

The sand and gravel resources of the country north of Newmarket, Cambridgeshire and Suffolk

Description of 1:25 000 sheet TL 67 and part of TL 66

C. E. Corser

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

Details of published reports are given at the end of this Report.

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PREFACE

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

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

This report describes the sand and gravel resources of 150 km² of country north of Newmarket, in Cambridgeshire and Suffolk, shown on the accompanying resource sheet TL 67 and part of TL 66. The survey was conducted by C. E. Corser who, with colleagues, compiled the report under the supervision of P. I. Manning. The work is based on six-inch scale geological surveys carried out by Institute Field Staff in 1938 and 1939 and between 1947 and 1953, and published on 1:50 000 Geological Sheet 188 (Cambridge). Information for the northern part of the district was obtained from six-inch scale soil mapping carried out by staff of the Soil Survey of Great Britain in 1972 and incorporated in 1:50 000 Geological Sheet 173 (Ely) by R. W. Gallois. Minor amendments have been made to the geological lines in the northern part of the district on the basis of the IMAU drilling results. Mr J. D. Burnell, ISO, FRICS, was responsible for negotiating access to land for drilling. The ready co-operation of land owners and tenants is gratefully acknowledged.

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MAP

The sand and gravel resources of the country north of Newmarket **in pocket**

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The sand and gravel resources of the country north of Newmarket, Cambridgeshire and Suffolk

Description of 1:25 000 sheet TL 67 and part of TL 66

C. E. CORSER

SUMMARY

The geological maps of the Institute of Geological Sciences, pre-existing borehole information, and 97 boreholes drilled for the Industrial Minerals Assessment Unit form the basis of the assessment of the sand and gravel resources of the country north of Newmarket.

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

The mineral-bearing ground is divided into four resource blocks, containing between 9.7 and 20.7 km² of sand and gravel. For each block the geology of the deposits is described, and the mineral-bearing area, the mean thicknesses of overburden and mineral and the mean gradings are stated. Detailed borehole data are also given. The geology, the position of the boreholes and the outlines of the resource blocks are shown on the accompanying map.

Notes

Each borehole registered with the Institute is identified by a four-element code (e.g. TL 67 SE 34). The first two elements define the 10-km square (of the National Grid) in which the borehole is situated; the third element defines a quadrant of that square, and the fourth is the accession number of the borehole. In the text of the report the borehole is normally referred to by the last two elements alone (e.g. SE 34).

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

Bibliographical reference

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INTRODUCTION

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

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

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

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

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

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

For the particular needs of assessing sand and gravel resources, a grain-size classification based on the geometric scale $\frac{1}{16}$ mm, $\frac{1}{4}$ mm, 1 mm, 4 mm, 16 mm, 64 mm has been adopted. The boundaries between fines (that is, the clay and silt fractions) and sand, and between sand and gravel material, are placed at $\frac{1}{16}$ 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 km² of sand and gravel. No account is taken of any factors, for example roads, villages or land of high agricultural or landscape value, which might stand in the way of sand and gravel being exploited, although towns are excluded. The estimated total volume therefore bears no simple relationship to the amount that could be extracted in practice.

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

DESCRIPTION OF THE DISTRICT

GENERAL

The district described covers an area of 150 km² lying to the north of Newmarket and includes parts of Cambridgeshire and Suffolk (Figure 1). It is predominantly an agricultural area with the exception of

Mildenhall Airfield [690 770]. The northern part of the district consists predominantly of Drift-covered Fenland lying at or about sea-level and here, rich peaty soils are intensively cultivated to yield cereal, vegetable and root crops. The fen is drained by a network of straightened watercourses and drainage ditches which feed the canalised River Lark. In contrast, the southern part of the district comprises undulating downland with overlying discontinuous sheets of varying thicknesses of Drift deposits. Here the soils, which are generally chalky, thin and light, favour permanent grassland and some cereal crops, mainly barley. The highest ground in the district at Trinity Hall Farm [693 651] reaches an elevation of 80 m above OD.

A few small villages are located within the district and recent housing developments have extended the residential areas of Newmarket into the parish of Exning near Etheldreda House [6272 6526]. The Newmarket bypass (A11/A45) crosses the southern part of the district.

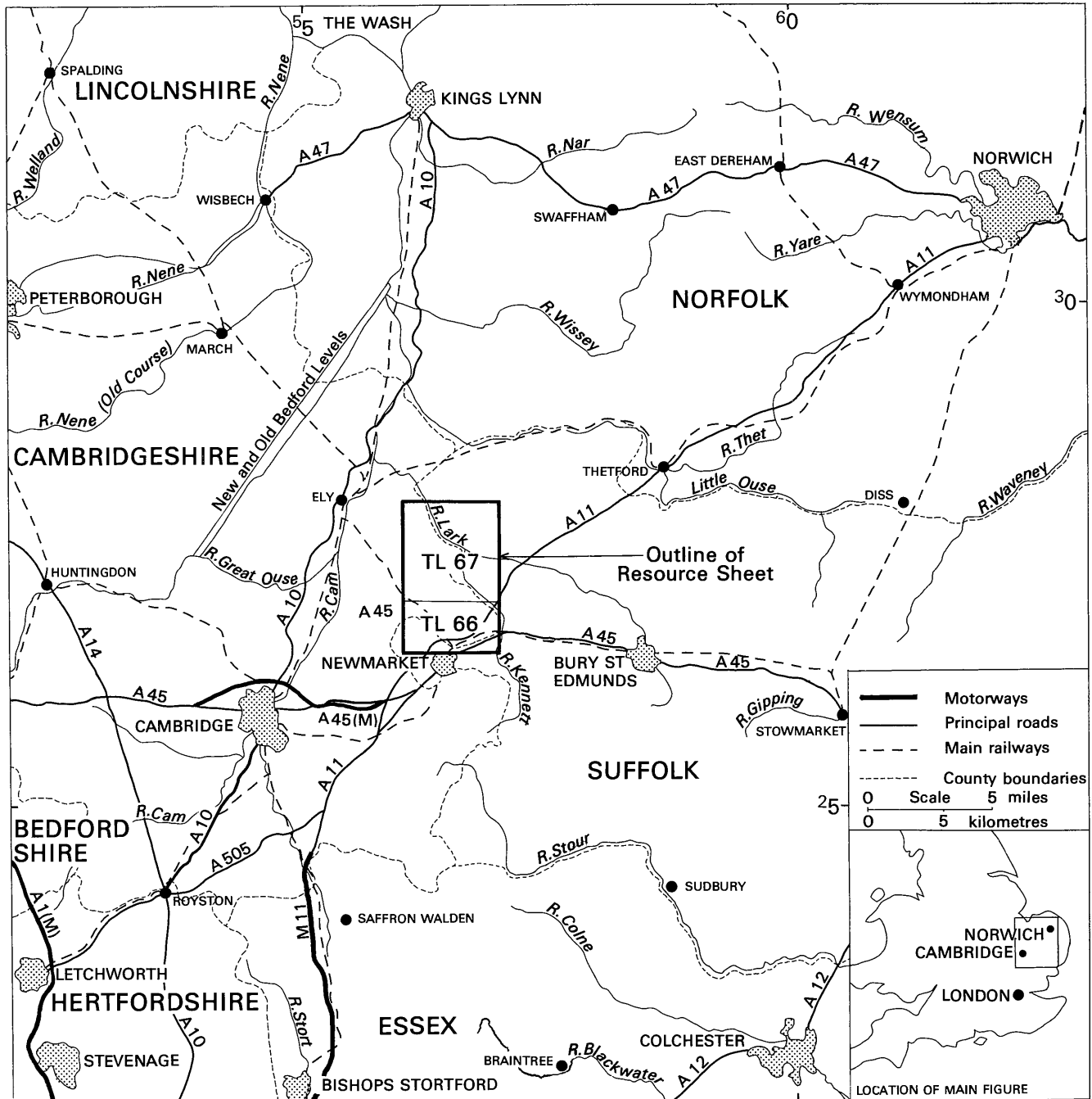


Figure 1 Sketch map showing the location of resource sheet TL 67 and part of TL 66.

The district is drained by three northward-flowing streams, the Kennett, Snail and Lark.

The River Terrace Deposits together with the Head Gravel contain the bulk of the sand and gravel resources in the district, while the remaining Drift deposits comprise peat, clays and silts. Within the area there are numerous disused sand and gravel workings.

GEOLOGY

The geological sequence is summarised in Table 1 and the relationships of the deposits are illustrated in the schematic cross-section (Figure 2). A brief description of these deposits is given below. A more detailed description of the geology of the central and southern parts of the area can be found in the memoir for the Cambridge district (Worssam and Taylor, 1969). The geology of the northern part of the district is outlined on the margin of the 1:50 000 geological sheet 173 (Ely). The 1:50 000 geological sheet 188 (Cambridge) also covers part of the district.

Table 1 Geological sequence.

DRIFT

Recent and Pleistocene

Blown Sand
 Shell Marl
 Alluvium
 Nordelph Peat
 River Terrace Deposits
 First Terrace
 Second Terrace
 Third Terrace
 Fourth Terrace
 Head Gravel
 Glacial Deposits
 Glacial Sand and Gravel
 Boulder Clay
 Glacial Loam

SOLID

Cretaceous

Upper Chalk
 Middle Chalk
 Lower Chalk
 Gault
 Woburn Sands (Lower Greensand)

Jurassic

Kimmeridge Clay

SOLID

Kimmeridge Clay This formation crops out beneath drift in a small area in the north-western part of the district but is nowhere exposed. It comprises dark and pale grey calcareous clays with sporadic bands and lenses of muddy limestone (cementstones).

Woburn Sands (Lower Greensand) Occurring in the north-western part of the district, the Woburn Sands comprise poorly sorted pale brown glauconitic quartz sands with occasional ironstone and sandstone pebbles and phosphatic nodules.

Gault The Gault clay is mostly concealed beneath drift deposits; it rests unconformably on Woburn Sands and consists of dark to bluish grey clays with sporadic beds of phosphatic pebbles.

Lower Chalk The lower part of this formation, which unconformably overlies the Gault, comprises grey and greyish brown argillaceous chalk; it is overlain by more uniformly white chalk which constitutes the upper part of the sequence.

Middle Chalk Most of the high ground in the south-eastern part of the district is underlain by Middle Chalk. It consists of massive, white shelly chalk with occasional beds of tabular and nodular flint.

Upper Chalk The Upper Chalk occupies a small area near Trinity Hall Farm [687 651], where it is seen to be massively bedded white chalk with thin beds of tabular and nodular flint.

DRIFT

Glacial Loam Three scattered patches of Glacial Loam occur in the south-east of the district. One patch was sampled to 4 m in IMAU hand auger borehole 66 NE 97 and comprised sandy silt with rare fine flint pebbles.

Boulder Clay Boulder Clay comprising sandy, pebbly grey clay occurs at two localities in the south-eastern part of the district, near La Hogue Hall [679 679] and Wellbottom Farm [674 652]. The maximum thickness recorded was 32.3 m in Hydrogeology Unit borehole record 66 NE 98.

Glacial Sand and Gravel Closely associated with the other glacial deposits in the south-east of the district are several small patches which are mapped as Glacial Sand and Gravel, but consist mainly of sandy clay.

Head Gravel Scattered patches of hummocky ground are mapped as Head Gravel in the vicinity of Worlington [696 737], Waterhall Farm [679 672] and Mildenhall Airfield [690 760]. The largest of these patches lies on the high ground at the junction of the Rivers Lark and Kennett. The hummocky ground may be due to solution of the chalk bedrock or may be a relic of periglacial conditions that prevailed during the Pleistocene (Worssam and Taylor, 1969). These solifluxion deposits are related to the existing drainage systems and, in some cases pass laterally into River Terrace Deposits from which they differ lithologically by having higher proportions of both 'white' flint and various relatively soft rock types (Table 2). The Head Gravel deposits grade mainly as 'clayey' pebbly sand.

Fourth Terrace This terrace caps the high ground at several localities in the south of the district. The largest deposits occur at Fordham [635 707] and Dane Hill [693 682]. The level of their base ranges from 13 m to 25 m above OD. The mineral in these deposits is typically 'very clayey' pebbly sand.

Third Terrace The Third Terrace deposits occur only in the south of the district. The largest deposits are found near Slate Farm [647 710] and Heath Plantation [682 694]. The level of the base of the deposits ranges in elevation from 8 m to 26 m above OD and their mineral usually consists of 'clayey' pebbly sand.

Second Terrace This terrace occurs throughout the district, but is most extensive near the village of Chippenham [664 699], and around Red Lodge [694 700] and Beck Row [696 776]. Typically, the mineral of this terrace comprises 'clayey' gravel, except near Beck Row, where it proved to be sand.

