellow/orange/brown | 3.2 | 3.8 |
| Glacial Silt | Silt, clayey, buff, becoming pale blue/grey at 4.4 m | 16.4+ | 20.2 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 11 | 64 | 25 | 0.6–1.2 | 16 | 43 | 15 | 4 | 14 | 8 | 0 |
| | | | 1.2–2.2 | 12 | 37 | 21 | 7 | 16 | 7 | 0 |
| | | | 2.2–2.8 | 13 | 38 | 13 | 10 | 22 | 4 | 0 |
| | | | 2.8–3.8 | 6 | 31 | 19 | 13 | 24 | 7 | 0 |
| | | | Mean | 11 | 37 | 18 | 9 | 19 | 6 | 0 |

## COMPOSITION

| Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 0.6–1.2 | 87 | 6 | 4 | 3 | 0 |

Surface level +28.6 m (+94 ft)
Water struck at +24.6 m
Shell and auger 152 mm diameter
October 1978

Overburden 1.8 m
Mineral 2.9 m
Waste 16.7+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; fine sand, brown, with occasional subangular to subrounded flint pebbles | 0.8 | 0.8 |
| River Terrace Deposits (2nd Terrace) | Clay, silty, sandy, pebbly, orange/brown, with occasional pale grey to white flint pebbles, with vein-quartz and some sandstone | 1.0 | 1.8 |
| | 'Clayey' gravel<br>Gravel: fine and coarse, flint<br>Sand: medium with fine and coarse, quartz with flint, orange | 2.9 | 4.7 |
| Glacial Silt | Silt, laminated in part, clayey in part, orange/buff, becoming blue/grey at 4.9 m, with a trace of fine to medium sand | 16.7+ | 21.4 |

## GRADING

| Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 15 | 43 | 42 | 1.8–2.8 | 19 | 19 | 17 | 10 | 23 | 12 | 0 |
| | | | 2.8–4.0 | 14 | 12 | 23 | 13 | 24 | 14 | 0 |
| | | | 4.0–4.7 | 10 | 3 | 13 | 12 | 32 | 30 | 0 |
| | | | Mean | 15 | 13 | 18 | 12 | 25 | 17 | 0 |

## COMPOSITION

| Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | |
|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others |
| 0.8–1.8 | 87 | 6 | 4 | 3 |

Surface level +41.8 m (+137 ft)                                                          Waste 0.3 m
Water not struck                                                                          Bedrock 1.2+ m
Shell and auger 152 mm diameter
September 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
|  | Soil; clayey sand, brown/buff, with occasional chalk and flint pebbles | 0.3 | 0.3 |
| Chalk | Chalk, with flints | 1.2+ | 1.5 |

**TL 86 NW 120      8414 6976      Near South Wood, Culford**                                    **Block A**

Surface level +23.2 m (+76 ft)                                                          Overburden 0.6 m
Water struck at +20.7 m                                                                 Mineral 3.4 m
Shell and auger 152 mm diameter                                                         Waste 11.5+ m
September 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
|  | Soil; fine sand, dark brown, with subangular flint pebbles | 0.6 | 0.6 |
| River Terrace Deposits (2nd Terrace) | Sandy gravel<br>    Gravel: fine and coarse, subangular to subrounded dark grey to white flint, with some vein-quartz and a trace of chalk<br>    Sand: fine and medium with coarse, quartz with flint, buff/brown | 3.4 | 4.0 |
| Boulder Clay | Clay, grey, with subrounded to rounded fine chalk pebbles, and some chalk sand and subangular to subrounded flint pebbles, particularly chalk-rich from 7.5 m to 8.7 m | 11.5+ | 15.5 |

## GRADING

| Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel |  | Fines | Sand | | | Gravel | | |
|  |  |  |  | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 7 | 59 | 34 | 0.6–1.8 | 11 | 47 | 28 | 5 | 7 | 2 | 0 |
|  |  |  | 1.8–2.8 | 9 | 16 | 18 | 10 | 30 | 17 | 0 |
|  |  |  | 2.8–4.0 | 2 | 14 | 22 | 14 | 26 | 22 | 0 |
|  |  |  | Mean | 7 | 26 | 23 | 10 | 20 | 14 | 0 |

## COMPOSITION

| Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | | |
|---|---|---|---|---|---|
|  | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 0.6–1.8 | 90 | 4 | 0 | 6 | 0 |

Surface level +36.8 m (+121 ft)
Water struck at +25.7 m
Shell and auger 152 mm diameter
September 1978

Overburden 8.1 m
Mineral 10.4 m
Bedrock 1.3+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional subangular flint pebbles | 0.6 | 0.6 |
| Cover Sand | Clay, silty, sandy, pebbly, orange/brown, with medium to fine sand and occasional flint and chalk pebbles | 1.2 | 1.8 |
| Boulder Clay | Clay, silty, mottled pale grey and brown, with orange/brown partings, with subrounded to rounded chalk and some subangular to subrounded flint pebbles | 6.3 | 8.1 |
| Glacial Sand and Gravel | 'Clayey' sand; fines decreasing with depth, pebbly at base. Gravel: fine and coarse, subangular to subrounded pale grey, brown and white flint, with chalk, vein-quartz and some sandstone. Sand: fine and medium with some coarse, quartz, orange/brown | 10.4 | 18.5 |
| Chalk | Chalk | 1.3+ | 19.8 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 11 | 87 | 2 | 8.1–9.1 | 15 | 24 | 56 | 2 | 2 | 1 | 0 |
| | | | 9.1–10.1 | 15 | 18 | 63 | 3 | 1 | 0 | 0 |
| | | | 10.1–11.1 | 16 | 13 | 68 | 2 | 1 | 0 | 0 |
| | | | 11.1–12.1 | 17 | 28 | 52 | 1 | 1 | 1 | 0 |
| | | | 12.1–13.4 | 13 | 66 | 20 | 1 | 0 | 0 | 0 |
| | | | 13.4–15.0 | 11 | 60 | 29 | 0 | 0 | 0 | 0 |
| | | | 15.0–16.0 | 3 | 73 | 24 | 0 | 0 | 0 | 0 |
| | | | 16.0–17.0 | 6 | 72 | 22 | 0 | 0 | 0 | 0 |
| | | | 17.0–18.0 | 4 | 58 | 38 | 0 | 0 | 0 | 0 |
| | | | 18.0–18.5 | 5 | 35 | 44 | 3 | 6 | 7 | 0 |
| | | | Mean | 11 | 46 | 40 | 1 | 1 | 1 | 0 |

## COMPOSITION

| Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 8.1–9.1 | 77 | 6 | 4 | 2 | 11 |
| 18.0–18.5 | 58 | 19 | 14 | 2 | 7 |
| Mean | 65 | 14 | 10 | 2 | 9 |

Surface level +27.0 m (+89 ft)
Water not struck
Shell and auger 152 mm diameter
October 1978

Overburden 0.5 m
Mineral 1.5 m
Waste 18.0+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; fine to medium sand, brown, with occasional angular to subrounded flint pebbles | 0.5 | 0.5 |
| River Terrace Deposits (2nd Terrace) | 'Clayey' pebbly sand<br>   Gravel: fine, subangular to subrounded flint<br>   Sand: fine and medium with some coarse, quartz, orange/brown | 1.5 | 2.0 |
| Glacial Silt | Silt, mottled brown and pale grey, becoming grey at 4.5 m | 13.8 | 15.8 |
| Boulder Clay | Clay, dark grey, with occasional chalk pebbles and some chalk sand and flint pebbles | 4.2+ | 20.0 |

## GRADING

| Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 16 | 78 | 6 | 0.5–2.0 | 16 | 46 | 29 | 3 | 6 | 0 | 0 |

Surface level +28.9 m (+95 ft)
Water struck at +25.7 m
Shell and auger 152 mm diameter
December 1978

Overburden 0.4 m
Mineral 10.1 m
Bedrock 0.4+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
|  | Made Ground | 0.4 | 0.4 |
| River Terrace Deposits (3rd Terrace) | **a** Sandy gravel<br>Gravel: fine and coarse, grey, brown and white flint, with some vein-quartz and sandstone, and a trace of ironstone and chalk<br>Sand: fine and medium with coarse, quartz with flint, orange/brown | 3.8 | 4.2 |
| Glacial Sand and Gravel | **b** Pebbly sand<br>Gravel: fine and coarse, flint<br>Sand: medium with fine and some coarse, quartz | 2.2 | 6.4 |
|  | **c** Gravel<br>Gravel: fine and coarse, subangular to subrounded dark grey to white flint, and sandstone, with vein-quartz and some ironstone<br>Sand: medium and coarse with fine, quartz with flint | 4.1 | 10.5 |
| Chalk | Chalk, with flints | 0.4+ | 10.9 |

## GRADING

| | Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| **a** | 5 | 55 | 40 | 0.4–1.2 | 7 | 53 | 16 | 2 | 10 | 12 | 0 |
| | | | | 1.2–2.3 | 5 | 36 | 23 | 9 | 17 | 10 | 0 |
| | | | | 2.3–3.2 | 6 | 8 | 20 | 14 | 35 | 17 | 0 |
| | | | | 3.2–4.2 | 1 | 7 | 19 | 13 | 33 | 27 | 0 |
| | | | | Mean | 5 | 25 | 20 | 10 | 24 | 16 | 0 |
| **b** | 2 | 90 | 8 | 4.2–5.2 | 2 | 18 | 64 | 5 | 6 | 5 | 0 |
| | | | | 5.2–6.4 | 2 | 15 | 77 | 2 | 3 | 1 | 0 |
| | | | | Mean | 2 | 16 | 71 | 3 | 5 | 3 | 0 |
| **c** | 4 | 46 | 50 | 6.4–7.4 | 3 | 7 | 24 | 10 | 29 | 27 | 0 |
| | | | | 7.4–8.4 | 1 | 5 | 20 | 9 | 25 | 40 | 0 |
| | | | | 8.4–9.4 | 12 | 9 | 30 | 9 | 18 | 22 | 0 |
| | | | | 9.4–10.5 | 0 | 3 | 24 | 30 | 34 | 9 | 0 |
| | | | | Mean | 4 | 6 | 25 | 15 | 26 | 24 | 0 |
| **b+c** | 3 | 62 | 35 | Mean | 3 | 10 | 41 | 11 | 19 | 16 | 0 |

## COMPOSITION

| | Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | |
|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others |
| **a** | 1.2–2.3 | 95 | 2 | 0 | 3 |
| | 2.3–3.2 | 94 | 5 | 0 | 1 |
| | 3.2–4.2 | 84 | 6 | 9 | 1 |
| **a** | Mean | 90 | 5 | 4 | 1 |
| **b** | 6.4–7.4 | 49 | 18 | 28 | 5 |
| | 8.4–9.4 | 42 | 18 | 28 | 12 |
| | 9.4–10.5 | 27 | 28 | 34 | 11 |
| **b** | Mean | 38 | 22 | 31 | 9 |

Surface level +30.5 m (+100 ft)
Water struck at +22.0 m
Shell and auger 152 mm diameter
December 1978

Overburden 0.4 m
Mineral 1.7 m
Waste 3.4 m
Mineral 1.8 m
Waste 0.9 m
Mineral 4.3 m
Bedrock 0.5+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; fine to medium sand, with occasional flint pebbles | 0.4 | 0.4 |
| Cover Sand | **a** 'Clayey' pebbly sand<br>Gravel: fine and coarse, grey to white flint, with vein-quartz and some sandstone<br>Sand: fine and medium with coarse, quartz with flint, orange/brown | 1.7 | 2.1 |
| Boulder Clay | Clay, buff/brown, with occasional chalk pebbles and some chalk sand | 3.4 | 5.5 |
| Glacial Sand and Gravel | **b** Gravel<br>Gravel: coarse and fine, flint and some sandstone<br>Sand: coarse and medium with some fine, quartz with flint | 1.8 | 7.3 |
| Lacustrine Deposits | Clay, silty, pink/brown | 0.7 | 8.0 |
| | Silt, sandy, dark grey, laminated, with plant remains | 0.2 | 8.2 |
| Glacial Sand and Gravel | **c** Sandy gravel<br>Gravel: fine and coarse, with some cobbles, subangular to well-rounded sandstone, with subangular to well-rounded vein-quartz, angular to rounded dark grey to white flint, and ironstone<br>Sand: medium with fine and coarse, quartz with flint, orange | 4.3 | 12.5 |
| Chalk | Chalk | 0.5+ | 13.0 |

## GRADING

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Fines | Sand | | | Gravel | | |
| | Fines | Sand | Gravel | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| **a** | 16 | 67 | 17 | 0.4–2.1 | 16 | 43 | 18 | 6 | 9 | 8 | 0 |
| **c** | 4 | 49 | 47 | 8.2–10.5 | 4 | 15 | 34 | 3 | 27 | 17 | 0 |
| | | | | 10.5–11.5 | 0 | 6 | 19 | 6 | 34 | 35 | 0 |
| | | | | 11.5–12.5 | 7 | 5 | 40 | 15 | 16 | 15 | 2 |
| | | | | Mean | 4 | 10 | 32 | 7 | 26 | 20 | 1 |

## COMPOSITION

| | Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | |
|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others |
| **a** | 0.4–2.1 | 90 | 5 | 1 | 4 |
| **c** | 10.5–11.5 | 21 | 25 | 43 | 11 |
| | 11.5–12.5 | 15 | 21 | 46 | 18 |
| **c** | Mean | 19 | 24 | 44 | 13 |

Surface level +36.8 m (+121 ft)
Water struck at +22.8 m
Shell and auger 152 mm diameter
November 1978