First Terrace Most of these deposits are located in the north of the district, where they form extensive continuous sheets, often concealed by peat. In the southern part of the district, First Terrace deposits form isolated patches. The largest of these are at Rectory Farm [684 736] and in the Snail Valley. The deposits in

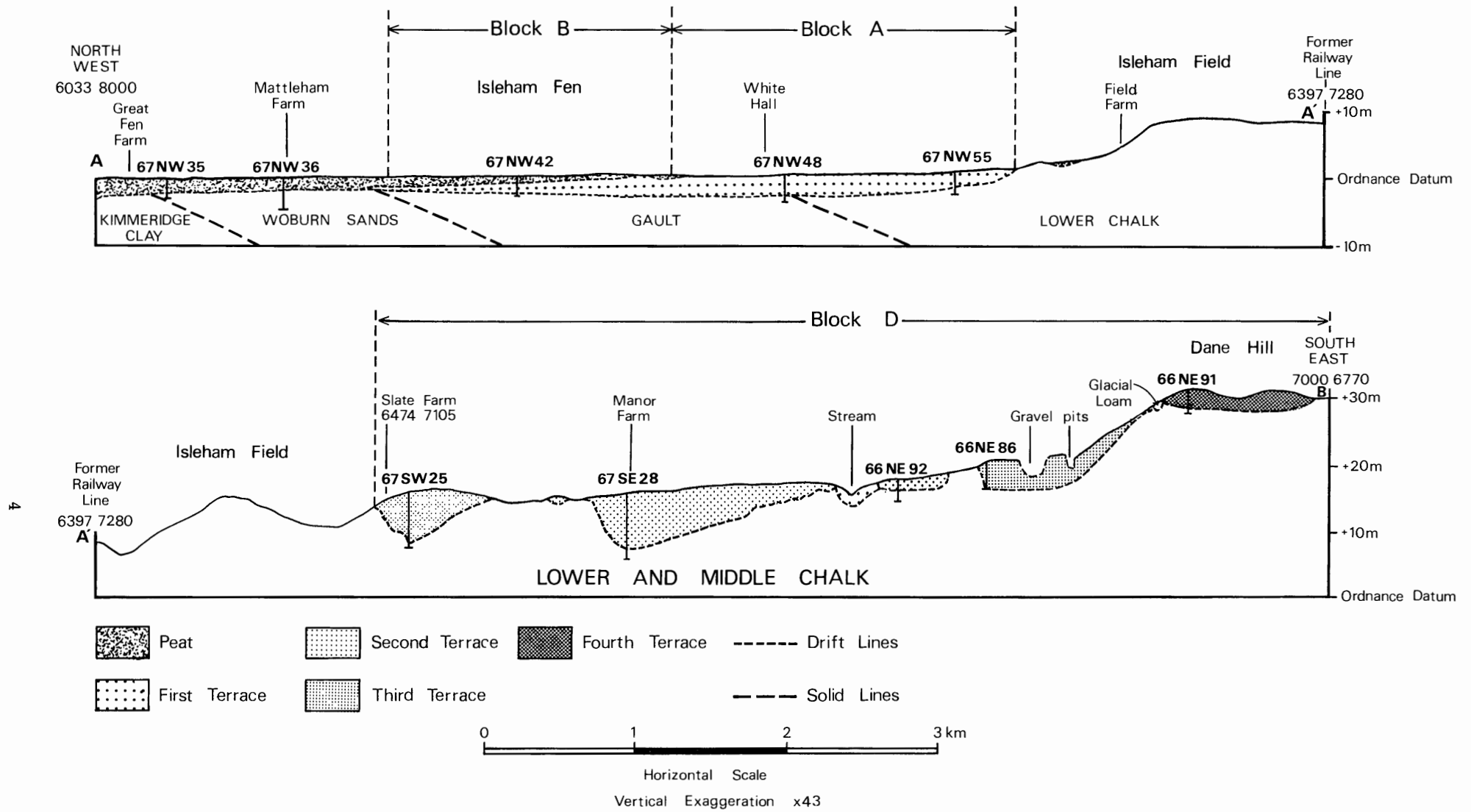


Figure 2 Schematic section across the district showing the relationship between the Drift deposits.

the Snail Valley are strung out along the valley floor between Exning [630 650] and Fordham [630 710], where they are covered in places by spreads of Alluvium. They consist of stratified, 'clayey' sands with pebbly seams.

Nordelph Peat The Nordelph Peat (the 'Upper Peat' of the Fenland sequence) is found in the north of the district where it occurs as a continuous sheet which floors the lower valleys of the Rivers Kennett and Lark where they debouch into the Fenland. A well-defined peat-filled channel marking the former course of the River Snail cuts into the First Terrace deposits near Black Hall [621 752]. An area of peat bog occurs in an isolated hollow at Chippenham Fen [647 694]. It has an average thickness of 0.5 to 1.0 m and lies on chalk bedrock. The Nordelph Peat is generally less than 1 m thick throughout the district, although, exceptionally, 5.0 m was recorded in IMAU borehole 67 SE 34. There has been considerable loss of peat by deflation resulting from the drainage of the Fens and the consequent lowering of the water table.

Alluvium Deposits are restricted to narrow strips on the floors of the Kennett, Snail, Lark and New River valleys. They consist of dark brown or black silts or clays, with occasional lenses of sand and fine gravel.

Shell Marl Small areas of Shell Marl occur within the Nordelph Peat in the north of the district near Forty Farm [652 792] and New Mill [628 789]. They comprise a shelly, calcareous mud, interbedded with alluvial clays and silts, which were deposited in areas of open water within the peat bog.

Blown Sand An area of low ridges in the vicinity of Rectory Farm [682 717] has been mapped as Blown Sand. These deposits consist of slightly clayey, well rounded sand. They are the result of the recent redistribution by the prevailing south-westerly winds of sands of Pleistocene age; they accumulate on the down-wind side of hedges or fences.

COMPOSITION OF THE SAND AND GRAVEL DEPOSITS

The deposits that contain potentially workable sand and gravel in the district are the River Terrace Deposits and the Head Gravel. The results of pebble-count analyses of these deposits are based on 145 samples from 72 IMAU boreholes (Figure 3). The mean composition and grading results for samples from each of the four terraces and Head Gravel are compared in Table 2. From each bulk sample collected, the proportions by weight of the different lithologies were determined in the +4-8, +8-16, +16-32, +32-64 mm size ranges. The results obtained were weighted by thickness and according to the percentage of gravel in each sample.

River Terrace Deposits and Head Gravel The average mineral grading for the district is 'clayey' pebbly sand and the predominant gravel component is flint. Despite the overall similarity in composition and grading of the four terraces and Head Gravel there are some differences. In the north-eastern part of the area (mainly in Block C) deposits mapped as First and Second Terrace comprise either sand or sand with a trace of gravel. The gravel content in this area averages 1 per cent, two-fifths of which is chalk; elsewhere the deposits comprise mainly sandy gravel. The mean fines content of the mineral in the River Terrace Deposits increases with increasing age of the deposit, ranging from 11 per cent in the First Terrace to 21 per cent in the Fourth Terrace (Table 2). The sand fraction consists mainly of medium-grained, subrounded quartz, together with subordinate amounts of flint, chalk and other rock fragments, mainly in the coarse fraction.

The gravel content of the mineral deposits ranges from above 1 per cent in the First Terrace in Block C to about 38 per cent in the Second Terrace in Block A. The majority of the pebbles are subrounded, but some of the fine flint pebbles occur as subangular flakes and blades. Quartz, quartzite and chalk pebbles are usually well rounded.

Table 2 Results of grading and composition analyses

Block	Number of boreholes	Mean grading percentages			Mean composition of the +4-16 mm fraction			
		Fines - $\frac{1}{16}$	Sand + $\frac{1}{16}$ -4	Gravel +4-64 mm	Flint black/brown	Quartz white	Quartz and quartzite	Other lithological constituents
First Terrace								
A	9	11	70	19	30	51	2	17
B	19*	13	75	12	38	41	4	17
C	7*	4	95	1	25	27	3	45
D	6	13	61	26	45	45	1	9
A+B+C+D	41	11	75	14	36	43	3	18
Second Terrace								
A	2	16	46	38	29	65	1	5
C	5*	5	92	3	31	30	6	33
D	12*	16	66	18	41	49	1	9
A+C+D	19	13	71	16	37	46	3	14
Third Terrace								
A	2	6	80	14	43	39	1	17
D	11	17	64	19	27	61	1	11
A+D	13	16	66	18	29	58	1	12
Fourth Terrace								
D	4	21	66	13	31	57	2	10
Head Gravel								
D	4	10	77	13	15	60	2	23

* Some boreholes proved mineral with no +4 mm material

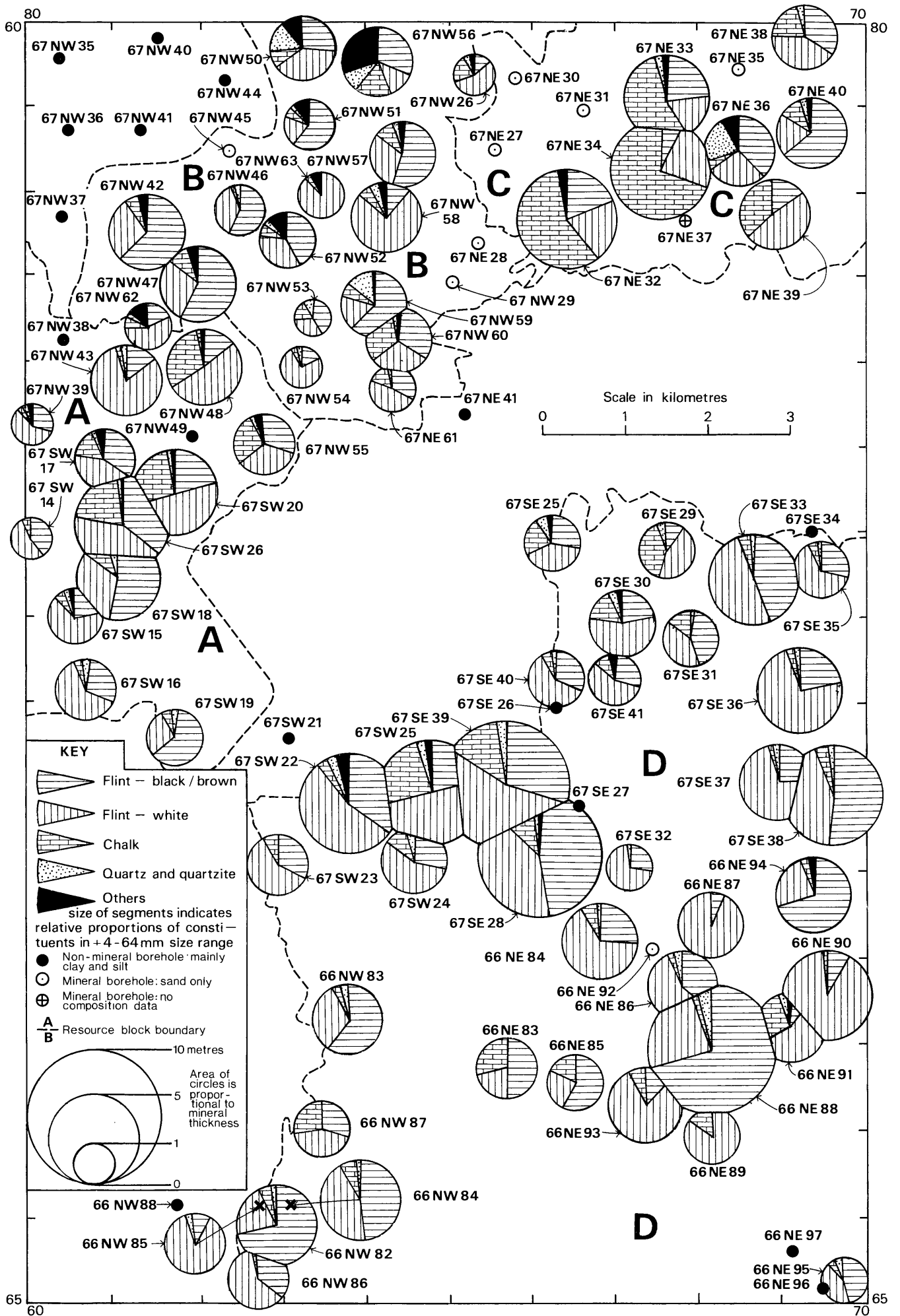


Figure 3 Relative composition of the +4-64 mm gravel fractions by weight in IMAU boreholes.

Flint is the major constituent, comprising 75 to 80 per cent of the gravel fraction. Generally, the higher proportions of flint are found in the older terraces and in the southern part of the district, some boreholes proving in excess of 97 per cent of flint, notably boreholes 66 NW 86, 66 NE 87 and 90, and 67 SW 32 and 37. Two types of flint have been identified from within the gravels: patinated and unpatinated. Table 2 shows that the patinated flint generally predominates; the highest percentages of patinated flint are found in the older terraces and in the Head Gravel. The unpatinated flint is invariably angular to subrounded with many freshly fractured faces. The patinated flint tends to be rounded to subangular and to vary in colour from greyish-white to brownish-white. Roeder (1977) suggests that the patinated white flint is more porous than the black unpatinated flint and, under certain weathering conditions, that is, alternate freezing and thawing, will absorb water and disintegrate ("popping"). The thickness of the patina is variable and the classification of pebbles as patinated or unpatinated was somewhat arbitrary.

Quartz and quartzite are minor constituents of the gravels, averaging 2 per cent and ranging from 1 to 6 per cent. They occur throughout the district but are found in their highest concentration in IMAU boreholes 67 NW 50 and 59 (Figure 3). Quartz and quartzite are invariably found in the fine gravel fraction. The quartz is white in colour while quartzite varies from pale brown to reddish-brown.

Chalk and ironstone pebbles, which are liable to be deleterious for many end-uses, occur mainly in the fine gravel fraction. The chalk is white, well rounded and equant. Ironstone usually occurs in the form of subangular pebbles, which are either black or dark brown.

In this report, 'ironstone' is taken to include quantities of such ferruginous fragments as goethite, iron-cemented sandstone and hematite. These pebbles are found in abundance in a few localities, mainly in the north of the district, for example in IMAU boreholes 67 NE 32, 33, 34, and 67 NW 50, 51 and 56. The mean percentage of the chalk and ironstone components in Blocks, A, B, C and D, is 13, 17, 40 and 12 per cent respectively.

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 also in grey, the geological data in black and the mineral resource information in shades of red.

Geological data The geological boundary lines and symbols are taken from geological maps of the area surveyed in 1938 by J. H. Taylor and 1949 to 1953 by S. C. A. Holmes and B. C. Worssam at the scale of 1:10 560. The information for 35 km² of ground along the northern edge of the district was obtained from 1:10 560-scale Soil Survey maps surveyed in 1972 by R. S. Searle and from a recent 1:10 560 scale survey (TL 67 NE) by the Institute's Field Staff carried out in 1978 and 1979. In this area the boundaries of the Solid formations and Drift deposits have been modified in the light of information revealed by recent IMAU boreholes. Borehole data, which include the stratigraphic relations, thickness, and mean particle-size distribution of the sand and gravel samples collected during the assessment survey, are also shown.

The geological boundaries are regarded as the best interpretation of the information available at the time of the survey. However, it is still likely that local discrepancies or irregularities will be revealed by

subsequent boreholes, particularly in areas with extensive overburden, as for example in the Fenland.

Mineral resource information For assessment purposes the mineral-bearing ground is divided into resource blocks. These may be sub-divided into areas containing mineral, and areas where sand and gravel is not potentially workable, or is absent (for definitions of 'mineral' and 'potentially workable' see p. 1). In this survey, the mineral has been subdivided into areas where it is exposed, that is where overburden averages less than 1 m in thickness, and areas where it is present in continuous, or almost continuous, spreads concealed beneath overburden greater than 1 m in thickness. Mineral is described as 'continuous or almost continuous' where it is present in 75 per cent or more of the boreholes in a resource block.

Areas where bedrock crops out, and where the available evidence suggests that sand and gravel is not potentially workable or is absent, are uncoloured on the map; where appropriate the reason is stated. In such areas it is assumed that mineral is absent except in infrequent and relatively minor patches which can neither be outlined nor assessed quantitatively within the context of this survey. Areas of unassessed sand and gravel, for example at Oak Wood [671 652], are indicated by a red stipple.

For the most part, the areas of the various categories of deposits are measured from the mapped geological boundary lines. Where there is a transition from one category to another which cannot be related to the geological boundaries, inferred boundaries, shown by a distinctive zigzag symbol, have been inserted. Such boundaries are drawn primarily for the purpose of volume estimation. The symbol is intended to convey an approximate location within a likely zone of occurrence rather than to represent the breadth of the zone, its size being limited only by cartographic considerations. For the purpose of measuring areas the centre-line of the symbol is used.

RESULTS

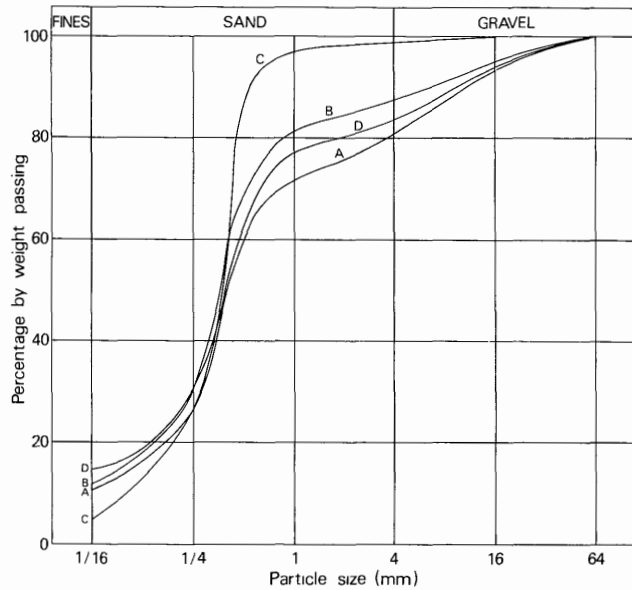
The statistical results are summarised in Table 3. Fuller grading particulars are shown in Figures 4 to 8 and Tables 4 to 7.

Accuracy of results For the four resource blocks, the accuracy of results at the symmetrical 95 per cent probability level ranges from 20 to 39 per cent (that is, it is probable that 19 times out of 20 the true volumes lie within the stated 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 approximately the same percentage limits would apply for the estimate of volume of a very much small parcel of ground (say 100 hectares) containing similar sand and gravel deposits, if the results from the same number of sample points (as provided by, say, ten boreholes) were used in the calculation. Thus, if closer limits are needed for the quotation of the reserves in part of a block, it can be expected that data from more than ten 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 total volume (155 million m³) can be estimated to limits of ± 14 per cent at the 95 per cent probability level, by a calculation based on the data from ninety-nine boreholes spread across the four resource blocks. However, it must be emphasised that the quoted volume of sand and gravel has no simple relationship with the amount that could be extracted in practice, since no allowance has been made in the calculations for any restraints (such as existing buildings and roads) on the use of land for mineral working.

Table 3 The sand and gravel resources of the country north of Newmarket; statistical assessment.

Block	Area		Mean thickness		Volume of mineral Million m ³	Limits at the 95% confidence level		Mean grading percentages		
	Block km ²	Mineral km ²	Over-burden m	Mineral m		±%	±Million m ³	Fines - $\frac{1}{16}$ mm	Sand + $\frac{1}{16}$ -4 mm	Gravel +4 mm
A	14.1	9.7	0.8	2.1	20	39	8	11	70	19
B	16.6	16.6	0.9	1.8	30	20	6	12	75	13
C	12.7	10.9	0.4	3.6	39	21	8	5	94	1
D	54.2	20.7	0.6	3.2	66	22	15	15	68	17
A to D	97.6*	57.9	0.7	2.8	155	14	23	13	75	14

* The resource sheet area comprises a further 52.4 km² which is barren ground.



Block	Percentage by weight						
	- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64 mm	+64 mm
A	11	16	45	9	13	6	0
B	12	18	52	5	8	5	0
C	5	22	70	2	1	0	0
D	15	15	47	6	10	7	trace

Figure 4 Mean particle-size distributions for the mineral in resource blocks A to D, based on data from IMAU boreholes.

NOTES ON THE RESOURCE BLOCKS AND ON UNASSESSED SAND AND GRAVEL DEPOSITS

The resource block boundaries enclose the mineral-bearing ground of the district which has been divided on a geological and geographical basis into four resource blocks comprising a total of 97.6 km². In the northern part of the district, Blocks A, B and C contain mineral which is continuous at the surface, and of relatively uniform thickness. In contrast, the mineral in Block D in the southern part of the district is discontinuous and variable in thickness. The remainder of the district is considered barren, except for minor occurrences of unassessed sand and gravel which are described below.

Block A (Figure 5, Table 4)

This block encompasses a tract of relatively flat ground adjacent to the southern edge of the Cambridgeshire Fenland. It comprises 9.7 km² of potentially workable

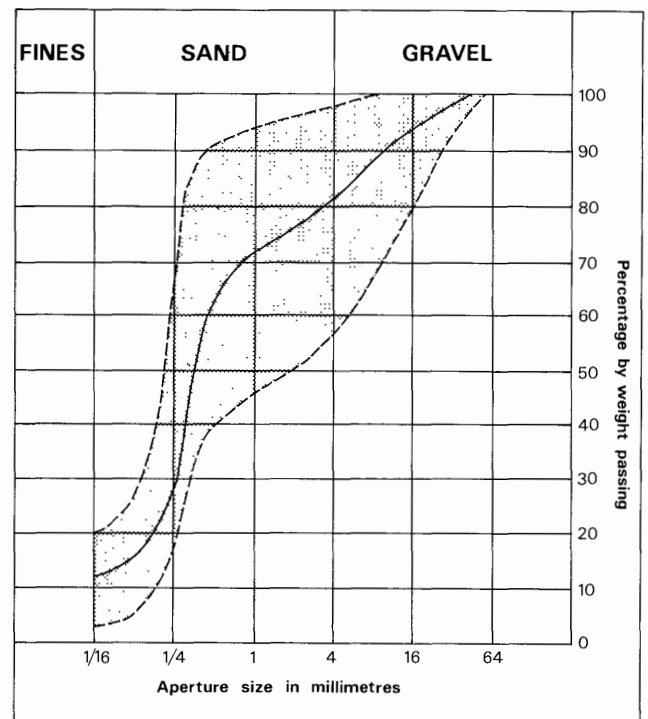


Figure 5 Grading characteristics of mineral in Block A: the continuous line represents the mean grading of the block; the broken lines denote the envelope within which the mean grading curves for individual boreholes fall.

sand and gravel deposits most of which are First Terrace deposits. Patches of Second and Third Terrace deposits lie along the western edge and southern boundary of the block. Peat infills a former channel of the River Snail which lies across, and in places cuts through, First Terrace deposits in the vicinity of Black Hall [621 752]. Although IMAU boreholes 67 NW 38 and 49 did not prove mineral, temporary exposures at the time of the survey indicated the presence of sand and gravel nearby, and data from these are included in the assessment of resources.

The assessment of resources is based on the records of 15 IMAU and 4 other boreholes. Proven thicknesses of mineral range from 0.9 m in borehole 67 SW 14 to 5.1 m in boreholes 67 SW 26, giving a mean thickness of 2.1 m and an estimated volume of 20 million m³ ± 8 million m³.

The mineral varies in grade from 'clayey' gravel to pebbly sand. The mean grading for the block is fines 11 per cent, sand 70 per cent and gravel 19 per cent. The sand content ranges from 41 to 85 per cent, and the gravel content from 2 to 44 per cent. The mean fines content is 11 per cent and ranges from 2 to 19 per cent.

Table 4 Block A: data from assessment boreholes proving sand and gravel.

Borehole	Recorded thickness (m)		Mean grading percentage					
	Mineral	Overburden	Fines	Fine sand	Medium sand	Coarse sand	Fine gravel	Coarse gravel
			$-\frac{1}{16}$ mm	$+\frac{1}{16} - \frac{1}{4}$ mm	$+\frac{1}{4} - 1$ mm	$+1 - 4$ mm	$+4 - 16$ mm	$+16$ mm
67 NW 38	absent	(1.7)	-	-	-	-	-	-
67 NW 39	1.0	0.5	15	10	20	11	22	22
67 NW 43	2.6	0.4	17	11	39	7	15	11
67 NW 48	2.9	0.6	11	21	49	8	10	1
67 NW 49	absent	(3.0)	-	-	-	-	-	-
67 NW 55	2.1	0.5	13	49	32	4	2	-
67 NW 62	1.3	0.6	2	14	44	16	23	1
67 SW 14	0.9	0.4	19	11	31	7	15	17
67 SW 15	1.5	0.5	9	15	47	5	14	10
67 SW 16	2.1	0.4	18	11	33	7	14	17
67 SW 17	2.0	0.5	13	23	40	9	12	3
67 SW 18	4.3	0.4	9	18	49	7	12	5
67 SW 19	1.7	0.3	8	9	66	6	8	3
67 SW 20	4.3	1.2	4	11	54	14	14	3
67 SW 26	5.1	0.5	5	15	48	11	14	7

Table 5 Block B: data from assessment boreholes proving sand and gravel.

Borehole	Recorded thickness (m)		Mean grading percentage					
	Mineral	Overburden	Fines	Fine sand	Medium sand	Coarse sand	Fine gravel	Coarse gravel
			$-\frac{1}{16}$ mm	$+\frac{1}{16} - \frac{1}{4}$ mm	$+\frac{1}{4} - 1$ mm	$+1 - 4$ mm	$+4 - 16$ mm	$+16$ mm
67 NW 42	2.8	0.3	15	8	36	7	18	16
67 NW 45	1.5	0.6	24	41	33	2	-	-
67 NW 46	1.6	0.4	13	16	51	5	10	5
67 NW 47	3.0	2.0	13	6	58	4	9	10
67 NW 50	2.4	0.6	5	29	56	4	5	1
67 NW 51	1.4	0.6	11	13	52	10	11	3
67 NW 52	1.6	0.4	5	15	52	6	15	7
67 NW 53	0.9	1.3	25	6	44	6	11	8
67 NW 54	1.0	2.4	12	13	52	4	11	8
67 NW 56	2.5	0.5	8	32	55	2	2	1
67 NW 57	2.5	1.0	8	18	61	6	7	-
67 NW 58	2.7	0.7	14	26	55	2	2	1
67 NW 59	2.4	0.6	14	5	43	8	18	12
67 NW 60	2.3	2.2	15	12	47	10	14	2
67 NW 61	1.0	0.5	24	11	39	6	13	7
67 NW 63	1.1	1.9	4	14	80	1	1	-
67 NE 26	1.2	0.5	4	23	68	3	2	-
67 NE 28	1.6	0.4	8	23	65	4	-	-
67 NE 29	1.5	0.4	19	33	45	3	-	-

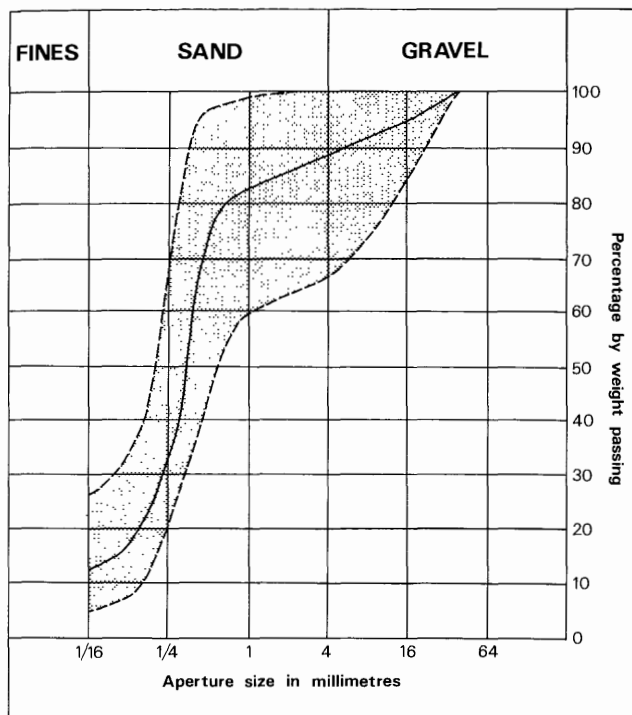


Figure 6 Grading characteristics of mineral in Block B: (for explanation see Figure 5).