Overburden 0.3 m
Mineral 2.2 m
Waste 0.8 m
Mineral 15.2 m
Bedrock 0.7+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; medium sand, brown, with occasional flint pebbles | 0.3 | 0.3 |
| Cover Sand | a 'Clayey' sand<br>Gravel: fine with coarse, flint<br>Sand: medium and fine with some coarse, quartz, orange/brown | 2.2 | 2.5 |
| Boulder Clay | Clay, silty at top, orange/brown, with occasional flint pebbles | 0.8 | 3.3 |
| Glacial Sand and Gravel | b Pebbly sand; 'clayey' from 3.3 m to 6.3 m, with a particularly high gravel content from 8.3 m to 16.8 m<br>Gravel: coarse and fine, subangular to subrounded, grey, brown and white flint, with rounded to subrounded sandstone, rounded to subrounded vein-quartz<br>Sand: medium and fine with coarse, quartz with flint, yellow | 15.2 | 18.5 |
| Chalk | Chalk, with flints | 0.7+ | 19.2 |

## GRADING

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| a | 16 | 80 | 4 | 0.3–1.4 | 18 | 38 | 34 | 3 | 5 | 2 | 0 |
| | | | | 1.4–2.5 | 14 | 30 | 53 | 2 | 1 | 0 | 0 |
| | | | | Mean | 16 | 34 | 44 | 2 | 3 | 1 | 0 |
| b | 8 | 72 | 20 | 3.3–4.3 | 23 | 31 | 42 | 2 | 2 | 0 | 0 |
| | | | | 4.3–5.3 | 10 | 17 | 67 | 4 | 2 | 0 | 0 |
| | | | | 5.3–6.3 | 23 | 32 | 41 | 2 | 2 | 0 | 0 |
| | | | | 6.3–7.3 | 5 | 43 | 48 | 1 | 1 | 2 | 0 |
| | | | | 7.3–8.3 | 7 | 50 | 43 | 0 | 0 | 0 | 0 |
| | | | | 8.3–9.3 | 4 | 48 | 9 | 2 | 14 | 23 | 0 |
| | | | | 9.3–10.3 | 6 | 46 | 16 | 3 | 12 | 17 | 0 |
| | | | | 10.3–11.3 | 6 | 68 | 17 | 1 | 2 | 6 | 0 |
| | | | | 11.3–12.3 | 20 | 27 | 15 | 4 | 14 | 20 | 0 |
| | | | | 12.3–14.0 | 2 | 27 | 35 | 5 | 15 | 16 | 0 |
| | | | | 14.0–15.4 | 2 | 13 | 34 | 12 | 18 | 21 | 0 |
| | | | | 15.4–16.8 | 1 | 5 | 32 | 14 | 17 | 31 | 0 |
| | | | | 16.8–17.8 | 3 | 11 | 66 | 12 | 6 | 2 | 0 |
| | | | | 17.8–18.5 | 1 | 8 | 67 | 11 | 9 | 4 | 0 |
| | | | | Mean | 8 | 30 | 37 | 5 | 9 | 11 | 0 |

## COMPOSITION

| | Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | | |
|---|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others | Chalk |
| b | 9.3–10.3 | 63 | 12 | 17 | 4 | 4 |
| | 11.3–12.3 | 50 | 20 | 21 | 3 | 6 |
| b | Mean | 56 | 16 | 19 | 4 | 5 |

Surface level +46.8 m (+154 ft)    Overburden 0.4 m
Water not struck    Mineral 4.2 m
Shell and auger 152 mm diameter    Waste 0.3 m
November 1978    Bedrock 0.8+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; fine to medium sand, brown, with occasional flint pebbles | 0.4 | 0.4 |
| Glacial Sand and Gravel | 'Clayey' sandy gravel; fines content decreasing with depth<br>    Gravel: fine and coarse, subangular to subrounded, grey to<br>        white flint, with some sandstone and vein-quartz<br>    Sand: medium and fine with coarse, quartz with flint, orange/brown | 4.2 | 4.6 |
| Boulder Clay | Clay, pale buff/grey, with occasional chalk pebbles and some chalk sand | 0.3 | 4.9 |
| Chalk | Chalk | 0.8+ | 5.7 |

## GRADING

| Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 16 | 62 | 22 | 0.4–1.5 | 24 | 42 | 17 | 3 | 7 | 7 | 0 |
| | | | 1.5–2.4 | 16 | 42 | 21 | 4 | 9 | 8 | 0 |
| | | | 2.4–3.4 | 13 | 15 | 34 | 7 | 12 | 19 | 0 |
| | | | 3.4–4.6 | 11 | 13 | 40 | 11 | 14 | 11 | 0 |
| | | | Mean | 16 | 27 | 29 | 6 | 11 | 11 | 0 |

## COMPOSITION

| Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | |
|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others |
| 2.4–3.4 | 84 | 13 | 2 | 1 |
| 3.4–4.6 | 92 | 4 | 2 | 2 |
| Mean | 88 | 8 | 2 | 2 |

Surface level +37.4 m (+123 ft)
Water struck at +26.8 m
Shell and auger 152 mm diameter
November 1978

Overburden 1.4 m
Mineral 4.5 m
Waste 1.4 m
Mineral 17.9 m
Bedrock 0.4+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, dark brown, with occasional flint pebbles | 0.5 | 0.5 |
| Boulder Clay | Clay, silty, orange/brown, with occasional chalk pebbles, and some chalk sand and flint pebbles | 0.9 | 1.4 |
| Glacial Sand and Gravel | **a** 'Clayey' sandy gravel<br>    Gravel: fine and coarse, subangular to subrounded flint, and subrounded to well-rounded chalk, with some vein-quartz and sandstone<br>    Sand: medium and fine with coarse, quartz with flint, yellow | 4.5 | 5.9 |
| Boulder Clay | Clay, buff/brown, becoming grey and then brown, with occasional chalk pebbles and some chalk sand | 1.4 | 7.3 |
| Glacial Sand and Gravel | **b** Sand<br>    Gravel: fine and coarse, flint<br>    Sand: medium and fine with some coarse, quartz, pale yellow/orange | 7.5 | 14.8 |
| | **c** Gravel<br>    Gravel: fine and coarse, subangular to subrounded grey, brown and white flint, with subangular to well-rounded vein-quartz and sandstone<br>    Sand: medium and coarse with fine, quartz with flint | 10.4 | 25.2 |
| Chalk | Chalk | 0.4+ | 25.6 |

# GRADING

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **a** | 16 | 60 | 24 | 1.4–2.3 | 24 | 32 | 23 | 7 | 9 | 5 | 0 |
| | | | | 2.3–3.2 | 14 | 20 | 27 | 11 | 16 | 12 | 0 |
| | | | | 3.2–4.1 | 13 | 12 | 28 | 14 | 23 | 10 | 0 |
| | | | | 4.1–5.9 | 14 | 14 | 33 | 15 | 14 | 10 | 0 |
| | | | | Mean | 16 | 19 | 29 | 12 | 15 | 9 | 0 |
| **b** | 8 | 88 | 4 | 7.3–8.4 | 14 | 25 | 46 | 8 | 7 | 0 | 0 |
| | | | | 8.4–9.4 | 9 | 41 | 45 | 3 | 2 | 0 | 0 |
| | | | | 9.4–10.6 | 9 | 36 | 42 | 4 | 9 | 0 | 0 |
| | | | | 10.6–11.8 | 11 | 43 | 43 | 2 | 1 | 0 | 0 |
| | | | | 11.8–12.7 | 6 | 28 | 65 | 1 | 0 | 0 | 0 |
| | | | | 12.7–13.8 | 5 | 19 | 69 | 1 | 1 | 5 | 0 |
| | | | | 13.8–14.8 | 1 | 14 | 72 | 9 | 2 | 2 | 0 |
| | | | | Mean | 8 | 30 | 54 | 4 | 3 | 1 | 0 |
| **c** | 3 | 41 | 56 | 14.8–15.8 | 23 | 4 | 24 | 16 | 26 | 7 | 0 |
| | | | | 15.8–18.0 | 0 | 1 | 8 | 7 | 53 | 31 | 0 |
| | | | | 18.0–19.5 | 2 | 3 | 16 | 14 | 39 | 26 | 0 |
| | | | | 19.5–20.5 | 1 | 3 | 25 | 17 | 24 | 30 | 0 |
| | | | | 20.5–21.5 | 0 | 2 | 18 | 12 | 28 | 38 | 2 |
| | | | | 21.5–22.5 | 1 | 7 | 34 | 14 | 21 | 23 | 0 |
| | | | | 22.5–23.5 | 1 | 9 | 39 | 13 | 10 | 28 | 0 |
| | | | | 23.5–25.2 | 2 | 7 | 36 | 20 | 15 | 18 | 2 |
| | | | | Mean | 3 | 4 | 23 | 14 | 30 | 25 | 1 |
| **a+b +c** | 7 | 61 | 32 | Mean | 7 | 16 | 35 | 10 | 18 | 14 | 0 |

# COMPOSITION

| | Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | | |
| | | Flint | Vein-quartz | Sandstone | Others | Chalk |
|---|---|---|---|---|---|---|
| **a** | 3.2–4.1 | 55 | 4 | 6 | 2 | 33 |
| **c** | 14.8–15.8 | 71 | 12 | 11 | 6 | 0 |
| | 15.8–18.0 | 44 | 20 | 18 | 18 | 0 |
| | 18.0–19.5 | 50 | 34 | 13 | 3 | 0 |
| | 19.5–20.5 | 56 | 14 | 22 | 8 | 0 |
| | 21.5–22.5 | 63 | 14 | 19 | 4 | 0 |
| | 22.5–23.5 | 60 | 17 | 15 | 5 | 3 |
| **c** | Mean | 52 | 19 | 17 | 12 | 0 |

Surface level +33.6 m (+110 ft)                                                          Overburden 0.1 m
Water not struck                                                                          Mineral 1.9 m
Shell and auger 152 mm diameter                                                          Waste 1.3 m
December 1978                                                                             Bedrock 1.0+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; sand, dark brown, with occasional flint pebbles | 0.1 | 0.1 |
| Glacial Sand and Gravel | 'Clayey' sandy gravel; more gravelly at base<br>　Gravel: fine and coarse, subangular to subrounded flint,<br>　　with chalk and some vein-quartz<br>　Sand: fine and medium with coarse, quartz with flint, orange/brown | 1.9 | 2.0 |
| Boulder Clay | Clay, silty, buff/brown, with occasional chalk pebbles, and some chalk sand and flint pebbles | 1.3 | 3.3 |
| Chalk | Chalk, with flints | 1.0+ | 4.3 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 12 | 58 | 30 | 0.1–0.9 | 9 | 43 | 27 | 5 | 9 | 7 | 0 |
| | | | 0.9–2.0 | 14 | 16 | 20 | 9 | 24 | 17 | 0 |
| | | | Mean | 12 | 28 | 23 | 7 | 17 | 13 | 0 |

## COMPOSITION

| Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 0.9–2.0 | 80 | 1 | 0 | 6 | 13 |

Surface level +48.6 m (+159 ft)                                                          Waste 4.5 m
Water not struck                                                                          Bedrock 0.5+ m
Shell and auger 152 mm diameter
November 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional flint pebbles | 0.2 | 0.2 |
| Boulder Clay | Clay, buff/brown, becoming mottled grey and brown at 3 m, and buff/brown at 3.5 m, with occasional chalk pebbles and some chalk sand and flint pebbles | 4.3 | 4.5 |
| Chalk | Chalk | 0.5+ | 5.0 |

Surface level  +31.4 m (+103 ft)
Water struck at +25.4 m
Shell and auger 152 mm diameter
December 1978

Overburden 0.2 m
Mineral 4.0 m
Waste 11.0 m
Bedrock 1.1+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made Ground | 0.2 | 0.2 |
| Head | 'Clayey' pebbly sand<br>  Gravel: fine and coarse, with some cobbles, flint<br>  Sand: medium and fine with coarse, quartz with flint, orange | 4.0 | 4.2 |
| Glacial Silt | Silt, buff/brown, becoming grey at 5.5 m, with occasional chalk<br>  pebbles, some chalk sand and a trace of flint pebbles | 2.3 | 6.5 |
| Boulder Clay | Clay, silty, brown/grey, with occasional chalk pebbles, some<br>  chalk sand and flint pebbles, and a trace of red chalk and shale | 8.7 | 15.2 |
| Chalk | Chalk | 1.1+ | 16.3 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 13 | 67 | 20 | 0.2–1.4 | 19 | 32 | 22 | 7 | 15 | 5 | 0 |
| | | | 1.4–2.4 | 10 | 40 | 31 | 7 | 9 | 3 | 0 |
| | | | 2.4–3.4 | 15 | 37 | 41 | 3 | 4 | 0 | 0 |
| | | | 3.4–4.2 | 4 | 8 | 30 | 7 | 23 | 26 | 2 |
| | | | Mean | 13 | 30 | 31 | 6 | 12 | 7 | 1 |

Surface level  +49.3 m (+162 ft)
Water not struck
Shell and auger 152 mm diameter
December 1978

Waste 7.9 m
Bedrock 1.0+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clay, dark brown, with occasional flint pebbles | 0.3 | 0.3 |
| Boulder Clay | Clay, buff/brown, becoming grey, with occasional chalk pebbles,<br>  and some chalk sand and flint pebbles | 7.6 | 7.9 |
| Chalk | Chalk | 1.0+ | 8.9 |

Surface level +63.6 m (+209 ft)
Water not struck
Shell and auger 152 mm diameter
November 1978

Waste 16.7 m
Bedrock 1.7+ m

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, dark brown, with some flint pebbles | 0.1 | 0.1 |
| Boulder Clay | Clay, silty, orange/brown, becoming dark grey, with occasional chalk pebbles, and some chalk sand and flint pebbles. Silt layer from 10.5 m to 11.1 m | 16.6 | 16.7 |
| Chalk | Chalk | 1.7+ | 18.4 |