The overburden comprises sandy peat or sandy soil; it ranges from 0.3 m to 1.2 m thick and has a mean value of 0.8 m.

Block B (Figure 6, Table 5)

This block covers 16.6 km² of peat-covered Fenland lying at about sea-level in the north of the district. Here, potentially workable sand and gravel deposits comprise a continuous thin sheet of First Terrace deposits, which crops out near the southern boundary of the block and wedges out beneath spreads of peat to the north-west. The bedrock comprises Gault clay in the west and Lower Chalk in the east.

The assessment of resources is based on data from 19 IMAU boreholes. Proved thicknesses of mineral range from 0.9 to 3.0 m giving a mean of 1.8 m. The estimated volume of mineral present in the block is 30 million m³ ± 6 million m³; it has a mean grading of fines 12 per cent, sand 75 per cent and gravel 13 per cent, and is thus classified overall as 'clayey' pebbly sand.

The mean fines content ranges from 4 to 25 per cent. The lowest sand content is 51 per cent; the highest is 95 per cent. The gravel content varies from nil to 34 per cent.

Overburden ranges in recorded thicknesses up to 2.4 m, it has a mean thickness of 0.9 m and consists mainly of peat or peaty clay soil.

Block C (Figure 7, Table 6)

This block encompasses 12.7 km² of the flat, sandy terrain adjacent to Mildenhall Airfield. The mineral comprises a continuous deposit, extending to 10.9 km², of First and Second Terrace deposits, which consist almost entirely of uniform medium sand. The bedrock is Lower Chalk.

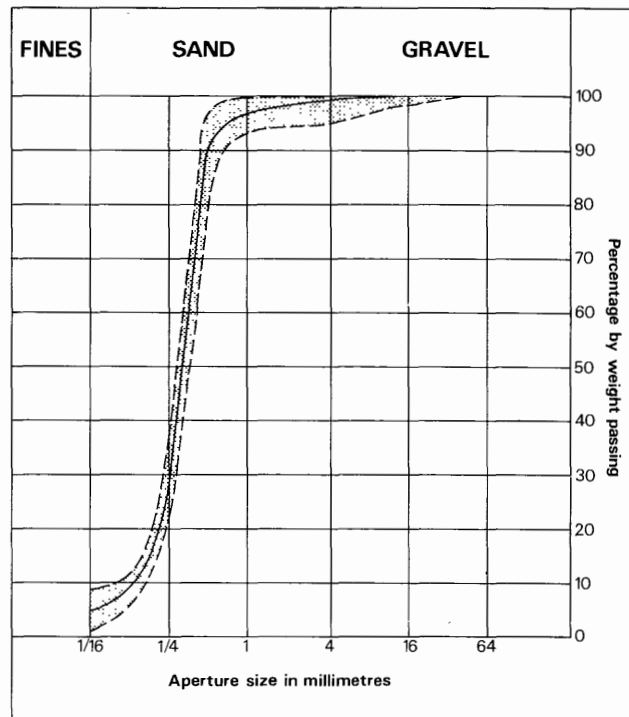


Figure 7 Grading characteristics of mineral in Block C: (for explanation see Figure 5).

Table 6 Block C: data from assessment boreholes proving sand and gravel.

Borehole	Recorded thickness (m)		Mean grading percentage					
	Mineral	Overburden	Fines	Fine sand	Medium sand	Coarse sand	Fine gravel	Coarse gravel
			- $\frac{1}{16}$ mm	+ $\frac{1}{16}$ - $\frac{1}{4}$ mm	+ $\frac{1}{4}$ -1 mm	+1 -4 mm	+4 -16 mm	+16 mm
67 NE 27	4.4	0.3	1	26	72	1	-	-
67 NE 30	3.7	0.6	5	30	64	1	-	-
67 NE 31	3.0	0.5	4	18	76	2	-	-
67 NE 32	5.4	0.6	5	25	66	3	1	-
67 NE 33	4.0	0.5	5	17	71	3	3	1
67 NE 34	5.0	0.6	6	23	68	2	1	-
67 NE 35	3.4	0.6	3	18	77	2	-	-
67 NE 36	2.7	0.2	3	18	74	1	2	2
67 NE 37	2.1	0.4	5	21	67	2	4	1
67 NE 38	2.5	0.5	4	26	65	2	3	-
67 NE 39	2.5	0.5	9	21	64	2	3	1
67 NE 40	2.7	0.5	4	18	74	2	2	-

Table 7 Block D: data from assessment boreholes proving sand and gravel.

Borehole	Recorded thickness (m)		Mean grading percentage					
	Mineral	Overburden	Fines	Fine sand	Medium sand	Coarse sand	Fine gravel	Coarse gravel
			- $\frac{1}{16}$ mm	+ $\frac{1}{16}$ - $\frac{1}{4}$ mm	+ $\frac{1}{4}$ -1 mm	+1 -4 mm	+4 -16 mm	+16 mm
66 NW 82	3.6	1.5	14	9	39	9	15	14
66 NW 83	2.6	1.2	5	8	31	15	19	22
66 NW 84	4.6	1.2	16	16	50	5	6	7
66 NW 85	2.0	1.0	32	16	42	3	4	3
66 NW 86	1.9	absent	21	8	49	3	6	13
66 NW 87	1.4	0.7	15	15	61	5	4	-
66 NE 83	2.4	0.4	21	19	44	4	8	4
66 NE 84	2.9*	0.5	20	14	53	2	6	5
66 NE 85	1.8	0.2	29	19	27	5	12	8
66 NE 86	2.4	0.1	17	13	47	5	12	6
66 NE 87	2.3	0.6	24	15	50	2	4	5
66 NE 88	9.7	0.3	13	19	56	5	5	2
66 NE 89	1.7	0.4	18	26	42	3	5	6
66 NE 90	4.7	0.3	32	15	39	4	6	4
66 NE 91	2.9	0.3	27	11	30	10	14	8
66 NE 92	1.0	1.0	28	32	40	-	-	-
66 NE 93	2.8	0.3	23	16	36	5	13	7
66 NE 94	3.0	0.5	2	8	39	14	17	20
66 NE 95	1.0	0.1	5	7	22	8	21	37
67 SW 22	5.4	0.4	14	14	52	4	11	5
67 SW 23	1.8	2.0	20	14	45	6	9	6
67 SW 24	2.6	0.4	13	10	36	12	21	8
67 SW 25	6.2	0.3	9	21	54	6	8	2
67 SE 25	1.6	0.4	1	14	66	6	9	4
67 SE 28	8.4	0.6	15	15	44	6	14	6
67 SE 29	1.7	0.3	12	15	57	4	8	4
67 SE 30	2.5	0.5	16	7	49	7	17	4
67 SE 31	1.6	0.4	18	10	45	16	9	2
67 SE 32	1.0	1.5	21	16	39	6	13	5
67 SE 33	4.6	0.4	6	17	57	4	9	7
67 SE 35	1.6	0.4	18	15	42	6	12	7
67 SE 36	4.2	0.5	8	14	56	4	8	10
67 SE 37	4.0	1.0	3	13	65	3	6	10
67 SE 38	5.5	0.5	7	14	45	5	14	15
67 SE 39	9.6	0.4	10	10	56	7	13	4
67 SE 40	1.7	0.4	16	7	15	8	24	30
67 SE 41	1.5	0.5	16	8	69	3	3	1

* A waste parting 1.6 m thick divides the mineral into two parts; the data given refer to the combined thickness of mineral.

The assessment of resources is based on 12 IMAU boreholes and one other record. Proved thicknesses of mineral fall within the range 2.1 m to 5.4 m, the mean being 3.6 m. The estimated volume of mineral is 39 million m³ \pm 8 million m³.

In all but one of the IMAU boreholes, the mineral comprises sand; the exception (67 NE 37) proved pebbly sand. The mean grading for the block is fines 5 per cent, sand 94 per cent and gravel 1 per cent. The sand content has a narrow range from 87 to 99 per cent. Gravel is noticeably scarce, or absent, with a maximum of 5 per cent, while fines vary from 1 to 9 per cent.

The overburden is limited to a thin covering of light, sandy soil with sporadic patches of peat; it averages 0.4 m in thickness.

Block D (Figure 8, Table 7)

The southern part of the district between the villages of Snailwell and Worlington is a broad tract of chalkland with scattered patches of Drift. The ground rises towards the south-east from approximately 5 m above OD at Worlington [696 740] to about 76 m above OD near Trinity Hall Farm [692 650].

Dispersed patches of sand and gravel in the south-east of the district show large local variations in thickness, but are grouped together in Block D because

of their stratigraphic, genetic and compositional similarities. The block is 54.2 km² in area, of which 20.7 km² contains potentially workable sand and gravel. Several small disused gravel pits totalling 100 hectares (1 km²), lie in an area between Chippenham, Kennett and Worlington. The mineral in the block comprises First, Second, Third and Fourth Terraces and Head Gravel.

The assessment of resources is based on 37 IMAU boreholes and 11 other records. The proved thicknesses of mineral range from 1.0 m to 9.7 m with a mean of 3.2 m. The estimated volume of mineral present is 66 million m³ \pm 15 million m³. The mineral varies widely in grading from pebbly sand to gravel. However, the majority of deposits consist of sand which is variably 'clayey' and pebbly. The mean grading of the block is fines 15 per cent, sand 68 per cent and gravel 17 per cent. Both the sand and gravel contents of the mineral vary widely; sand ranges from 30 to 86 per cent, and gravel from nil to 58 per cent. The fines content, which on average is highest in this block, varies from 1 to 32 per cent. A waste band 1.6 m thick was encountered in borehole 66 NE 84. Borehole 66 NE 97 proved non-mineral loamy clay down to 4 m depth, and borehole 66 NE 88 penetrated Boulder Clay beneath the Fourth Terrace.

Overburden consists of thin clayey or sandy soils averaging 0.6 m in thickness.

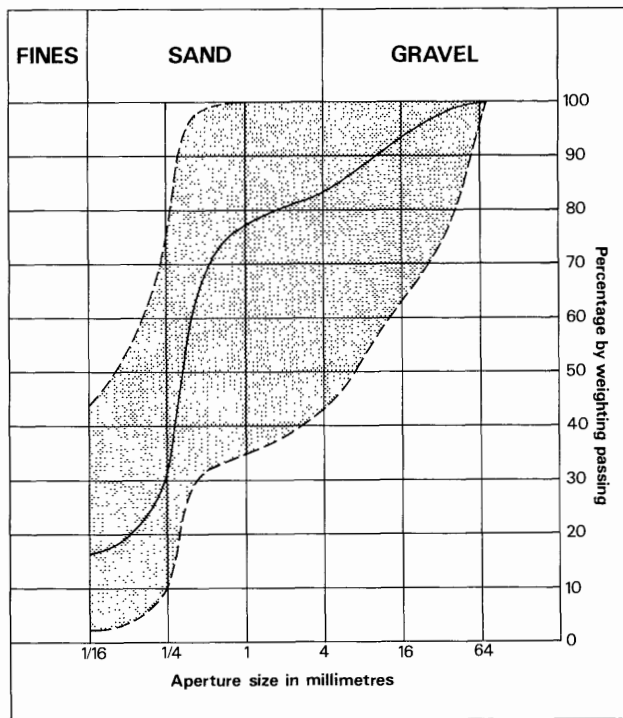


Figure 8 Grading characteristics of mineral in Block D: (for explanation see Figure 5).

Unassessed sand and gravel deposits

Small and discontinuous patches of sand and gravel are found outside the area of the four blocks. These deposits are comparatively minor in extent, and have therefore not been included in the overall mineral assessment (Appendix B, paragraph 14). A brief description is given below.

In the vicinity of Mettleham Farm [606 787] an area of peat-covered fenland was delineated as 'barren' on the evidence of 6 IMAU boreholes (67 NW 35, 36, 37, 40, 41 and 44). Sand and gravel deposits in this area were found to be discontinuous, and generally less than 1 m thick.

A tract of 'barren' ground between two and four kilometres wide divides the district from south-west to north-east. In this area there are only a few scattered Drift deposits which contain small amounts of sand and gravel. The narrow Drift-filled valleys which traverse the district contain mainly peat, clays and silts. The Head Gravel deposits near Mons Wood [690 760] have largely been sterilised by Mildenhall Airfield.

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APPENDIX A

FIELD AND LABORATORY PROCEDURES

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

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

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

The drilling machine employed should be capable of providing a continuous sample representative of all unconsolidated deposits, so that the in-situ grading can be determined, if necessary, to a depth of 30 m (100 ft) at a diameter of about 152 mm (6 in), beneath different types of overburden. It should be reliable, quiet, mobile and relatively small (so that it can be moved to sites of difficult access). Shell and auger rigs have proved to be almost ideal.

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

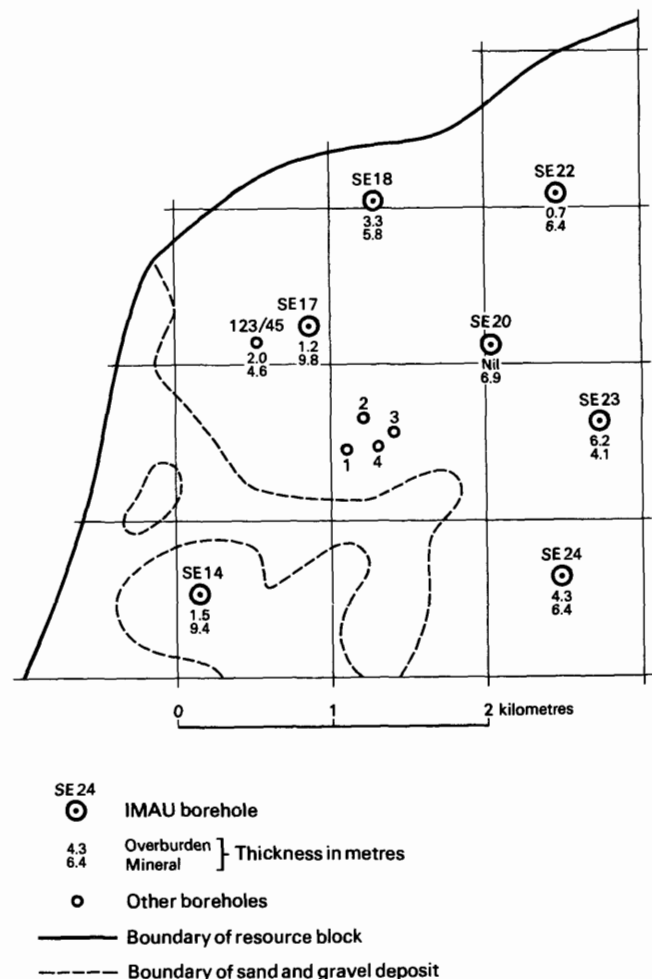
In order to substantiate the geological and assessment results, shallow hand-augered holes were drilled using a simple 6-inch (152 mm) auger.

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

is based on B.S. 1337 (British Standards Institution, 1967). Random checks of the accuracy of the grading are made in the Institute's laboratories.

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

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



Example of resource block assessment: map of a fictitious block

APPENDIX B

STATISTICAL PROCEDURE

Statistical assessment

1 A statistical assessment is made of an area of mineral greater than 2 km², if there are at least five evenly spaced boreholes in the resource block (for smaller areas, see Paragraph 12 below).

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

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

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

4 The above relationship may be transposed such that

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

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

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

5 Given that the number of approximately evenly spaced sample points in the sampled area is n with mineral thickness measurements $l_{m1}, l_{m2}, \dots, l_{mn}$, then the best estimate of mean thickness, \bar{l}_m , is given by

$$\bar{l}_m = (l_{m1} + l_{m2} + \dots + l_{mn}) / n.$$

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

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

where l_m is any value in the series l_{m1} to l_{mn} .

6 The sampled area in each resource block is coloured pink on the map. Wherever possible, calculations relate to the mineral within mapped geological boundaries (which may not necessarily correspond to the limits of a deposit). Where the area is not defined by a mapped boundary, that is, where the boundary is inferred, a distinctive symbol is used. Experience suggests that the errors in determining area are small relative to those in thickness. The relationship $S_A / S_{\bar{l}_m} \leq 0.3$ is assumed in all cases. It follows from Equation [2] that

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

7 The limits on the estimate of mean thickness of mineral, $L_{\bar{l}_m}$, may be expressed in absolute units $\pm (t/\sqrt{n}) \times S_{\bar{l}_m}$ or as a percentage $\pm (t/\sqrt{n}) \times S_{\bar{l}_m} \times (100/\bar{l}_m)$ per cent, where t is Student's t at the 95 per cent probability level for $(n - 1)$ degrees of freedom, evaluated by reference to statistical tables. (In applying Student's t it is assumed that the measurements are distributed normally).

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

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

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

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

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

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

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

per cent,

and when n is greater than 20, as

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

per cent.

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

Inferred assessment

12 If the sampled area of mineral in a resource block is between 0.25 km² and 2 km², an assessment is inferred on the basis of geological and topographical information, usually supported by the data from one or two boreholes. The volume of mineral is calculated as the product of the area, measured from field data, and the estimated thickness. Confidence limits are not calculated.

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

14 No assessment is attempted for an isolated area of mineral less than 0.25 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 needs to be only approximately regular and in estimating the mean thickness only simple weighting is necessary. In practice, equal weighting can often be applied to thicknesses at all sample points. If, however, there is a distinctly unequal distribution of points, bias is avoided by dividing the sampled area into broad zones, to each of which a value roughly proportional to its area is assigned. This value is then shared between the data points with the zone as the weighting factor.

Block calculation

Scale: 1:25 000
Block: Fictitious

Area
Block: 11.08 km²
Mineral: 8.32 km²

Mean thickness
Overburden: 2.5 m
Mineral: 6.5 m

Volume
Overburden: 21 million m³
Mineral: 54 million m³

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

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

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

Calculation of confidence limits

wl_m	$ (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

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

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

$$= 20.3$$

$$\approx 20 \text{ per cent.}$$

APPENDIX C

CLASSIFICATION AND DESCRIPTION OF SAND AND GRAVEL

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

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

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

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

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

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

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

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

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

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

The size distribution of borehole samples is determined by sieve analysis, which is presented by the laboratory as logarithmic cumulative curves (see, for example, British Standards Institution, 1967). In this report the grading is tabulated on the borehole record sheets (Appendix E), the intercepts corresponding with the simple geometric scale $\frac{1}{8}$ mm, $\frac{1}{4}$ mm, 1 mm, 4 mm, 16 mm and so on as required. Original sample grading curves are available for reference at the appropriate office of the Institute.

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

The relative proportions of the rock types present in the gravel fraction are indicated by the use of the words 'and' or 'with'. For example, 'flint and quartz' indicates roughly equal proportions with neither constituent accounting for less than about 25 per cent of the whole; 'flint with quartz' indicates that flint is dominant and quartz, the principal accessory rock type, comprises 5 to 25 per cent of the whole. Where the accessory material accounts for less than 5 per cent of the whole, but is still readily apparent, the phrase 'with some' has been used. Rare 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: not original faces, edges or corners left. The entire surface consists of broad curves; flat areas are absent. The original shape is suggested by the present form of the grain.

Classification of gravel, sand and fines

Size limits	Grain-size description	Qualification	Primary classification
64 mm	Cobble	Coarse	Gravel
		Fine	
16 mm	Pebble	Coarse	Sand
		Fine	
4 mm	Sand	Medium	Sand
		Fine	
1 mm	$\frac{1}{4}$ mm	Fines (silt and clay)	Fines
$\frac{1}{8}$ mm			

- 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

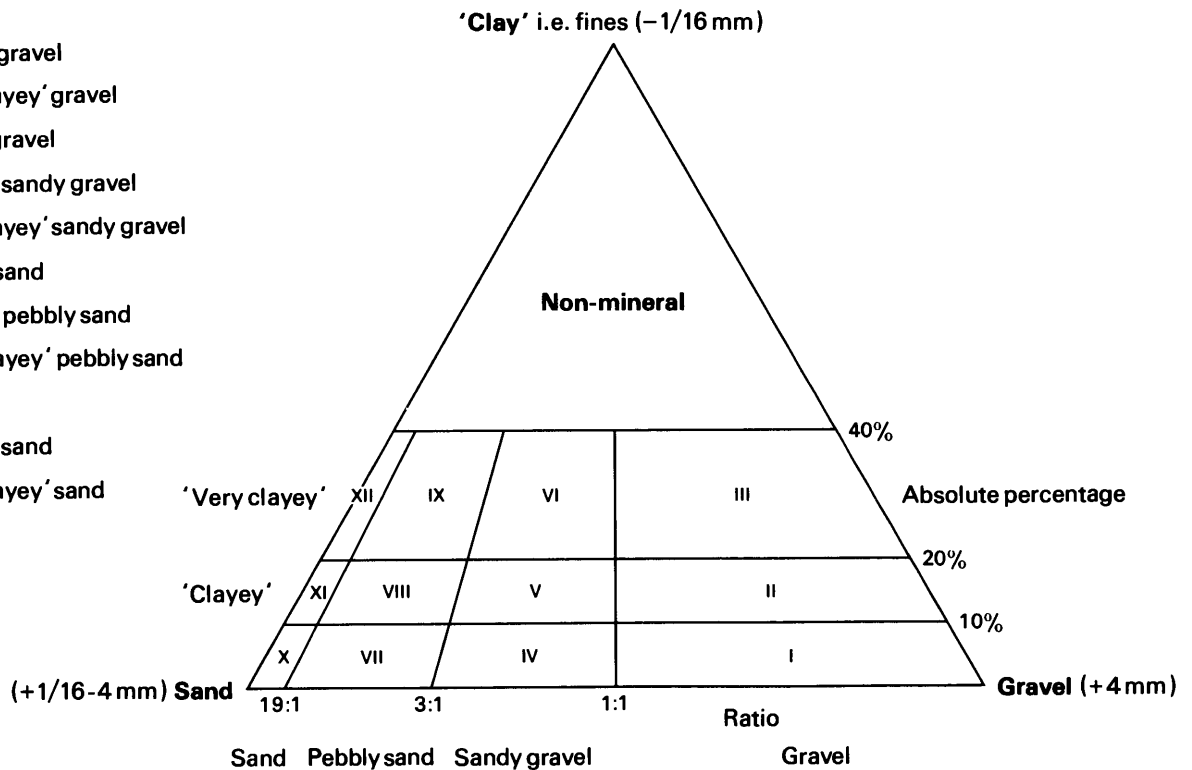


Diagram showing the descriptive categories used in the classification of sand and gravel

APPENDIX D

EXPLANATION OF THE BOREHOLE RECORDS

Annotated fictitious example

CK 66 NW 5¹ 6191 6962² Northfields³

Block B

Surface level (+49.7 m) ⁺163 ft⁴
 Water struck at +45.9 m⁵
 October 1972⁶

Overburden ⁷ 2.8 m
 Mineral 5.4 m
 Waste 1.1 m
 Mineral 1.4 m
 Bedrock 0.7 m⁸

LOG

Geological classification	Lithology ⁹	Thickness m	Depth m
	Soil	0.2	0.2
Alluvium	Clay, silty, dark brown	2.6	2.8
River Terrace Deposits	a Gravel Gravel: fine to coarse, with cobbles towards base, angular to rounded flint and limestone with ironstone and some quartz and chalk Sand: medium with coarse and some fine, quartz and limestone	5.4	8.2
Boulder Clay	Clay, sandy and pebbly, red-brown	1.1	9.3
Glacial Sand and Gravel	b Sand, 'clayey' in part: fine, subangular to rounded, quartz with some coal	1.4	10.7
Lias	Mudstone, blue-grey, fossiliferous	0.7+	11.4

GRADING¹⁰

	Mean for deposit percentages			Depth below surface (m)	percentages						
	Fines	Sand	Gravel		Fines		Sand		Gravel		
					- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
a	5	46	49	2.8-3.9	20	14	62	2	2	0	0
				3.8-4.8	2	2	12	18	42	24	0
				4.8-5.8	1	3	24	13	35	24	0
				5.8-6.8	0	4	21	20	26	29	0
				6.8-8.2	4	3	23	10	23	30	7
				Mean	5	5	28	13	25	22	2
b	5	95	0	9.3-10.3	3	73	23	1	0	0	0
				10.3-10.7	9	85	5	1	0	0	0
				Mean	5	77	17	1	0	0	0
a+b	5	56	39	Mean	5	20	26	10	20	17	2

COMPOSITION¹¹

Depth below surface (m)	percentages by weight in the 8-16 mm fraction				
	Flint	Quartz	Limestone	Chalk	Ironstone
3.8-4.8	41	5	50	1	3
4.8-5.8	39	3	45	5	8
5.8-6.8	45	2	42	5	6
6.8-8.2	19	6	61	3	11
Mean	35	4	51	3	7

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

1 Borehole Registration Number

Each Industrial Minerals Assessment Unit (IMAU) borehole is identified by a Registration Number. This consists of two statements.

- a The number of the 1:25 000 sheet on which the borehole lies, here CK 66.
- b 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, here NW 5.

Thus the full Registration Number is CK 66 NW 5.

2 National Grid Reference

All National Grid References fall in the 100 km square identified by the first two letters of the Registration Number. Grid references are given to eight figures, accurate to within 10 m.

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 the borehole 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 feet; approximate conversions to metres are given in brackets.

5 Groundwater conditions

If groundwater was present the level at which it was encountered is normally given (in metres relative to Ordnance Datum).

6 Type of drill and date of drilling

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

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. 1). Bedrock is the 'formation', 'country rock' or 'rock head' below which potentially workable sand and gravel will not be found. Waste is any material other than bedrock or mineral. Where waste occurs between the surface and mineral it is classified as overburden.

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

9 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 of the gravel and/or sand fraction. Where more than one bed of mineral is recognised each is designated by a letter, e.g. **a**, **b**, etc. The description of other deposits is based on visual examination in the field.

10 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 and cobble gravel ($+16$ mm) are stated.

The mean grading of groups of samples making up an identified bed of mineral are also given in detail and in summary. Where more than one bed is recognised the

mean grading for the whole of the mineral in the borehole may be given. Where necessary, in calculating mean gradings, 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 commonly suggests that in borehole samples the proportion of sand may be higher and the proportion of fines and coarse gravel may be lower.

11 Composition

Details of the composition of selected samples or groups of samples may be given. Where appropriate the calculated weighted mean composition of groups of samples may be quoted.