Surface level +61.5 m (+202 ft)
Water not struck
Shell and auger 152 mm diameter
November 1978

Waste 16.5 m
Bedrock 1.7+ m

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; fine sand, brown, with occasional flint pebbles | 0.3 | 0.3 |
| Boulder Clay | Clay, silty, sandy, buff/orange becoming grey, with occasional chalk pebbles, and some chalk sand and flint pebbles | 16.2 | 16.5 |
| Chalk | Chalk | 1.7+ | 18.2 |

Surface level +52.5 m (+172 ft)
Water not struck
Shell and auger 152 mm diameter
October 1978

Waste 4.4 m
Bedrock 1.3+ m

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional flint pebbles | 0.4 | 0.4 |
| Cover Sand | Clayey sand, fine, brown, with occasional subangular to subrounded flint pebbles | 0.3 | 0.7 |
| Glacial Silt | Clay, red/brown, with some subrounded chalk sand | 0.3 | 1.0 |
| | Silt, mottled buff/grey, with some subrounded to rounded chalk sand | 1.1 | 2.1 |
| Boulder Clay | Clay, dark brown/grey, with occasional chalk pebbles, some chalk sand and flint pebbles, and a trace of red chalk | 2.3 | 4.4 |
| Chalk | Chalk, with flints | 1.3+ | 5.7 |

Surface level + 54.8 (+ 180 ft)                                                                Overburden 3.1 m
Water not struck                                                                                      Mineral 5.4 m
Shell and auger 152 mm diameter                                                      Waste 0.5 m
November 1978                                                                                       Mineral 3.0+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey silty sand, brown, with occasional flint and a trace of chalk pebbles | 0.3 | 0.3 |
| Boulder Clay | Clay, buff/brown, becoming mottled grey and brown at 1.5 m, with occasional chalk pebbles, some chalk sand and flint pebbles | 2.8 | 3.1 |
| Glacial Sand and Gravel | **a** Pebbly sand; sandy gravel from 5.0 m to 6.8 m<br>Gravel: fine and coarse, subangular to subrounded flint, with sandstone and vein-quartz<br>Sand: medium and fine with some coarse, quartz, pale orange/brown | 5.4 | 8.5 |
| Boulder Clay | Clay, silty, pink/brown, becoming buff/grey, with occasional chalk pebbles, and some chalk sand and flint pebbles | 0.5 | 9.0 |
| Glacial Sand and Gravel | **b** Pebbly sand<br>Gravel: fine and coarse, flint<br>Sand: medium and fine with some coarse, quartz, pale orange/yellow | 3.0+ | 12.0 |

## GRADING

| | Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| **a** | 10 | 76 | 14 | 3.1–4.3 | 10 | 22 | 59 | 4 | 3 | 2 | 0 |
| | | | | 4.3–5.0 | 11 | 31 | 57 | 1 | 0 | 0 | 0 |
| | | | | 5.0–5.8 | 1 | 23 | 38 | 5 | 20 | 13 | 0 |
| | | | | 5.8–6.8 | 8 | 21 | 35 | 7 | 13 | 16 | 0 |
| | | | | 6.8–7.5 | 25 | 19 | 37 | 3 | 8 | 8 | 0 |
| | | | | 7.5–8.5 | 7 | 36 | 55 | 0 | 0 | 2 | 0 |
| | | | | Mean | 10 | 26 | 47 | 3 | 7 | 7 | 0 |
| **b** | 9 | 84 | 7 | 9.0–10.2 | 7 | 26 | 64 | 2 | 1 | 0 | 0 |
| | | | | 10.2–11.2 | 12 | 31 | 36 | 5 | 8 | 8 | 0 |
| | | | | 11.2–12.0 | 10 | 48 | 34 | 2 | 4 | 2 | 0 |
| | | | | Mean | 9 | 34 | 47 | 3 | 4 | 3 | 0 |
| **a+b** | 10 | 78 | 12 | Mean | 10 | 28 | 47 | 3 | 6 | 6 | 0 |

## COMPOSITION

| | Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | |
|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others |
| **a** | 5.0–5.8 | 69 | 10 | 18 | 3 |

Surface level +62.7 m (+206 ft)
Water not struck
Shell and auger 152 mm diameter
October 1978

Overburden 1.6 m
Mineral 6.7 m
Waste 3.9 m
Bedrock 1.3+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; sand, brown | 0.6 | 0.6 |
| ? Glacial Sand and Gravel | 'Clayey' sand; fine to medium, orange/brown, with occasional flint and vein-quartz pebbles | 0.2 | 0.8 |
| Boulder Clay | Clay, silty, sandy, pale brown, with occasional chalk pebbles, and some chalk sand and flint pebbles | 0.8 | 1.6 |
| Glacial Sand and Gravel | a 'Clayey' pebbly sand; gravelly towards base    Gravel: fine and coarse, with cobbles, angular to rounded dark grey to white flint, with vein-quartz, sandstone and some chalk    Sand: medium and fine with some coarse, quartz, yellow/orange | 6.7 | 8.3 |
| Boulder Clay | Clay, silty, pale brown, becoming blue/grey at 9 m, with occasional chalk pebbles, some chalk sand and flint pebbles | 2.6 | 10.9 |
| Glacial Sand and Gravel | b 'Very clayey' gravel    Gravel: fine and coarse, subrounded to well-rounded chalk and subangular to subrounded flint, with some vein-quartz and sandstone    Sand: medium and coarse with fine, quartz with flint, orange/brown | 0.5 | 11.4 |
| Boulder Clay | Clay, silty, grey, with occasional chalk pebbles, some chalk sand and flint pebbles | 0.8 | 12.2 |
| Chalk | Chalk, with flints | 1.3+ | 13.5 |

## GRADING

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| a | 10 | 81 | 9 | 1.6–2.5 | 13 | 24 | 47 | 4 | 6 | 6 | 0 |
| | | | | 2.5–3.5 | 17 | 46 | 31 | 3 | 2 | 1 | 0 |
| | | | | 3.5–4.7 | 11 | 28 | 57 | 2 | 1 | 1 | 0 |
| | | | | 4.7–5.7 | 6 | 16 | 76 | 1 | 1 | 0 | 0 |
| | | | | 5.7–6.6 | 5 | 25 | 68 | 1 | 1 | 0 | 0 |
| | | | | 6.6–7.7 | 5 | 22 | 52 | 3 | 6 | 12 | 0 |
| | | | | 7.7–8.3 | 15 | 14 | 29 | 8 | 14 | 13 | 7 |
| | | | | Mean | 10 | 25 | 53 | 3 | 4 | 4 | 1 |
| b | 32 | 33 | 35 | 10.9–11.4 | 32 | 7 | 15 | 11 | 24 | 11 | 0 |

## COMPOSITION

| | Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | | |
|---|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others | Chalk |
| a | 7.7–8.3 | 69 | 16 | 9 | 5 | 1 |
| b | 10.9–11.4 | 48 | 4 | 3 | 7 | 38 |

Surface level + 60.5 m ( + 198 ft)  
Water struck at + 55.7 m  
Shell and auger 152 mm diameter  
October 1978

Overburden 0.5 m  
Mineral 1.1 m  
Waste 2.4 m  
Mineral 1.2 m  
Waste 4.2 m  
Bedrock 0.9 + m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional subangular to subrounded flint pebbles | 0.5 | 0.5 |
| Cover Sand | **a** 'Very clayey' pebbly sand<br> Gravel: fine and coarse, angular to subrounded flint,<br> with chalk, sandstone and some vein-quartz<br> Sand: medium and fine with coarse, quartz with flint, buff/orange | 1.1 | 1.6 |
| Glacial Silt | Silt, sandy, pale buff/cream, with some flint and chalk pebbles | 1.0 | 2.6 |
| | Silt, sandy, laminated | 0.8 | 3.4 |
| | Clay, silty, buff | 0.6 | 4.0 |
| Glacial Sand and Gravel | **b** Sandy gravel<br> Gravel: fine with coarse, flint and chalk<br> Sand: medium and coarse with fine, quartz with flint, buff/brown | 1.2 | 5.2 |
| ? Glacial Silt | Clay, silty, mottled pale buff and grey, becoming dark grey, laminated in part | 2.2 | 7.4 |
| Boulder Clay | Clay, dark grey, becoming mottled brown and grey, with occasional chalk pebbles and chalk sand | 2.0 | 9.4 |
| Chalk | Chalk, with flints | 0.9+ | 10.3 |

## GRADING

| | Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| **a** | 27 | 56 | 17 | 0.5–1.6 | 27 | 23 | 27 | 6 | 11 | 6 | 0 |
| **b** | 6 | 51 | 43 | 4.0–5.2 | 6 | 10 | 27 | 14 | 36 | 7 | 0 |
| **a+b** | 16 | 53 | 31 | Mean | 16 | 16 | 27 | 10 · | 24 | 7 | 0 |

## COMPOSITION

| | Depth below surface (m) | *Percentage by weight in + 4–16 mm fraction* | | | | |
|---|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others | Chalk |
| **a** | 0.5–1.6 | 59 | 4 | 11 | 4 | 22 |

Surface level +66.9 m (+219 ft)                    Waste 18.2+ m
Water not struck
Shell and auger 152 mm diameter
October 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; very clayey sand, brown, with occasional angular to subrounded flint pebbles | 0.4 | 0.4 |
| Boulder Clay | Clay, silty, mottled pale brown and grey, becoming dark grey, with occasional chalk pebbles, and some chalk sand and flint pebbles | 17.8+ | 18.2 |

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TL 86 NE 98    8984 6807    **Vicarage Farm, Great Barton**    **Block D**

Surface level +56.3 m (+185 ft)                    Overburden 0.4 m
Water not struck                                    Mineral 5.1 m
Shell and auger 152 mm diameter          Waste 1.0 m
October 1978                                 Bedrock 0.8+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional angular to subrounded flint pebbles | 0.4 | 0.4 |
| Head Gravel | 'Very clayey' sandy gravel; gravel fraction increasing with depth<br>Gravel: fine and coarse, subangular to rounded grey, brown and white flint, with chalk, sandstone and vein-quartz<br>Sand: fine and medium with coarse, quartz with flint, orange | 5.1 | 5.5 |
| | Clay, silty, pale red/brown becoming yellow/orange, with some fine to coarse sand | 1.0 | 6.5 |
| Chalk | Chalk | 0.8+ | 7.3 |

## GRADING

| Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 22 | 48 | 30 | 0.4–1.4 | 27 | 49 | 16 | 2 | 3 | 3 | 0 |
| | | | 2.5–3.3 | 23 | 18 | 29 | 11 | 13 | 6 | 0 |
| | | | 3.3–4.3 | 20 | 11 | 18 | 14 | 22 | 15 | 0 |
| | | | 4.3–5.5 | 19 | 9 | 9 | 13 | 26 | 24 | 0 |
| | | | Mean | 22 | 21 | 17 | 10 | 17 | 13 | 0 |

## COMPOSITION

| Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 0.4–1.4 | 88 | 6 | 1 | 4 | 1 |
| 3.3–4.3 | 59 | 7 | 10 | 2 | 22 |
| Mean | 63 | 7 | 9 | 2 | 19 |

Surface level $+52.9$ m ($+174$ ft)  
Water not struck  
Shell and auger 152 mm diameter  
October 1978

Overburden 0.7 m  
Mineral 2.9 m  
Bedrock $0.8+$ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional angular to subrounded flint pebbles | 0.5 | 0.5 |
| ? Boulder Clay | Clay, silty, orange/buff, with occasional angular to subrounded flint pebbles | 0.2 | 0.7 |
| Glacial Sand and Gravel | 'Very clayey' pebbly sand; more gravelly towards base<br>Gravel: fine and coarse, flint<br>Sand: medium and fine with coarse, orange | 2.9 | 3.6 |
| Chalk | Chalk, with flints | $0.8+$ | 4.4 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 20 | 61 | 19 | 0.7–1.7 | 28 | 34 | 32 | 2 | 2 | 2 | 0 |
| | | | 1.7–2.7 | 19 | 14 | 42 | 8 | 10 | 7 | 0 |
| | | | 2.7–3.6 | 14 | 9 | 29 | 10 | 18 | 20 | 0 |
| | | | Mean | 20 | 20 | 35 | 6 | 10 | 9 | 0 |

Surface level + 58.4 m (+ 192 ft)                                              Overburden 1.8 m
Water not struck                                                               Mineral 1.2 m
Shell and auger 152 mm diameter                                               Waste 1.3 m
December 1978                                                                  Bedrock 1.0+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine to medium sand, with occasional subangular to subrounded flint pebbles | 0.3 | 0.3 |
| Cover Sand | 'Clayey' sand; medium, orange/brown | 0.3 | 0.6 |
| Boulder Clay | Clay, silty, buff/brown, with occasional chalk pebbles and some chalk sand | 1.2 | 1.8 |
| Glacial Sand and Gravel | 'Clayey' gravel<br>Gravel: fine and coarse, subangular to subrounded, grey to white flint, with vein-quartz, sandstone and some chalk<br>Sand: medium and coarse with fine, quartz with flint | 1.2 | 3.0 |
| Boulder Clay | Silt, pale cream/brown, laminated | 0.2 | 3.2 |
| | Clay, mottled buff and grey, with occasional chalk pebbles, and some chalk sand and flint pebbles | 1.1 | 4.3 |
| Chalk | Chalk, with flints | 1.0+ | 5.3 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | | $+4-16$ | $+16-64$ | $+64$ |
| 17 | 40 | 43 | 1.8–3.0 | 17 | 10 | 17 | 13 | | 28 | 15 | 0 |