APPENDIX E

**INDUSTRIAL MINERALS ASSESSMENT UNIT BOREHOLE RECORDS
AND LIST OF OTHER REGISTERED BOREHOLES**

TL 66 NW 82 6298 6590 Windmill Hill, Exning

Block D

Surface level (+17.6 m) +58 ft
Water not encountered
February 1979

Overburden 1.5 m
Mineral 3.6 m
Bedrock 0.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
First Terrace	Clay, grey, pebbly	1.5	1.5
	'Clayey', sandy gravel Gravel: fine to coarse with sporadic cobbles, angular to subrounded, predominantly flint, some chalk and sandstone Sand: mainly medium with fine and coarse, quartz with some flint and chalk, brown	3.6	5.1
Lower Chalk	Chalk, white	0.9+	6.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
14	57	29	1.5-5.1	14	9	39	9	15	14	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
1.5-5.1	72	20	5	0	1	2	0

Surface level (+12.3 m) +40 ft
 Water struck at (+11.1 m) +36 ft
 February 1979

Overburden 1.2 m
 Mineral 2.6 m
 Bedrock 0.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4
Alluvium	Silt, grey	0.8	1.2
First Terrace	Sandy gravel Gravel: fine to coarse with sporadic cobbles, subangular to subrounded, predominantly flint, with some well-rounded fine chalk pebbles and some quartz and quartzite Sand: medium with coarse and some fine, mainly quartz with some flint and chalk, brown	2.6	3.8
Lower Chalk	Chalk, white	0.2+	4.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
5	54	41	1.2-2.2	6	6	13	10	21	42	2
			2.2-3.8	4	9	42	19	18	8	0
			Mean	5	8	31	15	19	21	1

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
1.2-2.2	61	34	4	trace	1	0	trace
2.2-3.8	61	29	4	trace	4	0	2
Mean	61	32	4	trace	2	0	1

Surface level (+17.9 m) +59 ft
 Water not encountered
 January 1979

Overburden 1.2 m
 Mineral 4.6 m
 Bedrock 0.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.1	0.1
Second Terrace	Clay, pale brown, silty	1.1	1.2
	'Clayey' pebbly sand, gravel content increasing towards the base Gravel: fine to coarse with sporadic cobbles, subangular to well-rounded, predominantly flint with some chalk, quartz and quartzite Sand: mainly medium with some fine and coarse, quartz with some flint and chalk, brown	4.6	5.8
Lower Chalk	Chalk, white	0.2+	6.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
16	71	13	1.2-2.2	19	24	55	2	0	0	0
			2.2-3.2	15	15	63	1	3	3	0
			3.2-4.2	14	12	55	6	11	2	0
			4.2-5.8	14	8	32	9	15	20	2
			Mean	16	16	50	5	6	6	1

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction							
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others	
	Black/Brown	White						
2.2-3.2	8	80	3	trace	9	0	trace	
3.2-4.2	43	31	25	0	1	0	trace	
4.2-5.8	56	39	4	0	1	0	trace	
Mean	49	41	8	0	2	0	trace	

TL 66 NW 85 6278 6614 Exning House, Exning

Block D

Surface level (+34.1 m) +112 ft
 Water not encountered
 February 1979

Overburden 1.0 m
 Mineral 2.0 m
 Waste 4.8 m
 Bedrock 0.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Fourth Terrace	Clay, brown, pebbly	1.0	1.0
	'Very clayey' pebbly, sand, with fines content increasing towards the base Gravel: fine to coarse, well-rounded to subangular, patinated flint with some sandstone and chalk Sand: medium with fine and some coarse, mainly quartz, with some flint and chalk, brown	2.0	3.0
	Clay, brown, sandy	4.8	7.8
Middle Chalk	Chalk, white	0.2+	8.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
32	61	7	1.0-2.0	25	12	47	3	6	7	0
			2.0-3.0	39	20	37	2	2	0	0
			Mean	32	16	42	3	4	3	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction							
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others	
	Black/Brown	White						
1.0-2.0	6	86	1	0	trace	7	0	
2.0-3.0	14	47	7	0	0	26	6	
Mean	7	81	2	0	0	9	1	

TL 66 NW 86 6275 6527 Etheldreda House, Exning

Block D

Surface level (c.+27 m)c.+89 ft
 Water not encountered
 Hand auger 152 mm diameter
 June 1979

Mineral 1.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Second Terrace	'Very clayey' pebbly sand Gravel: fine to coarse with sporadic cobbles, angular subrounded, predominantly flint with some quartz and quartzite Sand: mainly medium with some fine and coarse, quartz with flint and chalk, brown Borehole abandoned at 1.9 m due to obstruction by flint cobbles	1.9+	1.9

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
21	60	19	0.0-1.0	26	9	55	2	4	4	0
			1.0-1.9	15	8	41	4	8	23	1
			Mean	21	8	49	3	6	13	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.0-1.0	10	88	1	1	trace	0	0
1.0-1.9	43	55	trace	trace	2	0	trace
Mean	35	63	trace	trace	2	0	0

TL 66 NW 87 6352 6701 Plantation Stud Farm, Exning

Block D

Surface level (+15.2 m) +50 ft
 Water struck at (+14.9 m) +49 ft
 Hand auger 152 mm diameter
 June 1979

Overburden 0.7 m
 Mineral 1.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.1	0.1
Alluvium	Silt, grey	0.6	0.7
First Terrace	'Clayey' sand, upper 0.2 m 'very clayey' Gravel: fine, subangular to subrounded flint and well rounded chalk Sand: medium with fine and some coarse, mainly quartz with some flint, brown	1.4+	2.1
Borehole abandoned at 2.1 m due to blowing sand			

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
15	81	4	0.7-2.1	15	15	61	5	4	0	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.7-2.1	27	46	27	0	0	0	0

TL 66 NW 88 6186 6620 Rose Hall, Exning

Surface level (c.+15.2 m)c.+50 ft
 Water struck at (c.+14.7 m)c.+48 ft
 Hand auger 152 mm diameter
 June 1979

Waste 1.3 m
 Bedrock 0.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Alluvium	Clay, grey, silty	1.3	1.3
Lower Chalk	Chalk, greyish white	0.3+	1.6

TL 66 NE 83 6578 6773 Foxburrow Plantation, Chippenham

Block D

Surface level (+27.7 m) +91 ft
 Water not encountered
 February 1979

Overburden 0.4 m
 Mineral 2.4 m
 Bedrock 0.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4
Third Terrace	'Very clayey' pebbly sand, fines content increasing with depth Gravel: mainly fine, subrounded flint and chalk Sand: medium with fine and some coarse, mainly quartz with some flint and chalk, pale brown	2.4	2.8
Middle Chalk	Chalk, white	0.2+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
21	67	12	0.4-1.4	11	9	53	6	13	8	0
			1.4-2.8	28	26	38	3	5	0	0
			Mean	21	19	44	4	8	4	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.4-1.4	68	24	7	0	trace	0	0
1.4-2.8	6	12	81	0	1	0	trace
Mean	51	21	28	0	trace	0	0

Surface level (+20.6 m) +68 ft
 Water not encountered
 February 1979

Overburden 0.5 m
 Mineral 1.5 m
 Waste 1.6 m
 Mineral 1.4 m
 Bedrock 2.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown	0.5	0.5
Second Terrace	'Clayey' pebbly sand Gravel: fine to coarse, subangular to subrounded mainly white flint with some black and brown flint, chalk and sandstone Sand: mainly medium with some coarse and fine, iron oxide staining in parts, quartz with flint, brown	1.5	2.0
	Clay, brown to reddish brown, with sand and sporadic fine flint pebbles	1.6	3.6
	'Very clayey' pebbly sand Gravel: fine to coarse, subangular to subrounded flint with some chalk Sand: mainly medium with some fine and coarse, quartz with flint, brown	1.4	5.0
Middle Chalk	Chalk, pale grey	2.0+	7.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
20	69	11	0.5-2.0	19	19	55	1	4	2	0
			2.0-3.6	Clay						
			3.6-5.0	21	8	52	3	8	8	0
			Mean	20	14	53	2	6	5	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-2.0	12	46	8	0	3	31	0
3.6-5.0	30	64	5	0	trace	1	0
Mean	24	59	6	0	1	10	0

TL 66 NE 85 6657 6758 Sounds Farm, Chippenham

Block D

Surface level (+20.9 m) +69 ft
 Water not encountered
 February 1979

Overburden 0.2 m
 Mineral 1.8 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.2	0.2
Second Terrace	'Very clayey' sandy gravel Gravel: fine to coarse, subangular to subrounded, mainly flint with some chalk and sandstone Sand: medium with fine and some coarse, quartz with some flint and chalk, pale brown	1.8	2.0
Middle Chalk	Chalk, white	1.0+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
29	51	20	0.2-2.0	29	19	27	5	12	8	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.2-2.0	54	22	18	0	1	5	0

TL 66 NE 86 6793 6867 Shambles Plantation, Chippenham

Block D

Surface level (+22.0 m) +72 ft
 Water not encountered
 February 1979

Overburden 0.1 m
 Mineral 2.4 m
 Waste 0.8 m
 Bedrock 0.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, greyish brown	0.1	0.1
Third Terrace	'Clayey' pebbly sand Gravel: fine to coarse, angular to subrounded, mainly flint with some chalk, quartz, quartzite and sandstone Sand: medium with fine and some coarse, mainly quartz with flint, brown becoming reddish brown	2.4	2.5
	Clay, reddish brown, sandy	0.8	3.3
Middle Chalk	Chalk, white	0.2+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
17	65	18	0.1-1.1	17	16	41	5	13	8	0
			1.1-2.5	16	11	51	5	12	5	0
			Mean	17	13	47	5	12	6	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.1-1.1	51	35	4	0	8	2	0
1.1-2.5	19	73	0	0	0	8	0
Mean	34	55	2	0	4	5	0

TL 66 NE 87 6825 6939 Heath Plantation, Chippenham

Block D

Surface level (+23.0 m) +75 ft
 Water not encountered
 March 1979

Overburden 0.6 m
 Mineral 2.3 m
 Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.6	0.6
Third Terrace	'Very clayey' pebbly sand Gravel: fine to coarse, well-rounded to subangular, predominantly patinated flint with some sanstone Sand: medium with fine and some coarse, mainly quartz with flint, brown	2.3	2.9
Middle Chalk	Chalk, white	0.6+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
24	67	9	0.6-2.9	24	15	50	2	4	5	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.6-2.9	5	91	0	0	0	4	0

Surface level (+35.4 m) +116 ft
 Water struck at (+30.5 m) +100 ft
 March 1979

Overburden 0.3 m
 Mineral 9.7 m
 Waste 2.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, pale brown	0.3	0.3
Fourth Terrace	'Clayey' pebbly sand; gravel absent between 1.2 m and 6.1 m Gravel: fine to coarse, subrounded, predominantly flint with some sandstone, chalk, quartz and quartzite Sand: mainly medium with fine and some coarse, mainly quartz with some flint and chalk brown	9.7	10.0
Boulder Clay	Clay, grey, laminated and silty	2.0+	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 mm
13	80	7	0.3-1.2	19	23	48	4	4	2	0
			1.2-3.1	15	23	61	1	0	0	0
			3.1-5.4	13	26	60	1	0	0	0
			5.4-6.1	15	17	67	1	0	0	0
			6.1-10.0	11	13	52	10	11	3	0
			Mean	13	19	56	5	5	2	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.3-1.2	3	78	0	trace	2	17	0
6.1-10.0	73	14	2	trace	3	8	0
Mean	67	20	2	trace	3	8	0

Surface level (+31.1 m) +102 ft
 Water not encountered
 March 1979

Overburden 0.4 m
 Mineral 1.7 m
 Bedrock 0.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4
Head Gravel	'Clayey' pebbly sand Gravel: fine to coarse, subangular to subrounded, mainly patinated flint with chalk and some sandstone Sand: medium with fine and some coarse, mainly quartz with flint and chalk, brown	1.7	2.1
Middle Chalk	Chalk, white	0.9+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
18	71	11	0.4-2.1	18	26	42	3	5	6	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.4-2.1	0	79	15	0	trace	6	0

TL 66 NE 90 6962 6858 Halfmoon Plantation, Kennett

Block D

Surface level (+25.6 m) +84 ft
 Water not encountered
 March 1979

Overburden 0.3 m
 Mineral 4.7 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.3	0.3
Third Terrace	'Very clayey' pebbly sand; high fines content in the lower 2.0 m Gravel: fine to coarse, subangular to subrounded, mainly medium with fine and some coarse, quartz with flint and chalk, reddish brown Sand: mainly medium with fine and some coarse, quartz with flint and chalk, reddish brown	4.7	5.0
Middle Chalk	Chalk, white	1.0+	6.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
32	58	10	0.3-3.0	26	17	46	4	6	1	0
			3.0-5.0	41	13	28	3	7	8	0
			Mean	32	15	39	4	6	4	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.3-3.0	13	69	1	0	1	16	0
3.0-5.0	3	89	1	trace	1	6	0
Mean	7	81	1	0	1	10	0

Surface level (+31.5 m) +103 ft
 Water not encountered
 March 1979

Overburden 0.3 m
 Mineral 2.9 m
 Bedrock 0.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.3	0.3
Fourth Terrace	'Very clayey' sandy gravel Gravel: fine to coarse, well rounded to subangular, predominantly flint with chalk and some quartz, quartzite and sandstone Sand: medium with fine and coarse, mainly quartz with some flint, brown	2.9	3.2
Middle Chalk	Chalk, white	0.8+	4.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
27	51	22	0.3-1.3	27	12	32	11	11	7	0
			1.3-3.2	26	11	29	10	15	9	0
			Mean	27	11	30	10	14	8	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.3-1.3	8	47	34	1	3	7	0
1.3-3.2	14	56	24	0	1	4	1
Mean	12	53	27	trace	2	5	1

Surface level (+18.8 m) +62 ft
 Water not encountered
 March 1979

Overburden 1.0 m
 Mineral 1.0 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil,	0.5	0.5
	Made ground, brownish white, chalk and soil	0.5	1.0
Second Terrace	'Very clayey' sand, with a high proportion of chalky fines Sand: fine and medium, quartz with some flint and chalk, pale brown	1.0	2.0
Middle Chalk	Chalk, white	1.0+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
28	72	0	1.0-2.0	28	32	40	0	0	0	0