## COMPOSITION

| Depth below surface (m) | Percentage by weight in + 4–16 mm fraction | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 1.8–3.0 | 72 | 18 | 7 | 1 | 2 |

Surface level +35.2 m (+115 ft)
Water struck at +23.7 m
Shell and auger 152 mm diameter
October 1978

Overburden 0.7 m
Mineral 1.0 m
Waste 2.1 m
Mineral 1.8 m
Waste 18.1 + m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional angular to subrounded flint pebbles | 0.7 | 0.7 |
| River Terrace Deposits (3rd Terrace) | a 'Clayey' pebbly sand<br>  Gravel: fine and coarse, grey, brown and white flint, with vein-quartz, and some ironstone, chalk and sandstone<br>  Sand: fine with medium and coarse, quartz with flint, orange | 1.0 | 1.7 |
| | Clay, silty, sandy, with angular to subrounded flint pebbles | 2.1 | 3.8 |
| | b 'Very clayey' pebbly sand<br>  Gravel: fine with coarse, grey and white flint, with some vein-quartz<br>  Sand: fine with medium and some coarse, quartz, orange/brown | 1.8 | 5.6 |
| Lacustrine Deposits | Silt, dark brown/green, becoming grey, with some shell fragments and plant remains | 2.4 | 8.0 |
| | Silt, blue/grey, becoming grey, laminated from 11.0 m to 12.5 m, with a trace of fine chalk sand, and some plant remains | 4.5 | 12.5 |
| Glacial Sand and Gravel | c Gravel<br>  Gravel: fine and coarse, angular to subrounded flint and subangular to rounded chalk, with sandstone and some vein-quartz, grit, limestone and volcanics<br>  Sand: coarse and medium with fine, quartz with flint | 1.2 | 13.7 |
| Boulder Clay | Clay, dark grey, with occasional chalk pebbles, some chalk sand and flint pebbles and a trace of red chalk and shale. Thin silt layer at 23 m | 10.0+ | 23.7 |

## GRADING

| | Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| a | 19 | 74 | 7 | 0.7–1.7 | 19 | 52 | 18 | 4 | 5 | 2 | 0 |
| b | 26 | 70 | 4 | 3.8–5.6 | 26 | 52 | 16 | 2 | 4 | 0 | 0 |
| c | 6 | 38 | 56 | 12.5–13.7 | 6 | 7 | 12 | 19 | 37 | 19 | 0 |
| a+b | 23 | 71 | 6 | Mean | 23 | 52 | 17 | 2 | 5 | 1 | 0 |

## COMPOSITION

| | Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | |
|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others |
| b | 3.8–5.6 | 94 | 3 | 0 | 3 |

Surface level +28.3 m (+93 ft)                                                           Overburden 1.2 m
Water struck at +26.4 m                                                                   Mineral 3.4 m
Shell and auger 152 mm diameter                                                           Waste 5.5+ m
December 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 1.2 | 1.2 |
| River Terrace Deposits (1st Terrace) | Gravel Gravel: fine and coarse, with some cobbles, angular to subangular flint, with vein-quartz and some sandstone Sand: coarse and medium with fine, quartz with flint | 3.4 | 4.6 |
| Glacial Silt | Silt, blue/grey, with some fine chalk sand | 5.5+ | 10.1 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | | $+4-16$ | $+16-64$ | $+64$ |
| 2 | 28 | 70 | 1.2–2.2 | 3 | 6 | 12 | 14 | | 33 | 32 | 0 |
| | | | 2.2–3.2 | 2 | 3 | 17 | 14 | | 41 | 16 | 7 |
| | | | 3.2–4.6 | 1 | 2 | 7 | 14 | | 34 | 42 | 0 |
| | | | Mean | 2 | 3 | 11 | 14 | | 36 | 32 | 2 |

## COMPOSITION

| Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | |
|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others |
| 3.2–4.6 | 88 | 8 | 3 | 1 |

Surface level +76.3 m (+250 ft)
Water struck at +67.5 m
Shell and auger 152 mm diameter
October 1978

Overburden 0.6 m
Mineral 1.7 m
Waste 9.7 m
Bedrock 0.8 + m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
|  | Soil; clayey fine sand, brown, with occasional angular to subrounded flint pebbles | 0.6 | 0.6 |
| Cover Sand | 'Very clayey' sandy gravel Gravel: fine and coarse, snbangular to subrounded, pale grey to white flint, with vein-quartz and some sandstone Sand: fine with medium and coarse, quartz with flint, orange/brown | 1.7 | 2.3 |
| Boulder Clay | Clay, silty, buff/brown becoming dark grey at 7.5 m, becoming grey/brown at 10.5 m, with subrounded to rounded chalk pebbles, some chalk sand, and a trace of flint, red chalk, sandstone and oolitic limestone | 8.4 | 10.7 |
|  | Clay, sandy, buff | 0.9 | 11.6 |
|  | Clay, red/brown, with subangular to rounded chalk and angular to subangular flint pebbles, and a trace of subrounded to rounded red chalk | 0.4 | 12.0 |
| Chalk | Chalk, with flints | 0.8 + | 12.8 |

## GRADING

| Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
|  |  |  |  | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 20 | 58 | 22 | 0.6–1.6 | 20 | 43 | 11 | 4 | 10 | 12 | 0 |

## COMPOSITION

| Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | | |
|---|---|---|---|---|---|
|  | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 0.6–1.6 | 89 | 7 | 3 | 1 | 0 |

TL 86 SW 27    8068 6322    **Little Saxham Hall, Little Saxham**    **Block C**

Surface level +79.9 m (+262 ft)    Waste 8.5 m
Water not struck    Bedrock 0.4 + m
Shell and auger 152 mm diameter
October 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown | 0.4 | 0.4 |
| Boulder Clay | Clay, sandy, with chalk and flint pebbles and a trace of red chalk | 0.4 | 0.8 |
| | Clay, silty, pale grey with orange/brown sub-vertical partings, with subrounded to rounded chalk pebbles and some chalk sand | 2.2 | 3.0 |
| | Clay, grey/brown, with subangular to rounded chalk pebbles, and a trace of flint, red chalk, siltstone, sandstone, calcite and pyrite | 3.5 | 6.5 |
| | Clay, silty, orange/brown, becoming pale brown/grey, with iron-stained chalk pebbles | 2.0 | 8.5 |
| Chalk | Chalk | 0.4+ | 8.9 |


TL 86 SW 28    8024 6176    **Horsepool Lodge, Chevington**    **Block C**

Surface level +87.8 m (+288 ft)    Waste 19.1 + m
Water not struck
Shell and auger 152 mm diameter
December 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; silt, clayey, dark brown | 0.3 | 0.3 |
| Boulder Clay | Clay, silty at top, brown, becoming grey at 1.5 m, and then brown/grey near base, with occasional chalk pebbles, and some chalk sand and flint pebbles | 18.8+ | 19.1 |

Surface level +65.4 m (+215 ft)                      Overburden 0.1 m
Water not struck                                     Mineral 2.7 m
Shell and auger 152 mm diameter             Waste 2.6 m
December 1978                                  Bedrock 0.5+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; fine to medium sand, brown | 0.1 | 0.1 |
| Head | 'Very clayey' pebbly sand<br>   Gravel: fine and coarse, angular to subrounded, grey, brown<br>     and white flint, with chalk and some sandstone and vein-quartz<br>     Sand: fine with medium and coarse quartz with flint, orange/brown | 2.7 | 2.8 |
| | Clay, silty, sandy, pebbly, angular to subrounded flint pebbles<br>  and some chalk, sandstone and vein-quartz | 1.9 | 4.7 |
| | Clay, sandy, brown, with chalk and flint pebbles | 0.7 | 5.4 |
| Chalk | Chalk | 0.5+ | 5.9 |

## GRADING

| Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 29 | 54 | 17 | 0.1–1.1 | 37 | 39 | 11 | 2 | 5 | 6 | 0 |
| | | | 1.1–1.8 | 18 | 42 | 16 | 5 | 19 | 0 | 0 |
| | | | 1.8–2.8 | 29 | 28 | 14 | 9 | 14 | 6 | 0 |
| | | | Mean | 29 | 36 | 13 | 5 | 12 | 5 | 0 |

## COMPOSITION

| Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 1.8–2.8 | 85 | 1 | 3 | 1 | 10 |
| 2.8–3.8 | 93 | 0 | 2 | 0 | 5 |
| 3.8–4.7 | 83 | 0 | 1 | 0 | 16 |
| Mean | 88 | 0 | 2 | 0 | 10 |

Surface level +71.6 m (+235 ft)                      Waste 4.4 m
Water not struck                                         Bedrock 0.7+ m
Shell and auger 152 mm diameter
November 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 3.1 | 3.1 |
| Boulder Clay | Clay, buff/brown, with chalk pebbles and a trace of red chalk | 1.3 | 4.4 |
| Chalk | Chalk | 0.7+ | 5.1 |

Surface level +51.8 m (+170 ft)          Overburden 1.9 m
Water not struck                         Mineral 4.1 m
Shell and auger 152 mm diameter          Waste 1.3 m
December 1978                            Mineral 2.0 m
                                         Bedrock 0.5+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
|  | Soil; fine silty sand, brown | 0.3 | 0.3 |
| Alluvium | Silt, brown/buff, with occasional flint and chalk sand | 1.6 | 1.9 |
| Head | **a** 'Clayey' sandy gravel<br>Gravel: fine and coarse, subangular to subrounded grey, brown and white flint, with chalk, sandstone and some vein-quartz and ironstone<br>Sand: fine and medium, with coarse, quartz with flint, orange/brown | 4.1 | 6.0 |
|  | Silt, sandy, grey/brown, with some well-rounded chalk sand | 1.3 | 7.3 |
|  | **b** 'Very clayey' pebbly sand; with layers of laminated silt, particularly pebbly towards base<br>Gravel: coarse and fine, subangular to subrounded, pale grey to white flint with sandstone and some vein-quartz and chalk<br>Sand: fine, with medium and coarse, quartz with flint, orange | 2.0 | 9.3 |
| Chalk | Chalk | 0.5+ | 9.8 |

## GRADING

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| **a** | 17 | 61 | 22 | 1.9–2.8 | 16 | 11 | 15 | 14 | 26 | 18 | 0 |
| | | | | 2.8–3.4 | 22 | 10 | 13 | 12 | 21 | 22 | 0 |
| | | | | 3.4–4.4 | 21 | 56 | 14 | 4 | 5 | 0 | 0 |
| | | | | 4.4–6.0 | 11 | 43 | 26 | 8 | 11 | 1 | 0 |
| | | | | Mean | 17 | 36 | 16 | 9 | 14 | 8 | 0 |
| **b** | 25 | 59 | 16 | 7.3–8.4 | 37 | 49 | 9 | 3 | 2 | 0 | 0 |
| | | | | 8.4–9.3 | 11 | 40 | 11 | 5 | 10 | 23 | 0 |
| | | | | Mean | 25 | 45 | 10 | 4 | 6 | 10 | 0 |
| **a+b** | 20 | 60 | 20 | Mean | 20 | 39 | 14 | 7 | 11 | 9 | 0 |

## COMPOSITION

| | Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | | |
|---|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others | Chalk |
| **a** | 1.9–2.8 | 79 | 1 | 8 | 3 | 9 |
| **b** | 8.4–9.3 | 76 | 3 | 10 | 8 | 3 |

Surface level +80.3 m (+263 ft)
Water not struck
Shell and auger 152 mm diameter
December 1978

Waste 8.5 m
Bedrock 0.3 + m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; silty sandy clay, brown, with occasional flint pebbles and some coarse flint sand | 0.3 | 0.3 |
| Boulder Clay | Clay, silty, buff/brown, becoming mottled pale grey and brown and then dark grey, with occasional chalk and flint pebbles | 8.1 | 8.4 |
| | Sand, fine to medium, buff/yellow | 0.1 | 8.5 |
| Chalk | Chalk | 0.3 + | 8.8 |

Surface level +95.1 m (+312 ft)
Water not struck
Shell and auger 152 mm diameter
December 1978

Waste 19.1 + m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; sandy silty clay, brown, with occasional flint pebbles | 0.1 | 0.1 |
| Boulder Clay | Clay, silty near top, buff/orange/brown, becoming mottled pale grey and brown, and then dark grey at 4 m, with occasional chalk pebbles and some chalk sand, and a trace of flint pebbles | 19.0 + | 19.1 |

Surface level + 58.5 m (+ 192 ft)                                              Overburden 0.5 m
Water not struck                                                               Mineral 2.1 m
Shell and auger 152 mm diameter                                                Bedrock 0.3 + m
November 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; fine sand, brown, with occasional flint pebbles | 0.5 | 0.5 |
| Glacial Sand and Gravel | 'Very clayey' sandy gravel<br>　　Gravel: fine and coarse, subangular to subrounded, pale grey<br>　　　to white flint, with vein-quartz and sandstone<br>　　Sand: fine with medium and coarse, quartz with flint, orange/brown | 2.1 | 2.6 |
| Chalk | Chalk, with flints | 0.3 + | 2.9 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 25 | 55 | 20 | 0.5–1.5 | 29 | 43 | 14 | 3 | 9 | 2 | 0 |
| | | | 1.5–2.6 | 22 | 31 | 13 | 7 | 14 | 13 | 0 |
| | | | Mean | 25 | 37 | 13 | 5 | 12 | 8 | 0 |

## COMPOSITION

| Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 0.5–1.5 | 82 | 8 | 8 | 2 | 0 |