TL 66 NE 93

6742 6731

Sounds Plantation, Chippenham

Block D

Surface level (+25.8 m) +85 ft
 Water not encountered
 March 1979

Overburden 0.3 m
 Mineral 2.8 m
 Bedrock 0.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.3	0.3
Third Terrace	'Very clayey' sandy gravel Gravel: fine to coarse, subangular flint with some chalk and sandstone Sand: medium with fine and some coarse, quartz with some flint and chalk, pale brown	2.8	3.1
Middle Chalk	Chalk, white	0.4+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
23	57	20	0.3-3.1	23	16	36	5	13	7	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.3-3.1	13	74	8	0	trace	5	0

TL 66 NE 94 6950 6973 North of Grange Farm, Kennett

Block D

Surface level (+20.2 m) +66 ft
Water not encountered
March 1979

Overburden 0.5 m
Mineral 3.0 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground, dark brown, mainly soil with sand and clay	0.5	0.5
Second Terrace	Sandy gravel Gravel: fine to coarse with some cobbles, angular to subangular, predominantly flint Sand: medium with coarse and some fine, quartz with flint, brown	3.0	3.5
Middle Chalk	Chalk, white	0.5+	4.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	$+\frac{1}{16}$ - $\frac{1}{4}$	$+\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
2	61	37	0.5-2.5	2	9	45	14	15	15	0
			2.5-3.5	2	4	26	16	23	29	0
			Mean	2	8	39	14	17	20	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-2.5	52	46	0	2	0	0	0
2.5-3.5	95	3	1	trace	1	0	trace
Mean	70	28	1	1	trace	0	0

TL 66 NE 95 6978 6522 Trinity Hall Farm, Moulton

Block D

Surface level (c.+35.0 m)c.+115 ft
Water not encountered
Hand auger 152 mm diameter
June 1979

Overburden 0.1 m
Mineral 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, pale brown	0.1	0.1
Third Terrace	Gravel Gravel: fine to coarse with cobbles, well rounded to subrounded, predominantly flint in the coarse fraction and flint with some chalk in the fine fraction Sand: medium with fine and coarse, mainly quartz with flint and chalk, brown	1.0+	1.1
Borehole abandoned at 1.1 m due to obstruction by flint cobbles			

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	$+\frac{1}{16}$ - $\frac{1}{4}$	$+\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
5	37	58	0.1-1.1	5	7	22	8	21	37	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.1-1.1	49	43	5	1	1	0	1

TL 66 NE 96 6953 6515 Trinity Hall Farm, Moulton Block D

Surface level (c.+41.0 m)c.+135 ft Waste 0.6 m
 Water not encountered Bedrock 0.1 m+
 Hand auger 152 mm diameter
 June 1979

LOG

Geological classification	Lithology	Thickness m	Depth m
Fourth Terrace	Clay, brown, pebbly and sandy	0.6	0.6
Middle Chalk	Chalk, white	0.1+	0.7

TL 66 NE 97 6915 6559 Near Trinity Hall Farm, Moulton Block D

Surface level (c.+61.0 m)c.+200 ft Waste 4.0 m+
 Water not encountered
 Hand auger 152 mm diameter
 June 1979

LOG

Geological classification	Lithology	Thickness m	Depth m
Glacial Loam	Silt, pale brown, sandy with rare fine flint pebbles	4.0+	4.0

Borehole abandoned at 4.0 m due to ground being too hard and compact for hand auger drilling

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	$+\frac{1}{16}$ - $\frac{1}{4}$	$+\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
51	48	1	0.0-4.0	51	16	31	1	1	0	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.0-4.0	75	11	0	0	0	0	14

TL 67 NW 35 6053 7959 Great Fen Drove, Soham

Surface level (+0.3 m) +1 ft Waste 2.0 m
 Water struck at (-0.7 m)-2 ft Bedrock 1.5 m+
 March 1979

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black	2.0	2.0
Woburn Sand (Lower Greensand)	Sand, khaki green, clayey and silty, fine to medium mainly quartz with some glauconite, iron-cemented sandstone, flint and pyrite	1.5+	3.5

TL 67 NW 36 6063 7873 Mettleham Farm, Soham

Surface level at OD Waste 1.5 m
 Water struck at (-4.0 m)-13 ft Bedrock 3.5 m+
 March 1979

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black	0.6	0.6
First Terrace	'Clayey' pebbly sand Gravel: fine to coarse, angular to subrounded, predominantly flint with some chalk, quartz, quartzite and sandstone Sand: mainly medium with coarse and some fine, quartz with some flint and chalk, yellowish brown	0.9	1.5
Woburn Sand (Lower Greensand)	Sand, khaki-green, mainly quartz and flint with some glauconite and chalk	3.5+	5.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
17	66	17	0.6-1.5	17	9	42	15	13	4	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.6-1.5	8	76	2	0	8	6	0

TL 67 NW 37 6054 7773 North of Slack Hill, Soham

Surface level (+0.6 m) +2 ft
 Water not encountered
 March 1979

Waste 3.0 m
 Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, clayey and pebbly	0.6	0.6
First Terrace	Clay, pale grey, silty with sporadic angular to subrounded grey flint	2.4	3.0
Gault	Clay, bluish grey	0.5+	3.5

TL 67 NW 38 6055 7628 Longfield Farm, Soham

Block A

Surface level (+0.2 m) +1 ft
 Water not encountered
 March 1979

Waste 1.7 m
 Bedrock 0.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, clayey and pebbly	0.6	0.6
First Terrace	Clay, brown, with fine well rounded flint and chalk pebbles	1.1	1.7
Gault	Clay, greyish blue	0.3+	2.0

TL 67 NW 39 6015 7526 West of Little Hasse Farm, Soham

Block A

Surface level (+4.1 m) +14 ft
 Water not encountered
 March 1979

Overburden 0.5 m
 Mineral 1.0 m
 Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.5	0.5
Second Terrace	'Clayey' gravel Gravel: fine to coarse, subangular to subrounded, mainly flint with chalk, quartz and quartzite Sand: medium with fine and coarse, quartz with some flint and chalk, yellowish brown	1.0	1.5
Gault	Clay, greyish blue	0.5+	2.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
15	41	44	0.5-1.5	15	10	20	11	22	22	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-1.5	28	64	3	trace	2	0	3

TL 67 NW 40 6176 7984 Near Lark Hill Farm, Soham

Surface level (+0.9 m) +3 ft Waste 2.3 m
 Water not encountered Bedrock 1.2 m+
 March 1979

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black becoming brown, fibrous	2.3	2.3
Gault	Clay, bluish grey	1.2+	3.5

TL 67 NW 41 6156 7874 Sixteen Foot Drain, Isleham

Surface level (+0.3 m) +1 ft Waste 2.5 m
 Water struck at (-1.8 m)-6 ft Bedrock 0.5 m+
 March 1979

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black becoming brown, fibrous, sporadic pebbles	2.1	2.1
First Terrace	'Clayey' pebbly sand Gravel: fine to coarse, angular to subrounded, predominantly flint with chalk and some quartz and quartzite Sand: mainly medium with fine and coarse, quartz with some flint, silty in parts, grey	0.4	2.5
Gault	Clay, bluish grey	0.5+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
12	67	21	2.1-2.5	12	10	44	13	13	8	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
2.1-2.5	47	45	6	0	2	0	0

Surface level at OD
Water not encountered
March 1979

Overburden 0.3 m
Mineral 2.8 m
Bedrock 0.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, clayey with sporadic pebbles	0.3	0.3
First Terrace	'Clayey' sandy gravel Gravel: fine to coarse, angular to subrounded, predominantly flint with some chalk and sandstone Sand: medium with coarse and fine, flint and quartz with some chalk, yellowish brown	2.8	3.1
Gault	Clay, greyish blue	0.4+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
15	51	34	0.3-1.3	17	9	37	7	18	12	0
			1.3-3.1	13	7	35	8	18	19	0
			Mean	15	8	36	7	18	16	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction							
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others	
	Black/Brown	White						
0.3-1.3	33	49	6	trace	1	2	9	
1.3-3.1	75	16	5	1	1	0	2	
Mean	62	26	5	1	1	2	3	

Surface level (+1.2 m) +4 ft
Water struck at (-0.5 m)-2 ft
March 1979

Overburden 0.4 m
Mineral 2.6 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, black	0.4	0.4
First Terrace	'Clayey' sandy gravel Gravel: fine to coarse, subrounded to subangular, predominantly flint with some sandstone Sand: mainly medium with fine and coarse, quartz with some flint, yellowish brown	2.6	3.0
Gault	Clay, grey	1.0+	4.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
17	57	26	0.4-1.4	15	7	38	10	17	13	0
			1.4-3.0	19	13	39	6	13	10	0
			Mean	17	11	39	7	15	11	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction								
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others		
	Black/Brown	White							
0.4-1.4	28	64	2	2	1	3	0		
1.4-3.0	5	88	1	0	trace	6	0		
Mean	15	77	1	1	1	5	0		

TL 67 NW 44 6253 7933 Lark Hall Farm, Isleham

Surface level (+0.6 m) +2 ft	Waste	0.6 m
Water struck at (-0.7 m) -2 ft	Bedrock	2.9 m+
March 1979		

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, clayey with some gastropod shells	0.6	0.6
Woburn Sand (Lower Greensand)	Sand, khaki green, silty and clayey, mainly fine to medium quartz with glauconite grains and sporadic pebbles of flint and ferruginous sandy concretions	2.9+	3.5

TL 67 NW 45 6260 7848 Spooner's Drove, Isleham

Block B

Surface level (-0.9 m) -3 ft	Overburden	0.6 m
Water not encountered	Mineral	1.5 m
March 1979	Bedrock	1.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, clayey	0.6	0.6
First Terrace	'Very clayey' sand, fine and medium with some coarse, mainly quartz with some flint and chalk, brown	1.5	2.1
Gault	Clay, grey	1.4+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
24	76	0	0.6-2.1	24	41	33	2	0	0	0

TL 67 NW 46 6270 7779 Ash Drove, Isleham

Block B

Surface level (-0.6 m) -2 ft
 Water not encountered
 March 1979

Overburden 0.4 m
 Mineral 1.6 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, clayey	0.4	0.4
First Terrace	'Clayey' pebbly sand Gravel: fine to coarse, subangular to subrounded, predominantly flint with some quartz, quartzite and sandstone Sand: medium with fine and some coarse, mainly quartz with some flint and chalk, brown	1.6	2.0
Gault	Clay, grey	1.0+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
13	72	15	0.4-2.0	13	16	51	5	10	5	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.4-2.0	47	43	1	0	3	6	0

TL 67 NW 47 6220 7692 Windy Hill, Isleham

Block B

Surface level at OD
 Water struck at (-3.4 m) -11 ft
 March 1979

Overburden 2.0 m
 Mineral 3.0 m
 Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, clayey	2.0	2.0
First Terrace	'Clayey' pebbly sand, with a high fines content in the upper 1.4 m Gravel: fine to coarse, well-rounded to subangular, predominantly flint with some chalk, quartz and quartzite Sand: dominantly medium with some fine and coarse, quartz with some flint and chalk, pale grey	3.0	5.0
Gault	Clay, grey	0.5+	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 mm
13	68	19	2.0-3.4	21	3	63	3	5	5	0
			3.4-4.4	6	7	49	3	14	21	0
			4.4-5.0	5	10	64	5	10	6	0
			Mean	13	6	58	4	9	10	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction							
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others	
	Black/Brown	White						
2.0-3.4	45	40	11	0	3	0	1	
3.4-4.4	61	27	6	0	6	0	trace	
4.4-5.0	54	27	14	0	3	0	2	
Mean	56	30	9	0	5	0	trace	

TL 67 NW 48 6224 7593 White Hall, Isleham

Block A

Surface level (+0.3 m) +1 ft
 Water struck at (-1.7 m) -6 ft
 March 1979

Overburden 0.6 m
 Mineral 2.9 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, black	0.6	0.6
First Terrace	'Clayey' pebbly sand, with the highest fines content in the lower 0.9 m Gravel: mainly fine with some coarse, subangular to well-rounded flint with chalk and some sandstone Sand: mainly medium with fine and some coarse, quartz with some flint and chalk, 'clayey' in parts, pale brown	2.9	3.5
Gault	Clay, bluish grey	1.0+	4.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ - 1	+1 - 4	+4 - 16	+16 - 64	+64 mm
11	78	11	0.6-1.6	10	30	52	4	4	0	0
			1.6-2.6	6	18	50	9	15	2	0
			2.6-3.5	17	13	45	11	13	1	0
			Mean	11	21	49	8	10	1	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.6-1.6	28	51	18	2	0	1	0
1.6-2.6	14	52	33	0	0	1	0
2.6-3.5	19	41	28	1	4	7	0
Mean	18	48	29	1	1	3	0

TL 67 NW 49 6211 7514 Black Hall, Isleham Block A

Surface level (+1.8 m) +6 ft Waste 3.0 m
 Water not encountered Bedrock 0.5 m+
 March 1979

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, clayey	1.0	1.0
First Terrace	Clay, brown, with some fine angular to well-rounded flint and chalk pebbles, and some mainly medium quartz, flint and chalk sand	2.0	3.0
Lower Chalk	Chalk, grey	0.5+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand		Gravel			
				- $\frac{1}{16}$	$+\frac{1}{16}$ - $\frac{1}{4}$	$+\frac{1}{4}$ - 1	+1 - 4	+4 - 16	+16 - 64	+64 mm
54	42	4	1.0-3.0	54	7	31	4	3	1	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
1.0-3.0	34	29	22	0	0	15	0