Surface level + 85.2 m (+ 280 ft)                                              Waste 20.0 m
Water not struck                                                               Bedrock 0.1 + m
Shell and auger 152 mm diameter
December 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; silty sandy clay, dark brown, with occasional flint pebbles | 0.3 | 0.3 |
| Boulder Clay | Clay, silty near top, buff/brown, becoming mottled pale grey and buff, and then dark grey at 2.7 m, with occasional chalk pebbles, some chalk sand and flint pebbles and a trace of red chalk | 17.5 | 17.8 |
| | Clay, sandy, silty, mottled dark grey and brown, with some flint pebbles | 2.2 | 20.0 |
| Chalk | Chalk | 0.1 + | 20.1 |

**TL 86 SW 36    8306 6092    Shrubland Lodge, Horringer**    **Block C**

Surface level +93.7 m (+307 ft)                                              Waste 18.9+ m
Water not struck
Shell and auger 152 mm diameter
November 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
|  | Soil; silty clay, dark brown, with occasional flint pebbles | 0.3 | 0.3 |
| Boulder Clay | Clay, orange/brown, becoming buff/brown, and then grey at 4.2 m, with occasional chalk pebbles and some chalk sand and flint pebbles | 18.6+ | 18.9 |

**TL 86 SW 37    8315 6272    Great Horringer Hall, Horringer**    **Block C**

Surface level +71.5 m (+235 ft)                                              Overburden 10.8 m
Water not struck                                                             Mineral 3.7 m
Shell and auger 152 mm diameter                                             Bedrock 0.4+ m
November 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
|  | Soil; clayey fine sand, dark brown, with occasional flint pebbles | 0.3 | 0.3 |
| Cover Sand | Sand, fine, becoming clayey towards base, with occasional flint pebbles | 0.5 | 0.8 |
| Boulder Clay | Clay, silty near top, buff/orange/brown, becoming dark grey with orange/brown partings at 7.0 m, and then buff/brown at 8.5 m, with occasional chalk pebbles and some chalk sand | 10.0 | 10.8 |
| Glacial Sand and Gravel | 'Very clayey' sandy gravel<br>    Gravel: fine and coarse, subangular to rounded dark grey to white flint, and chalk with some vein-quartz<br>    Sand: medium coarse and fine, quartz with flint, orange/brown | 3.7 | 14.5 |
| Chalk | Chalk | 0.4+ | 14.9 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
|  |  |  |  | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 21 | 40 | 39 | 10.8–11.6 | 27 | 14 | 15 | 11 | 22 | 11 | 0 |
|  |  |  | 11.6–12.6 | 22 | 12 | 17 | 13 | 22 | 14 | 0 |
|  |  |  | 12.6–13.4 | 15 | 7 | 16 | 15 | 17 | 30 | 0 |
|  |  |  | 13.4–14.1 | 21 | 9 | 16 | 14 | 21 | 19 | 0 |
|  |  |  | 14.1–14.5 | 21 | 9 | 14 | 16 | 24 | 16 | 0 |
|  |  |  | Mean | 21 | 10 | 16 | 14 | 21 | 18 | 0 |

## COMPOSITION

| Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | |
|---|---|---|---|---|
|  | Flint | Vein-quartz | Others | Chalk |
| 10.8–11.6 | 62 | 2 | 6 | 30 |
| 11.6–12.6 | 70 | 2 | 9 | 19 |
| Mean | 66 | 2 | 8 | 24 |

Surface level +70.8 m (+232 ft)     Overburden 5.9 m
Water not struck     Mineral 2.6 m
Shell and auger 152 mm diameter     Bedrock 0.8+ m
November 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional flint pebbles | 0.4 | 0.4 |
| Cover Sand | Clayey fine to medium sand, with some flint pebbles, orange/brown | 0.2 | 0.6 |
| Boulder Clay | Clay, orange/brown, becoming buff at 1 m and then mottled dark brown and grey, with chalk pebbles and some chalk sand | 5.3 | 5.9 |
| ? Glacial Sand and Gravel | **a** 'Clayey' sandy gravel<br>Gravel: fine and coarse, with cobbles, subangular to rounded flint<br>Sand: medium and fine with coarse, quartz with flint, pale yellow | 0.7 | 6.6 |
| Crag | **b** 'Very clayey' pebbly sand<br>Gravel: fine, subrounded to rounded vein-quartz, with flint and sandstone<br>Sand: medium and fine with coarse, quartz with flint, pale yellow | 1.9 | 8.5 |
| Chalk | Chalk | 0.8+ | 9.3 |

## GRADING

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| a | 12 | 51 | 37 | 5.9–6.6 | 12 | 20 | 22 | 9 | 20 | 12 | 5 |
| b | 24 | 71 | 5 | 6.6–8.5 | 24 | 20 | 42 | 9 | 5 | 0 | 0 |

Surface level +88.9 m (+292 ft)     Waste 19.1+ m
Water not struck
Shell and auger 152 mm diameter
December 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey sandy silt, dark brown | 0.2 | 0.2 |
| Boulder Clay | Clay, brown, becoming mottled brown and grey and then grey at 3.2 m, with chalk pebbles, some chalk sand and flint pebbles | 18.9+ | 19.1 |

Surface level +81.1 m (+266 ft)                                                 Overburden 14.5 m
Water not struck                                                                Mineral 5.3 m
Shell and auger 152 mm diameter                                                 Bedrock 0.3+ m
November 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clay, dark brown, with occasional flint pebbles | 0.1 | 0.1 |
| Boulder Clay | Clay, silty, brown, becoming grey, and then brown at 14 m, with chalk pebbles and some chalk sand and flint pebbles | 14.4 | 14.5 |
| Crag | 'Clayey' sand<br>    Gravel: coarse and fine, flint<br>    Sand: fine and medium with some coarse, quartz, pale yellow/orange | 5.3 | 19.8 |
| Chalk | Chalk | 0.3+ | 20.1 |

## GRADING

| Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 16 | 83 | 1 | 14.5–15.8 | 3 | 48 | 45 | 1 | 1 | 2 | 0 |
| | | | 15.8–17.0 | 19 | 46 | 34 | 1 | 0 | 0 | 0 |
| | | | 17.0–18.5 | 16 | 51 | 33 | 0 | 0 | 0 | 0 |
| | | | 18.5–19.8 | 26 | 28 | 45 | 1 | 0 | 0 | 0 |
| | | | Mean | 16 | 43 | 39 | 1 | 0 | 1 | 0 |

Surface level +82.2 m (+270 ft)                                     Overburden 11.7 m
Water not struck                                                    Mineral 8.3 m
Shell and auger 152 mm diameter                                     Bedrock 0.4+ m
November 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey silt, dark brown, with occasional chalk pebbles, and some chalk sand and flint pebbles | 0.4 | 0.4 |
| Boulder Clay | Clay, silty near top, mottled grey and brown, becoming dark grey, and then brown/grey at 10.5 m, with occasional chalk pebbles and some chalk sand and flint pebbles | 10.4 | 10.8 |
| ? Boulder Clay | Clay, silty, sandy, with fine and coarse pebbles, vein-quartz and pale grey to white flint with chalk and sandstone | 0.9 | 11.7 |
| Crag | 'Very clayey' sand<br>Gravel: fine with coarse, vein-quartz and flint, with some chalk and sandstone<br>Sand: medium and fine with some coarse, quartz, yellow/orange | 8.3 | 20.0 |
| Chalk | Chalk | 0.4+ | 20.4 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Fines | Sand | | | Gravel | | |
| Fines | Sand | Gravel | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 24 | 75 | 1 | 11.7–12.6 | 38 | 22 | 38 | 1 | 0 | 1 | 0 |
| | | | 12.6–13.7 | 23 | 14 | 57 | 5 | 1 | 0 | 0 |
| | | | 13.7–15.3 | 24 | 20 | 49 | 4 | 3 | 0 | 0 |
| | | | 15.3–16.4 | 21 | 59 | 19 | 1 | 0 | 0 | 0 |
| | | | 16.4–18.1 | 20 | 36 | 42 | 2 | 0 | 0 | 0 |
| | | | Mean | 24 | 30 | 42 | 3 | 1 | 0 | 0 |

## COMPOSITION

| Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 10.8–11.7 | 42 | 43 | 6 | 3 | 6 |

**TL 86 SE 163      8531 6129      Near Nowton Grove, Nowton**                                          **Block C**

Surface level +77.4 m (+254 ft)                                                                          Waste 15.4+ m
Water struck at +63.4 m
Shell and auger 152 mm diameter
November 1978


**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clay, silty, sandy, brown, with occasional subangular to subrounded flint pebbles | 0.3 | 0.3 |
| Boulder Clay | Clay, silty, sandy, brown, with occasional flint pebbles, becoming a grey clay, with occasional chalk pebbles, and some chalk sand and flint pebbles at 4 m | 13.7 | 14.0 |
| | Clay, silty, grey, with occasional chalk pebbles, some chalk sand and a trace of flint and shale pebbles | 1.4+ | 15.4 |


**TL 86 SE 164      8564 6050      High Green, Nowton**                                            **Block C**

Surface level +82.4 m (+270 ft)                                                                          Waste 18.1+ m
Water not struck
Shell and auger 152 mm diameter
December 1978


**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clay, silty, dark brown, with occasional flint pebbles | 0.3 | 0.3 |
| Boulder Clay | Clay, silty, brown/buff | 3.7 | 4.0 |
| | Clay, grey, with occasional subrounded chalk pebbles, and some chalk sand and flint pebbles | 14.1+ | 18.1 |


**TL 86 SE 165      8687 6478      Near Moreton Hall, Bury St Edmunds**                            **Block D**

Surface level +64.4 m (+211 ft)                                                                          Waste 7.4 m
Water not struck                                                                                          Bedrock 0.4+ m
Shell and auger 152 mm diameter
October 1978


**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional flint pebbles | 0.6 | 0.6 |
| Boulder Clay | Clay, buff, becoming mottled buff and pale grey, and then dark grey, with occasional chalk pebbles, and some chalk sand and flint pebbles | 6.8 | 7.4 |
| Chalk | Chalk | 0.4+ | 7.8 |

Surface level  + 49.1 m ( + 161 ft)                                                      Overburden 14.8 m
Water struck at  + 32.5 m                                                                 Mineral 6.7 m
Shell and auger 152 mm diameter                                                          Waste 0.5 + m
November 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; fine sand, brown, with occasional flint pebbles | 0.5 | 0.5 |
| Head | Clay, silty, sandy, pale orange, with occasional flint pebbles | 3.0 | 3.5 |
| ? Lacustrine Deposits | Clay, silty, orange/brown, with occasional flint pebbles | 5.0 | 8.5 |
| | Clay, silty, laminated, with some sandy layers, purple/dark grey, with some plant remains | 0.5 | 9.0 |
| | Silt, pale cream to orange/brown, with occasional shell fragments from 9 m to 10 m | 5.8 | 14.8 |
| Glacial Sand and Gravel | Gravel; becoming sandy towards base<br>    Gravel: fine and coarse, with some cobbles, angular to subangular, dark grey to white flint and chalk, with some sandstone and vein-quartz<br>    Sand: medium and fine with coarse, quartz with flint | 6.7 | 21.5 |
| ? Lacustrine Deposits | Silt, pale cream/orange | 0.5 + | 22.0 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 7 | 44 | 49 | 14.8–15.8 | 10 | 11 | 13 | 10 | 33 | 23 | 0 |
| | | | 15.8–16.8 | 15 | 12 | 13 | 9 | 30 | 14 | 7 |
| | | | 16.8–17.8 | 5 | 10 | 19 | 14 | 24 | 28 | 0 |
| | | | 17.8–18.8 | 4 | 7 | 15 | 9 | 26 | 39 | 0 |
| | | | 18.8–19.9 | 4 | 15 | 34 | 9 | 12 | 26 | 0 |
| | | | 19.9–21.5 | 8 | 17 | 26 | 12 | 20 | 17 | 0 |
| | | | Mean | 7 | 13 | 21 | 10 | 24 | 24 | 1 |

## COMPOSITION

| Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | |
|---|---|---|---|---|
| | Flint | Vein-quartz | Others | Chalk |
| 14.8–15.8 | 44 | 2 | 14 | 40 |
| 18.8–19.9 | 61 | 1 | 7 | 31 |
| Mean | 49 | 2 | 12 | 37 |

TL 86 SE 167    8690 6200    **Court Park, Nowton**                                    **Block C**

Surface level +51.3 m (+168 ft)                                                   Waste 15.5 m
Water not struck                                                                  Bedrock 0.4+ m
Shell and auger 152 mm diameter
November 1978


**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Made ground | 1.2 | 1.2 |
| ? Head | Clay, brown, with occasional flint pebbles and some flint sand, with a flint and chalk gravel layer from 1.5 m to 1.6 m | 0.8 | 2.0 |
| Lacustrine Deposits | Silt, cream to orange/brown, becoming blue/grey at 14.5 m | 12.8 | 14.8 |
| | Silt, orange/brown, with occasional chalk pebbles and some chalk sand | 0.7 | 15.5 |
| Chalk | Chalk | 0.4+ | 15.9 |


TL 86 SE 168    8706 6265    **Near Puthawks Bush Plantation, Bury St Edmunds**       **Block A**

Surface level +33.4 m (+110 ft)                                                   Waste 2.0 m
Water not struck                                                                  Bedrock 0.8+ m
Shell and auger 152 mm diameter
December 1978


**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; silty fine sand, brown | 0.3 | 0.3 |
| Alluvium | Silt, clayey, mottled orange/brown and grey, with shell fragments and a trace of flint pebbles | 0.6 | 0.9 |
| River Terrace Deposits (? 2nd Terrace) | 'Clayey' gravel; medium and coarse sand with some flint pebbles | 0.8 | 1.7 |
| ? Glacial Silt | Silt, mottled brown and grey, with occasional chalk pebbles some chalk sand and flint pebbles | 0.3 | 2.0 |
| Chalk | Chalk, with flints | 0.8+ | 2.8 |


TL 86 SE 169    8698 6108    **Nowton Lodge Farm, Nowton**                            **Block C**

Surface level +53.6 m (+176 ft)                                                   Waste 19.6+ m
Water struck at +34.1 m
Shell and auger 152 mm diameter
December 1978


**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; very clayey fine sand, dark brown, with some medium to coarse sand and occasional subangular to subrounded flint pebbles | 0.3 | 0.3 |
| Boulder Clay | Clay, silty near top, buff, becoming mottled buff and pale grey, then grey, with occasional chalk pebbles, some chalk sand and flint pebbles, and a trace of red chalk and shale | 16.7 | 17.0 |
| | Clay, silty, grey, with some fine to medium chalk sand | 2.6+ | 19.6 |

Surface level +46.7 m (+153 ft)
Water struck at +39.5 m
Shell and auger 152 mm diameter
November 1978

Overburden 0.4 m
Mineral 3.2 m
Waste 1.1 m
Mineral 2.5 m
Waste 10.3+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine to medium sand, brown, with some subangular to subrounded coarse flint sand and occasional flint pebbles | 0.4 | 0.4 |
| River Terrace Deposits (2nd Terrace) | a 'Very clayey' sandy gravel<br>  Gravel: fine and coarse, angular to subrounded, dark grey to white flint, with chalk and some vein-quartz and sandstone<br>  Sand: fine and medium with coarse, quartz with flint, orange/brown | 3.2 | 3.6 |
| | Silt, orange/brown, with occasional subrounded chalk pebbles, and subangular to rounded flint pebbles, with some chalk sand | 1.1 | 4.7 |
| | b 'Clayey' gravel<br>  Gravel: fine and coarse, dark grey, brown and white flint, with some vein-quartz and sandstone<br>  Sand: coarse and medium with fine, quartz with flint | 2.5 | 7.2 |
| Glacial Silt | Silt, pale yellow/brown, with a trace of chalk sand and flint sand | 2.4 | 9.6 |
| | Silt, grey, laminated | 7.9+ | 17.5 |

## GRADING

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| a | 21 | 47 | 32 | 0.4–1.5 | 29 | 28 | 18 | 4 | 7 | 14 | 0 |
| | | | | 1.5–2.5 | 15 | 23 | 17 | 13 | 18 | 14 | 0 |
| | | | | 2.5–3.6 | 20 | 11 | 13 | 12 | 25 | 19 | 0 |
| | | | | Mean | 21 | 21 | 16 | 10 | 16 | 16 | 0 |
| b | 17 | 37 | 46 | 4.7–5.8 | 23 | 9 | 12 | 14 | 24 | 18 | 0 |
| | | | | 5.8–7.2 | 12 | 8 | 15 | 17 | 28 | 20 | 0 |
| | | | | Mean | 17 | 8 | 14 | 15 | 27 | 19 | 0 |
| a+b | 20 | 42 | 38 | Mean | 20 | 15 | 15 | 12 | 21 | 17 | 0 |

## COMPOSITION

| | Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | | |
|---|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others | Chalk |
| a | 1.5–2.5 | 81 | 5 | 1 | 7 | 6 |
| b | 5.8–7.2 | 95 | 2 | 3 | 0 | 0 |

Surface level + 60.8 m (+ 199 ft)
Water struck at + 57.3 m
Shell and auger 152 mm diameter
October 1978

Overburden 0.7 m
Mineral 3.0 m
Waste 0.4 m
Mineral 2.4 m
Waste 0.3 m
Bedrock 0.6+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional angular to subrounded flint pebbles | 0.7 | 0.7 |
| Glacial Sand and Gravel | **a** 'Clayey' gravel<br>  Gravel: fine and coarse, angular to subrounded, dark grey to white flint, with vein-quartz, chalk and sandstone<br>  Sand: medium, fine and coarse, quartz with flint, orange/brown | 3.0 | 3.7 |
| | Silt, buff, with occasional subrounded to rounded chalk pebbles | 0.4 | 4.1 |
| | **b** 'Very clayey' pebbly sand<br>  Gravel: fine and coarse, flint and chalk<br>  Sand: medium and fine with coarse, quartz with flint | 0.7 | 4.8 |
| | **c** Sandy gravel<br>  Gravel: fine and coarse, flint and chalk<br>  Sand: medium, coarse and fine | 1.7 | 6.5 |
| Boulder Clay | Clay, buff/brown, with occasional chalk pebbles, and some chalk sand and flint pebbles | 0.3 | 6.8 |
| Chalk | Chalk | 0.6+ | 7.4 |

## GRADING

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| **a** | 11 | 43 | 46 | 0.7–1.8 | 13 | 24 | 21 | 8 | 23 | 11 | 0 |
| | | | | 1.8–2.7 | 6 | 10 | 18 | 14 | 28 | 24 | 0 |
| | | | | 2.7–3.7 | 15 | 6 | 13 | 14 | 25 | 27 | 0 |
| | | | | Mean | 11 | 14 | 17 | 12 | 25 | 21 | 0 |
| **b** | 35 | 50 | 15 | 4.1–4.8 | 35 | 20 | 20 | 10 | 9 | 6 | 0 |
| **c** | | | | | No grading information available | | | | | | |
| **a+b** | 16 | 44 | 40 | Mean | 16 | 15 | 17 | 12 | 22 | 18 | 0 |

## COMPOSITION

| | Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | | |
|---|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others | Chalk |
| **a** | 2.7–3.7 | 69 | 12 | 8 | 1 | 10 |

Surface level + 67.0 m (220 ft)  
Water not struck  
Shell and auger 152 mm diameter  
October 1978

Overburden 0.5 m  
Mineral 5.8 m  
Bedrock 0.4 + m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; fine sand, brown, with occasional subangular to subrounded flint pebbles | 0.5 | 0.5 |
| Cover Sand | **a** 'Very clayey' pebbly sand<br>Gravel: coarse and fine, subangular to subrounded, dark grey to white flint, with vein-quartz, sandstone, and a trace of ironstone and chalk<br>Sand: fine with medium and some coarse, quartz, orange/brown | 1.0 | 1.5 |
| Glacial Sand and Gravel | **b** Gravel<br>Gravel: coarse and fine, with cobbles, angular to subrounded, grey, brown and white flint, and sandstone<br>Sand: medium, fine and coarse, quartz with flint, white/yellow/brown | 4.8 | 6.3 |
| Chalk | Chalk | 0.4+ | 6.7 |

## GRADING

| | Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| **a** | 27 | 59 | 14 | 0.5–1.5 | 27 | 46 | 12 | 1 | 6 | 8 | 0 |
| | | | | 1.5–2.5 | 1 | 22 | 14 | 8 | 22 | 33 | 0 |
| | | | | 2.5–3.5 | 8 | 6 | 11 | 9 | 19 | 31 | 16 |
| | | | | 3.5–5.3 | 9 | 6 | 17 | 12 | 28 | 28 | 0 |
| | | | | 5.3–6.3 | 10 | 10 | 28 | 7 | 14 | 18 | 13 |
| **b** | 7 | 37 | 56 | Mean | 7 | 10 | 17 | 10 | 22 | 28 | 6 |

## COMPOSITION

| | Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | |
|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others |
| **a** | 0.5–1.5 | 73 | 10 | 5 | 12 |
| **b** | 2.5–3.5 | 70 | 10 | 11 | 9 |

Surface level +43.4 m (+142 ft)                                                           Overburden 0.7 m
Water not struck                                                                          Mineral 4.2 m
Shell and auger 152 mm diameter                                                           Bedrock 3.3 + m
October 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; fine sand, brown, with occasional flint pebbles | 0.7 | 0.7 |
| Head | Pebbly sand | 4.2 | 4.9 |
| |     Gravel: fine and coarse, grey to white flint, with vein-quartz, sandstone, and some ironstone | | |
| |     Sand: fine and medium with some coarse, quartz, orange | | |
| Chalk | Chalk | 3.3 + | 8.2 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 6 | 81 | 13 | 0.7–1.4 | 13 | 33 | 12 | 7 | 18 | 17 | 0 |
| | | | 1.4–2.7 | 4 | 51 | 35 | 3 | 5 | 2 | 0 |
| | | | 2.7–3.6 | 2 | 63 | 35 | 0 | 0 | 0 | 0 |
| | | | 3.6–4.9 | 5 | 49 | 25 | 4 | 12 | 5 | 0 |
| | | | Mean | 6 | 50 | 28 | 3 | 8 | 5 | 0 |

## COMPOSITION

| Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | |
|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others |
| 0.7–1.4 | 75 | 12 | 12 | 1 |
| 3.6–4.9 | 63 | 29 | 6 | 2 |
| Mean | 68 | 21 | 9 | 2 |

TL 86 SE 174     8896 6171     **Hall Farm, Rushbrooke**                                    **Block D**

Surface level +71.1 m (+233 ft)                                                           Waste 18.2 + m
Water not struck
Shell and auger 152 mm diameter
October 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, dark brown, with occasional subangular to subrounded flint pebbles | 0.8 | 0.8 |
| Boulder Clay | Clay, buff/brown, becoming grey at 7.7 m, and then brown/grey at 16.8 m, with occasional chalk pebbles, some chalk sand and flint pebbles | 17.4 + | 18.2 |

Surface level +67.8 m (+222 ft)                    Overburden 3.5 m
Water not struck                                  Mineral 12.0 m
Shell and auger 152 mm diameter         Bedrock 1.4+ m
October 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional subangular to subrounded flint pebbles | 0.3 | 0.3 |
| Boulder Clay | Clay, buff/brown, becoming orange/brown, with occasional chalk pebbles and some chalk sand | 3.2 | 3.5 |
| Crag | **a** 'Clayey' sandy gravel<br>Gravel: fine with coarse, subangular to well-rounded vein-quartz, subangular to well-rounded sandstone and angular to subrounded flint<br>Sand: medium and coarse with fine, quartz with flint, dark orange/brown | 4.1 | 7.6 |
| | **b** 'Clayey' sand; with some thin clay horizons<br>Gravel: coarse and fine, vein-quartz, sandstone and flint<br>Sand: medium and fine with some coarse, quartz, yellow/orange | 7.9 | 15.5 |
| Chalk | Chalk | 1.4+ | 16.9 |

## GRADING

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| **a** | 14 | 64 | 22 | 3.5–4.5 | 21 | 6 | 43 | 16 | 13 | 1 | 0 |
| | | | | 4.5–5.5 | 16 | 6 | 38 | 22 | 15 | 3 | 0 |
| | | | | 5.5–6.6 | 15 | 5 | 29 | 25 | 19 | 7 | 0 |
| | | | | 6.6–7.2 | 0 | 6 | 40 | 27 | 21 | 6 | 0 |
| | | | | 7.2–7.6 | 15 | 6 | 28 | 16 | 28 | 7 | 0 |
| | | | | Mean | 14 | 6 | 37 | 21 | 18 | 4 | 0 |
| **b** | 12 | 86 | 2 | 7.6–8.6 | 21 | 60 | 15 | 2 | 2 | 0 | 0 |
| | | | | 8.6–9.6 | 10 | 22 | 64 | 3 | 1 | 0 | 0 |
| | | | | 9.6–10.8 | 15 | 16 | 60 | 8 | 1 | 0 | 0 |
| | | | | 10.8–11.8 | 11 | 25 | 60 | 4 | 0 | 0 | 0 |
| | | | | 11.8–12.9 | 10 | 46 | 39 | 5 | 0 | 0 | 0 |
| | | | | 12.9–14.0 | 11 | 64 | 24 | 1 | 0 | 0 | 0 |
| | | | | 14.0–15.5 | 11 | 42 | 41 | 2 | 0 | 4 | 0 |
| | | | | Mean | 12 | 39 | 43 | 4 | 1 | 1 | 0 |
| **a+b** | 13 | 79 | 8 | Mean | 13 | 28 | 41 | 10 | 6 | 2 | 0 |

## COMPOSITION

| | Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | |
|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others |
| **a** | 4.5–5.5 | 14 | 42 | 28 | 16 |
| | 5.5–6.6 | 10 | 45 | 23 | 22 |
| | 7.2–7.6 | 30 | 35 | 35 | 0 |
| **a** | Mean | 16 | 42 | 27 | 15 |

Surface level +63.6 m (+209 ft)
Water not struck
Shell and auger 152 mm diameter
October 1978

Overburden 0.3 m
Mineral 6.6 m
Bedrock 0.8+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional chalk and flint pebbles | 0.3 | 0.3 |
| Cover Sand | **a** 'Very clayey' pebbly sand<br>    Gravel: coarse and fine, flint and chalk<br>    Sand: fine with medium and some coarse, quartz, orange/brown | 1.0 | 1.3 |
| Glacial Sand and Gravel | **b** 'Very clayey' sandy gravel<br>    Gravel: coarse and fine, subangular to well-rounded,<br>      grey to white flint, and subangular to well-rounded chalk,<br>      with some vein-quartz and sandstone<br>    Sand: medium and fine with coarse, quartz with flint, orange | 5.6 | 6.9 |
| Chalk | Chalk | 0.8+ | 7.7 |

## GRADING

| | Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | | $+4-16$ | $+16-64$ | $+64$ |
| **a** | 28 | 67 | 5 | 0.3–1.3 | 28 | 49 | 16 | 2 | | 2 | 3 | 0 |
| **b** | 24 | 44 | 32 | 1.3–3.5 | 27 | 20 | 20 | 6 | | 10 | 17 | 0 |
| | | | | 3.5–4.5 | 17 | 16 | 20 | 10 | | 25 | 12 | 0 |
| | | | | 4.5–5.4 | 15 | 11 | 24 | 12 | | 21 | 17 | 0 |
| | | | | 5.4–6.4 | 23 | 11 | 15 | 14 | | 17 | 20 | 0 |
| | | | | 6.4–6.9 | 39 | 14 | 12 | 10 | | 16 | 9 | 0 |
| | | | | Mean | 24 | 16 | 19 | 9 | | 16 | 16 | 0 |
| **a+b** | 24 | 48 | 28 | Mean | 24 | 21 | 19 | 8 | | 14 | 14 | 0 |

## COMPOSITION

| | Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | | |
|---|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others | Chalk |
| **b** | 4.5–5.4 | 64 | 5 | 3 | 2 | 26 |

Surface level + 63.4 m ( + 208 ft)                                          Overburden 3.0 m
Water not struck                                                            Mineral 5.8 m
Shell and auger 152 mm diameter                                            Bedrock 0.6 + m
November 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; fine sand, brown, with occasional flint pebbles | 0.4 | 0.4 |
| Cover Sand | a 'Very clayey' pebbly sand<br>    Gravel: coarse and fine, flint<br>    Sand: fine with medium and some coarse, quartz, orange/brown | 0.9 | 1.3 |
| Boulder Clay | Clay, orange/brown, with occasional chalk pebbles, and some chalk sand and flint pebbles | 1.7 | 3.0 |
| Glacial Sand and Gravel | b 'Clayey' sandy gravel<br>    Gravel: coarse and fine, with cobbles, angular to subrounded,<br>      dark grey to white flint, with sandstone and vein-quartz<br>    Sand: fine and medium with coarse, quartz with flint, orange/brown | 5.8 | 8.8 |
| Chalk | Chalk | 0.6 + | 9.4 |

## GRADING

| | Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| a | 27 | 67 | 6 | 0.4–1.3 | 27 | 48 | 16 | 3 | 1 | 5 | 0 |
| b | 14 | 45 | 41 | 3.0–4.0 | 15 | 16 | 15 | 11 | 22 | 21 | 0 |
| | | | | 4.0–5.0 | 7 | 7 | 14 | 10 | 23 | 39 | 0 |
| | | | | 5.0–5.9 | 8 | 7 | 14 | 13 | 22 | 27 | 9 |
| | | | | 5.9–7.0 | 11 | 20 | 12 | 9 | 18 | 26 | 4 |
| | | | | 7.0–8.8 | 20 | 36 | 22 | 5 | 14 | 3 | 0 |
| | | | | Mean | 14 | 20 | 16 | 9 | 19 | 20 | 2 |

## COMPOSITION

| | Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | |
|---|---|---|---|---|---|
| | | Flint | Vein-quartz | Sandstone | Others |
| b | 3.0–4.0 | 82 | 9 | 6 | 3 |
| | 5.0–5.9 | 72 | 15 | 7 | 6 |
| | 7.0–8.8 | 65 | 15 | 19 | 1 |
| b | Mean | 73 | 13 | 11 | 3 |

Surface level +62.6 m (+205 ft)
Water not struck
Shell and auger 152 mm diameter
October 1978

Overburden 5.2 m
Mineral 3.0 m
Bedrock 1.5+ m

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, brown, with occasional flint pebbles | 0.4 | 0.4 |
| Boulder Clay | Clay, orange/buff, with occasional chalk pebbles and some chalk sand | 3.8 | 4.2 |
| | Silt, clayey, sandy, laminated, orange/grey | 1.0 | 5.2 |
| Crag | 'Very clayey' pebbly sand<br>Gravel: fine and coarse, subangular to subrounded, grey to white flint, and subrounded to well-rounded vein-quartz, with sandstone and a trace of ironstone<br>Sand: fine with medium and some coarse, quartz, orange/brown | 3.0 | 8.2 |
| Chalk | Chalk, with flints | 1.5+ | 9.7 |

## GRADING

| Mean for deposit percentages | | | Depth below surface (m) | percentages | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 32 | 53 | 15 | 5.2–6.2 | 32 | 49 | 8 | 2 | 9 | 0 | 0 |
| | | | 6.2–7.1 | 28 | 31 | 16 | 5 | 10 | 10 | 0 |
| | | | 7.1–8.2 | 36 | 28 | 14 | 4 | 6 | 12 | 0 |
| | | | Mean | 32 | 36 | 13 | 4 | 8 | 7 | 0 |

## COMPOSITION

| Depth below surface (m) | Percentage by weight in +4–16 mm fraction | | | |
|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others |
| 5.2–6.2 | 49 | 37 | 8 | 6 |
| 6.2–7.1 | 50 | 32 | 7 | 11 |
| Mean | 50 | 35 | 7 | 8 |

Surface level +70.1 m (+230 ft)                                                     Overburden 6.2 m
Water not struck                                                                    Mineral 14.5 m
Shell and auger 152 mm diameter                                                     Bedrock 0.5+ m
October 1978

## LOG

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey silt, dark brown, with occasional flint pebbles | 0.3 | 0.3 |
| Boulder Clay | Clay, buff/orange/brown, with occasional chalk pebbles, and some chalk sand and flint pebbles | 5.9 | 6.2 |
| Crag | 'Clayey' pebbly sand<br>  Gravel: fine and coarse, and cobbles, vein-quartz and subangular to subrounded dark grey to white flint, with subrounded to rounded sandstone<br>  Sand: fine with medium and some coarse, quartz, pale yellow to deep orange | 14.5 | 20.7 |
| Chalk | Chalk | 0.5+ | 21.2 |

## GRADING

| Mean for deposit *percentages* | | | Depth below surface (m) | *percentages* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fines | Sand | Gravel | | Fines | Sand | | | | Gravel | | |
| | | | | $-\frac{1}{16}$ | $+\frac{1}{16}-\frac{1}{4}$ | $+\frac{1}{4}-1$ | $+1-4$ | $+4-16$ | $+16-64$ | $+64$ |
| 20 | 76 | 4 | 6.2–7.3 | 27 | 11 | 45 | 12 | 5 | 0 | 0 |
| | | | 7.3–8.4 | 24 | 24 | 40 | 9 | 3 | 0 | 0 |
| | | | 8.4–8.9 | 25 | 61 | 14 | 0 | 0 | 0 | 0 |
| | | | 8.9–9.9 | 23 | 57 | 16 | 2 | 2 | 0 | 0 |
| | | | 9.9–10.6 | 18 | 70 | 9 | 2 | 1 | 0 | 0 |
| | | | 10.6–11.6 | 16 | 79 | 4 | 1 | 0 | 0 | 0 |
| | | | 11.6–12.5 | 17 | 81 | 2 | 0 | 0 | 0 | 0 |
| | | | 12.5–13.7 | 22 | 68 | 9 | 1 | 0 | 0 | 0 |
| | | | 13.7–14.6 | 15 | 75 | 7 | 1 | 2 | 0 | 0 |
| | | | 14.6–15.6 | 13 | 75 | 9 | 2 | 1 | 0 | 0 |
| | | | 15.6–16.4 | 18 | 58 | 21 | 2 | 1 | 0 | 0 |
| | | | 16.4–17.1 | 16 | 49 | 19 | 4 | 7 | 5 | 0 |
| | | | 17.1–18.0 | 20 | 55 | 13 | 3 | 5 | 0 | 4 |
| | | | 18.0–19.5 | 20 | 53 | 17 | 4 | 4 | 2 | 0 |
| | | | 19.5–20.7 | 18 | 49 | 14 | 2 | 2 | 5 | 10 |
| | | | Mean | 20 | 57 | 16 | 3 | 2 | 1 | 1 |

## COMPOSITION

| Depth below surface (m) | *Percentage by weight in +4–16 mm fraction* | | | | |
|---|---|---|---|---|---|
| | Flint | Vein-quartz | Sandstone | Others | Chalk |
| 6.2–8.4 | 37 | 52 | 9 | 2 | 0 |
| 16.4–18.0 | 31 | 53 | 16 | 0 | 0 |
| Mean | 34 | 52 | 13 | 1 | 0 |

**TL 86 SE 180      8976 6119      Near Ford, Rushbrooke**                                          **Block D**

Surface level +68.8 m (+226 ft)                                                                    Waste 18.4+ m
Water not struck
Shell and auger 152 mm diameter
October 1978

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, dark brown, with occasional subangular to subrounded flint pebbles | 0.3 | 0.3 |
| Boulder Clay | Clay, silty, orange/brown, becoming dark grey at 4 m, with occasional chalk pebbles, and some chalk sand and flint pebbles | 18.1+ | 18.4 |

**TL 86 SE 181      8962 6069      Rushbrooke Park, Rushbrooke**                                     **Block D**

Surface level +78.8 m (+286 ft)                                                                    Waste 18.6+ m
Water not struck
Shell and auger 152 mm diameter
October 1978

**LOG**

| Geological classification | Lithology | Thickness m | Depth m |
|---|---|---|---|
| | Soil; clayey fine sand, dark brown, with occasional flint pebbles | 0.5 | 0.5 |
| Boulder Clay | Clay, orange/buff, becoming mottled pale grey and orange/buff, then dark grey at 7 m, with occasional subangular to well-rounded chalk pebbles, and some chalk sand and angular to subrounded flints up to cobble size | 18.1+ | 18.6 |

## APPENDIX G
## LIST OF WORKINGS

In 1979 there were no working sand and gravel pits within the resource sheet. The main areas of worked-out ground shown on the map accompanying the report are listed below.

| Location | Grid reference | Deposits worked |
|---|---|---|
| Kingsburyhill Wood | 833 689 | River Terrace Deposits |
| Fornham Park | 842 684 | Glacial Sand and Gravel |
| Stanchil's Farm | 812 683 | Glacial Sand and Gravel |

# APPENDIX H
## CONVERSION TABLE, METRES TO FEET (to nearest 0.5 ft)

| m | ft | m | ft | m | ft | m | ft | m | ft |
|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 0.5 | 6.1 | 20 | 12.1 | 39.5 | 18.1 | 59.5 | 24.1 | 79 |
| 0.2 | 0.5 | 6.2 | 20.5 | 12.2 | 40 | 18.2 | 59.5 | 24.2 | 79.5 |
| 0.3 | 1 | 6.3 | 20.5 | 12.3 | 40.5 | 18.3 | 60 | 24.3 | 79.5 |
| 0.4 | 1.5 | 6.4 | 21 | 12.4 | 40.5 | 18.4 | 60.5 | 24.4 | 80 |
| 0.5 | 1.5 | 6.5 | 21.5 | 12.5 | 41 | 18.5 | 60.5 | 24.5 | 80.5 |
| 0.6 | 2 | 6.6 | 21.5 | 12.6 | 41.5 | 18.6 | 61 | 24.6 | 80.5 |
| 0.7 | 2.5 | 6.7 | 22 | 12.7 | 41.5 | 18.7 | 61.5 | 24.7 | 81 |
| 0.8 | 2.5 | 6.8 | 22.5 | 12.8 | 42 | 18.8 | 61.5 | 24.8 | 81.5 |
| 0.9 | 3 | 6.9 | 22.5 | 12.9 | 42.5 | 18.9 | 62 | 24.9 | 81.5 |
| 1.0 | 3.5 | 7.0 | 23 | 13.0 | 42.5 | 19.0 | 62.5 | 25.0 | 82 |
| 1.1 | 3.5 | 7.1 | 23.5 | 13.1 | 43 | 19.1 | 62.5 | 25.1 | 82.5 |
| 1.2 | 4 | 7.2 | 23.5 | 13.2 | 43.5 | 19.2 | 63 | 25.2 | 82.5 |
| 1.3 | 4.5 | 7.3 | 24 | 13.3 | 43.5 | 19.3 | 63.5 | 25.3 | 83 |
| 1.4 | 4.5 | 7.4 | 24.5 | 13.4 | 44 | 19.4 | 63.5 | 25.4 | 83.5 |
| 1.5 | 5 | 7.5 | 24.5 | 13.5 | 44.5 | 19.5 | 64 | 25.5 | 83.5 |
| 1.6 | 5 | 7.6 | 25 | 13.6 | 44.5 | 19.6 | 64.5 | 25.6 | 84 |
| 1.7 | 5.5 | 7.7 | 25.5 | 13.7 | 45 | 19.7 | 64.5 | 25.7 | 84.5 |
| 1.8 | 6 | 7.8 | 25.5 | 13.8 | 45.5 | 19.8 | 65 | 25.8 | 84.5 |
| 1.9 | 6 | 7.9 | 26 | 13.9 | 45.5 | 19.9 | 65.5 | 25.9 | 85 |
| 2.0 | 6.5 | 8.0 | 26 | 14.0 | 46 | 20.0 | 65.5 | 26.0 | 85.5 |
| 2.1 | 7 | 8.1 | 26.5 | 14.1 | 46.5 | 20.1 | 66 | 26.1 | 85.5 |
| 2.2 | 7 | 8.2 | 27 | 14.2 | 46.5 | 20.2 | 66.5 | 26.2 | 86 |
| 2.3 | 7.5 | 8.3 | 27 | 14.3 | 47 | 20.3 | 66.5 | 26.3 | 86.5 |
| 2.4 | 8 | 8.4 | 27.5 | 14.4 | 47 | 20.4 | 67 | 26.4 | 86.5 |
| 2.5 | 8 | 8.5 | 28 | 14.5 | 47.5 | 20.5 | 67.5 | 26.5 | 87 |
| 2.6 | 8.5 | 8.6 | 28 | 14.6 | 48 | 20.6 | 67.5 | 26.6 | 87.5 |
| 2.7 | 9 | 8.7 | 28.5 | 14.7 | 48 | 20.7 | 68 | 26.7 | 87.5 |
| 2.8 | 9 | 8.8 | 29 | 14.8 | 48.5 | 20.8 | 68 | 26.8 | 88 |
| 2.9 | 9.5 | 8.9 | 29 | 14.9 | 49 | 20.9 | 68.5 | 26.9 | 88.5 |
| 3.0 | 10 | 9.0 | 29.5 | 15.0 | 49 | 21.0 | 69 | 27.0 | 88.5 |
| 3.1 | 10 | 9.1 | 30 | 15.1 | 49.5 | 21.1 | 69 | 27.1 | 89 |
| 3.2 | 10.5 | 9.2 | 30 | 15.2 | 50 | 21.2 | 69.5 | 27.2 | 89 |
| 3.3 | 11 | 9.3 | 30.5 | 15.3 | 50 | 21.3 | 70 | 27.3 | 89.5 |
| 3.4 | 11 | 9.4 | 31 | 15.4 | 50.5 | 21.4 | 70 | 27.4 | 90 |
| 3.5 | 11.5 | 9.5 | 31 | 15.5 | 51 | 21.5 | 70.5 | 27.5 | 90 |
| 3.6 | 12 | 9.6 | 31.5 | 15.6 | 51 | 21.6 | 71 | 27.6 | 90.5 |
| 3.7 | 12 | 9.7 | 32 | 15.7 | 51.5 | 21.7 | 71 | 27.7 | 91 |
| 3.8 | 12.5 | 9.8 | 32 | 15.8 | 52 | 21.8 | 71.5 | 27.8 | 91 |
| 3.9 | 13 | 9.9 | 32.5 | 15.9 | 52 | 21.9 | 72 | 27.9 | 91.5 |
| 4.0 | 13 | 10.0 | 33 | 16.0 | 52.5 | 22.0 | 72 | 28.0 | 92 |
| 4.1 | 13.5 | 10.1 | 33 | 16.1 | 53 | 22.1 | 72.5 | 28.1 | 92 |
| 4.2 | 14 | 10.2 | 33.5 | 16.2 | 53 | 22.2 | 73 | 28.2 | 92.5 |
| 4.3 | 14 | 10.3 | 34 | 16.3 | 53.5 | 22.3 | 73 | 28.3 | 93 |
| 4.4 | 14.5 | 10.4 | 34 | 16.4 | 54 | 22.4 | 73.5 | 28.4 | 93 |
| 4.5 | 15 | 10.5 | 34.5 | 16.5 | 54 | 22.5 | 74 | 28.5 | 93.5 |
| 4.6 | 15 | 10.6 | 35 | 16.6 | 54.5 | 22.6 | 74 | 28.6 | 94 |
| 4.7 | 15.5 | 10.7 | 35 | 16.7 | 55 | 22.7 | 74.5 | 28.7 | 94 |
| 4.8 | 15.5 | 10.8 | 35.5 | 16.8 | 55 | 22.8 | 75 | 28.8 | 94.5 |
| 4.9 | 16 | 10.9 | 36 | 16.9 | 55.5 | 22.9 | 75 | 28.9 | 95 |
| 5.0 | 16.5 | 11.0 | 36 | 17.0 | 56 | 23.0 | 75.5 | 29.0 | 95 |
| 5.1 | 17 | 11.1 | 36.5 | 17.1 | 56 | 23.1 | 76 | 29.1 | 95.5 |
| 5.2 | 17 | 11.2 | 36.5 | 17.2 | 56.5 | 23.2 | 76 | 29.2 | 96 |
| 5.3 | 17.5 | 11.3 | 37 | 17.3 | 57 | 23.3 | 76.5 | 29.3 | 96 |
| 5.4 | 17.5 | 11.4 | 37.5 | 17.4 | 57 | 23.4 | 77 | 29.4 | 96.5 |
| 5.5 | 18 | 11.5 | 37.5 | 17.5 | 57.5 | 23.5 | 77 | 29.5 | 97 |
| 5.6 | 18.5 | 11.6 | 38 | 17.6 | 57.5 | 23.6 | 77.5 | 29.6 | 97 |
| 5.7 | 18.5 | 11.7 | 38.5 | 17.7 | 58 | 23.7 | 78 | 29.7 | 97.5 |
| 5.8 | 19 | 11.8 | 38.5 | 17.8 | 58.5 | 23.8 | 78 | 29.8 | 98 |
| 5.9 | 19.5 | 11.9 | 39 | 17.9 | 58.5 | 23.9 | 78.5 | 29.9 | 98 |
| 6.0 | 19.5 | 12.0 | 39.5 | 18.0 | 59 | 24.0 | 78.5 | 30.0 | 98.5 |

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# INSTITUTE OF GEOLOGICAL SCIENCES

## INDUSTRIAL MINERALS ASSESSMENT UNIT

# THE SAND & GRAVEL RESOURCES OF THE BURY ST EDMUNDS (SUFFOLK) AREA.

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

ORDNANCE SURVEY
**SHEET TL86**
PROVISIONAL EDITION

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

72

### EXPLANATION OF SYMBOLS AND ABBREVIATIONS

**DRIFT**

Peat – soft dark brown organic matter.  P-8

Alluvium – clay and silt, shelly and peaty in part.  A-48

Head and Head Gravel – gravel to sandy clay, of variable composition, mainly derived by solifluction.  H-29

River Terrace Deposits – sand and gravel, locally clayey, composed mainly of flint.  RT-18

Cover Sand – fine to medium-grained clayey sand, with scattered flint pebbles.  CS-1

Lacustrine Deposits – grey and buff silt and clay with shells and plant material in part.  LA-4

Glacial Silts – grey and buff silt and clayey silt.  GSI-4

Boulder Clay – grey and brown clay and silty clay, with scattered chalk and flint pebbles.  BC-27

Glacial Sand and Gravel – sand and gravel, locally clayey, consisting mainly of flint. (Suffices Land U indicate respectively, where known, gravels beneath or above Boulder Clay).  GS-51

RECENT AND PLEISTOCENE

**SOLID**

Crag – yellow and orange clayey quartz sand and pebbly sand, pebbles consisting mainly of vein-quartz and flint.  Cg

Chalk – soft white limestone with nodular flints.  Ck

UPPER CRETACEOUS

Made ground  MG-2

Worked out sand and gravel - mostly back-filled.  WO-17

### BOUNDARY LINES

Geological boundary, Drift

Geological boundary, Solid

Limits of Drift-filled buried channels

Resource Block Boundary

Inferred boundary between recognized categories of deposits

Inferred sub-drift boundary of potentially workable Crag
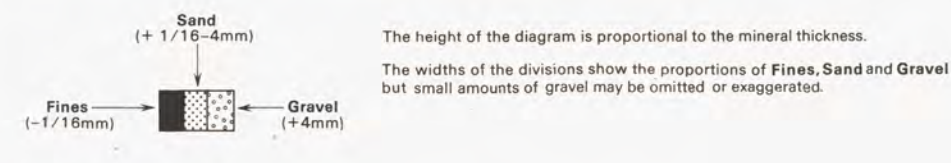
Broken lines denote uncertainty

### BOREHOLE DATA

**SITE LOCATIONS**

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

• Other boreholes

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

Borehole Registration Number — NW 108

Surface level in metres (italics) and feet above O.D. (Newlyn).

Borehole Site

Overburden

Geological Classification

Mineral (sand and gravel)

Waste

Mineral (sand and gravel)

Bedrock

Thickness in metres

Note:
1. Figures underlined denote thickness used in the assessment of resources.
2. The + sign indicates that the base of the deposit was not reached.
3. The Geological Classification is given only for mineral and bedrock.

**Borehole Registration Number**

Each I.M.A.U. borehole is identified by a Registration Number, eg. NW 108. 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 108 is TL86 NW 108.

**Grading Diagrams**

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

Sand (+ 1/16–4mm)

The height of the diagram is proportional to the mineral thickness.

Fines (–1/16mm)  Gravel (+4mm)

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

**OTHER BOREHOLES**

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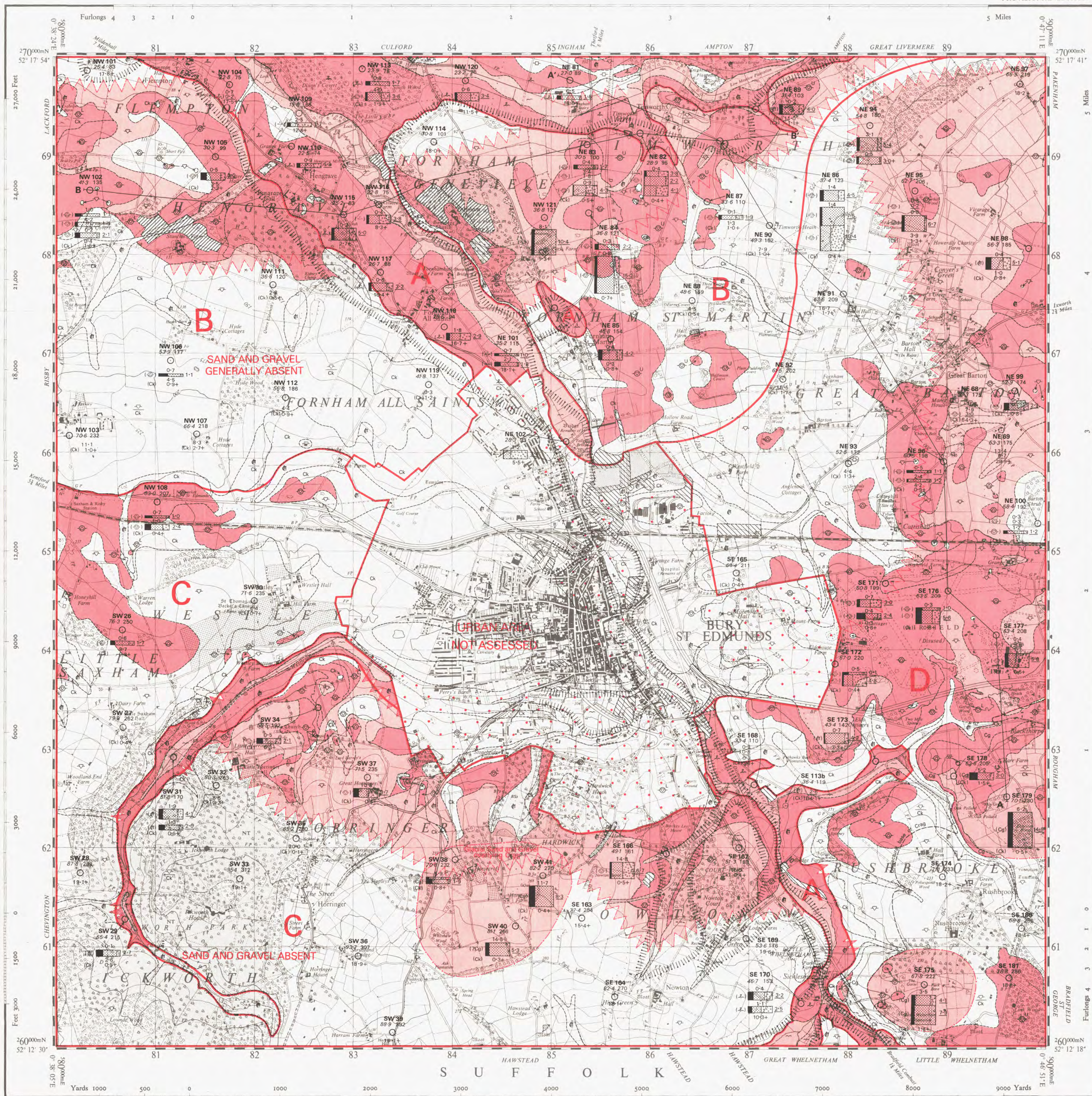
### CATEGORIES OF DEPOSITS

Exposed mineral.  CAT-E6

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

Sand and Gravel either not potentially workable (see Report) or absent.  CAT-A2

Sand and gravel not assessed.  CAT-N1

### RESOURCE BLOCKS

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

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

SAND AND GRAVEL GENERALLY ABSENT

URBAN AREA NOT ASSESSED

SAND AND GRAVEL ABSENT

BURY ST EDMUNDS

**SECTIONS ACROSS THE RESOURCE SHEET ALONG LINES A-A' AND B-B'**

A (8961 6248)

A' (8510 6981)

SE 179  Blackthorpe  SE 177  Airfield (Disused)  SE 176  NE 96  Barton Park  NE 91  NE 90 Timworth Heath  NE 86  NE 81

BLOCK D   BLOCK B   BLOCK A

Metres above Ordnance Datum  70 60 50 40 30 20 10 0

Chalk

B (8030 6866)

B' (8739 6913)

NW 102  Hengrave Park  Moat  NW 115  NW 116  R. Lark  NE 83  Timworth Green  NE 82  NE 86

BLOCK B   BLOCK A   BLOCK B   BLOCK A   BLOCK D

Metres above Ordnance Datum  40 30 20 10 0

Chalk

Horizontal scale:
1:25 000

0   0·5   1·0 km

Vertical exaggeration × 25

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

The GRID lines on this map are at 1 Kilometre interval.
Heights are in feet above Mean Sea Level at Newlyn.

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 as variable in sand and gravel. However, estimates of the volume and mean grading of the mineral as a whole in each Resource Block are given in the Report.

Diagram showing the relation of the National Grid 1:25,000 sheets with the One-Inch Geological Sheets 174, 189 and 206.

| | 174 | |
|---|---|---|
| TL77 | TL87 | TL97 |
| 189 | | |
| TL76 | TL86 | TL96 |
| TL75 | TL85 | TL95 |
| 206 | | |