Surface level (+0.6 m) +2 ft
 Water not encountered
 March 1979

Overburden 0.6 m
 Mineral 2.4 m
 Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, silty and sandy	0.6	0.6
First Terrace	Pebbly sand Gravel: mainly fine with some coarse, subrounded to sub angular, mainly flint, some chalk ironstone, quartz, quartzite and sandstone Sand: mainly medium with fine and some coarse, quartz with some flint and chalk, brown	2.4	3.0
Gault	Clay, grey	0.5+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- $\frac{1}{16}$	$+\frac{1}{16}$ - $\frac{1}{4}$	$+\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
5	89	6	0.6-1.6	6	35	50	3	4	2	0
			1.6-3.0	3	24	61	5	6	1	0
			Mean	5	29	56	4	5	1	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.6-1.6	26	14	6	1	21	32	0
1.6-3.0	20	49	6	7	3	1	14
Mean	22	36	6	5	10	12	9

Surface level (+0.2 m) +1 ft
 Water struck at (-0.6 m) -2 ft
 March 1979

Overburden 0.6 m
 Mineral 1.4 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, clayey	0.6	0.6
First Terrace	'Clayey' pebbly sand Gravel: fine with some coarse, angular to subrounded, mainly flint with chalk, ironstone, sandstone, quartz and quartzite Sand: mainly medium with fine and coarse, quartz with some flint, brown	1.4	2.0
Gault	Clay, grey	1.0+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
11	75	14	0.6-2.0	11	13	52	10	11	3	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.6-2.0	58	19	6	8	3	5	1

TL 67 NW 52 6326 7743 Baskeybay, Isleham

Block B

Surface level (-0.3 m) -1 ft
Water struck at (-1.3 m) -4 ft
March 1979

Overburden 0.4 m
Mineral 1.6 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, some pebbles	0.4	0.4
First Terrace	Pebbly sand Gravel: fine with some coarse, angular to well-rounded, predominantly flint with sporadic quartz and quartzite and rare chalk and ironstone Sand: medium with fine and some coarse, mainly quartz with some flint and chalk, brown	1.6	2.0
Gault	Clay, grey	1.0+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
5	73	22	0.4-2.0	5	15	52	6	15	7	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.4-2.0	43	35	7	10	3	0	2

TL 67 NW 53 6355 7652 Black Drove, Isleham

Block B

Surface level (-0.2 m) -1 ft
 Water not encountered
 March 1979

Overburden 1.3 m
 Mineral 0.9 m
 Bedrock 1.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black	1.3	1.3
First Terrace	'Very clayey' sandy gravel Gravel: fine to coarse, well rounded to subrounded, mainly flint with chalk and some quartz and quartzite Sand: mainly medium with some fine and coarse, quartz with some chalk and flint; brown	0.9	2.2
Lower Chalk	Clay, grey, chalky	1.0	3.2
	Chalk, greyish white	0.3+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand		Gravel			
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
25	56	19	1.3-2.2	25	6	44	6	11	8	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
1.3-2.2	43	30	18	0	9	0	trace

TL 67 NW 54 6340 7594 Black Drove, Isleham

Block B

Surface level (+0.3 m) +1 ft
 Water not encountered
 March 1979

Overburden 2.4 m
 Mineral 1.0 m
 Bedrock 1.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black	2.4	2.4
First Terrace	'Clayey' pebbly sand Gravel: fine with coarse, angular to subrounded, predominantly flint with sporadic chalk and some quartz, and quartzite Sand: mainly medium with fine and some coarse, quartz with some flint and chalk; brown	1.0	3.4
Lower Chalk	Chalk, grey	1.1+	4.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
12	69	19	2.4-3.4	12	13	52	4	11	8	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction							
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others	
	Black/Brown	White						
2.4-3.4	18	74	4	1	2	1	0	

TL 67 NW 55 6296 7503 West Fen Drove, Isleham Block A

Surface level (+1.0 m) +3 ft Overburden 0.5 m
 Water not encountered Mineral 2.1 m
 March 1979 Bedrock 1.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, black	0.5	0.5
First Terrace	'Clayey' sand Gravel: mainly fine, well rounded to subangular, mainly flint with chalk Sand: fine with medium and some coarse, mainly quartz with flint and chalk, yellowish brown	2.1	2.6
Lower Chalk	Chalk, pale grey	1.4+	4.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
13	85	2	0.5-1.5	14	77	6	2	1	0	0
			1.5-2.6	11	23	56	6	4	0	0
			Mean	13	49	32	4	2	0	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction							
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others	
	Black/Brown	White						
0.5-1.5	13	43	41	2	1	0	0	
1.5-2.6	31	33	29	0	1	1	5	
Mean	29	34	30	trace	1	1	5	

Surface level (+0.4 m) +1 ft
 Water struck at (-1.1 m) -4 ft
 March 1979

Overburden 0.5 m
 Mineral 2.5 m
 Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, clayey	0.5	0.5
First Terrace	Sand with some gravel Gravel: mainly fine, subrounded to subangular, flint with chalk, ironstone, sandstone, quartz and quartzite Sand: medium with fine and some coarse, quartz with some flint and chalk, brown	2.5	3.0
Gault	Clay, grey	0.5+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
8	89	3	0.5-1.5	9	35	54	2	0	0	0
			1.5-3.0	7	30	56	2	4	1	0
			Mean	8	32	55	2	2	1	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
1.5-3.0	28	12	14	20	7	12	7

Surface level (+1.1 m) +4 ft
 Water struck at (-1.1 m) -4 ft
 March 1979

Overburden 1.0 m
 Mineral 2.5 m
 Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, black	1.0	1.0
First Terrace	Pebbly sand Gravel: predominantly fine, well rounded to subangular, mainly flint with some chalk, ironstone, quartz and quartzite Sand: medium with fine and some coarse, quartz with some flint and chalk, silty and clayey in parts, yellowish brown	2.5	3.5
Lower Chalk	Chalk, white	0.5+	4.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
8	85	7	1.0-2.0	14	12	53	9	11	1	0
			2.0-3.0	4	20	65	5	6	0	0
			3.0-3.5	4	25	66	5	0	0	0
			Mean	8	18	61	6	7	0	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction								
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others		
	Black/Brown	White							
1.0-2.0	53	30	11	2	3	0	1		
2.0-3.0	56	33	8	2	1	0	0		
Mean	54	31	10	2	2	0	1		

TL 67 NW 58

6445 7770

Delph Drove, Mildenhall

Block B

Surface level (+0.6 m) +2 ft
Water not encountered
March 1979

Overburden 0.7 m
Mineral 2.7 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, clayey	0.7	0.7
First Terrace	'Clayey' sand with sporadic gravel Gravel: mainly fine with some coarse, subangular to subrounded, predominantly flint with some chalk, sandstone, ironstone, quartz and quartzite Sand: mainly medium with fine and some coarse, quartz, flint and chalk, becoming more chalky with depth, orange-brown	2.7	3.4
Lower Chalk	Chalk, grey	0.6+	4.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
14	83	3	0.7-1.7	7	34	55	2	2	0	0
			1.7-3.4	18	21	55	3	2	1	0
			Mean	14	26	55	2	2	1	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.7-1.7	28	53	1	0	3	15	0
1.7-3.4	5	83	8	3	1	0	0
Mean	11	75	6	2	2	4	0

TL 67 NW 59	6429 7669	Hayland Drove, Mildenhall	Block B
Surface level (+1.0 m) +3 ft			Overburden 0.6 m
Water not encountered			Mineral 2.4 m
March 1979			Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, clayey with sand and sporadic flint pebbles	0.6	0.6
First Terrace	'Clayey' sandy gravel Gravel: fine to coarse, angular to well rounded, mainly flint with some chalk, quartz and quartzite Sand: mainly medium with some fine and coarse, mainly quartz with flint and chalk, yellowish brown becoming pale brown	2.4	3.0
Lower Chalk	Chalk, greyish white	0.5+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
14	56	30	0.6-1.6	No data						
			1.6-3.0	14	5	43	8	18	12	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
1.6-3.0	62	16	8	0	13	0	1

Surface level (+0.5 m) +2 ft
 Water struck at (-1.7 m) -6 ft
 March 1979

Overburden 2.2 m
 Mineral 2.3 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black	2.2	2.2
First Terrace	'Clayey' pebbly sand Gravel: fine with some coarse, well rounded to rounded, mainly flint with chalk Sand: mainly medium with some fine and coarse, quartz with some flint and chalk, grey	2.3	4.5
Gault	Clay, bluish grey	1.0+	5.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{3}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
15	69	16	2.2-3.2	17	13	43	12	13	2	0
			3.2-4.5	15	10	49	9	15	2	0
			Mean	15	12	47	10	14	2	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction							
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others	
	Black/Brown	White						
2.2-3.2	30	30	39	0	1	0	0	
3.2-4.5	39	30	28	1	1	0	1	
Mean	35	30	33	1	1	0	trace	

Surface level (+2.0 m) +7 ft
 Water not encountered
 March 1979

Overburden 0.5 m
 Mineral 1.0 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, black	0.5	0.5
First Terrace	'Very clayey' sandy gravel Gravel: fine with some coarse, angular to subrounded, mainly flint with some chalk Sand: medium with fine and some coarse, mainly quartz with chalk, and some flint, pale grey	1.0	1.5
Lower Chalk	Chalk, greyish white	1.0+	2.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
24	56	20	0.5-1.5	24	11	39	6	13	7	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-1.5	32	49	18	0	1	0	0

TL 67 NW 62 6159 7641 Great Hasse Farm, Soham Block A

Surface level (+0.9 m) +3 ft Overburden 0.6 m
 Water struck at (+0.4 m) +1 ft Mineral 1.3 m
 March 1979 Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, clayey with sporadic flint pebbles	0.6	0.6
First Terrace	Pebbly sand Gravel: fine with sporadic coarse, angular to subrounded mainly flint with some chalk, ironstone and sandstone Sand: mainly medium with fine and coarse, quartz with flint and chalk, yellowish brown	1.3	1.9
Gault	Clay, bluish grey	0.6+	2.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
2	74	24	0.6-1.9	2	14	44	16	23	1	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.6-1.9	18	54	10	12	1	5	0

Surface level (+0.6 m)+2 ft
 Water struck at (-1.3 m)-4 ft
 March 1979

Overburden 1.9 m
 Mineral 1.1 m
 Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, becoming brown, fibrous	1.9	1.9
First Terrace	Sand, with sporadic pebbles Gravel: fine, subangular to well rounded, predominantly patinated flint with some chalk Sand: fine and coarse, mainly quartz with some flint and chalk, brown	1.1	3.0
Gault	Clay, bluish grey	0.5+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	$+\frac{1}{16}$ - $\frac{1}{4}$	$+\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
4	95	1	1.9-3.0	4	14	80	1	1	0	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
1.9-3.0	0	88	4	0	0	0	8

Surface level (+1.8 m)+6 ft
 Water struck at (+1.1 m)+4 ft
 March 1979

Overburden 0.5 m
 Mineral 1.2 m
 Bedrock 0.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown	0.5	0.5
First Terrace	Sand Gravel: fine, well rounded to subangular, mainly flint with chalk and sandstone and some ironstone, quartz and quartzite Sand: mainly medium with some fine and coarse, quartz with some flint and chalk, brown	1.2	1.7
Lower Chalk	Chalk, greyish white	0.8+	2.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
4	94	2	0.5-1.7	4	23	68	3	2	0	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-1.7	14	45	20	3	3	15	0

TL 67 NE 27

6576 7849

New Drove, Mildenhall

Block C

Surface level (+1.8 m) +6 ft
Water struck at (+1.3 m) +4 ft
March 1979

Overburden 0.3 m
Mineral 4.4 m
Bedrock 0.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.3	0.3
First Terrace	Sand, mainly medium with some fine and coarse, mainly quartz, brown	4.4	4.7
Lower Chalk	Chalk, greyish white	0.3+	5.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
1	99	0	0.3-1.3	2	23	74	1	0	0	0
			1.3-3.3	1	25	73	1	0	0	0
			3.3-4.7	1	28	69	2	0	0	0
			Mean	1	26	72	1	0	0	0

TL 67 NE 28 6555 7738 Cooks Drove, Mildenhall

Block B

Surface level (+1.5 m) +5 ft
 Water struck at (+0.5 m) +2 ft
 March 1979

Overburden 0.4 m
 Mineral 1.6 m
 Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4
First Terrace	Sand, mainly medium with fine and some coarse, quartz with some flint and chalk, yellowish brown	1.6	2.0
Lower Chalk	Chalk, white	0.5+	2.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
8	92	0	0.4-2.0	8	23	65	4	0	0	0

TL 67 NE 29 6522 7692 Hayland Drove, Mildenhall

Block B

Surface level (+1.5 m) +5 ft
 Water not encountered
 March 1979

Overburden 0.4 m
 Mineral 1.5 m
 Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4
First Terrace	'Clayey' sand, medium with fine and some coarse, mainly quartz with some flint and chalk fines, yellowish brown	1.5	1.9
Lower Chalk	Chalk, pale grey	0.6+	2.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
19	81	0	0.6-1.9	19	33	45	3	0	0	0

TL 67 NE 30	6601 7933	North-west of Hurdle Drove, Mildenhall	Block C
Surface level (+1.8 m) +6 ft			Overburden 0.6 m
Water struck at (+1.1 m) +4 ft			Mineral 3.7 m
March 1979			Bedrock 0.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, clayey	0.6	0.6
First Terrace	Sand, mainly medium with fine and some coarse, quartz with flint and chalk, brown	3.7	4.3
Lower Chalk	Chalk, greyish white	0.7+	5.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
5	95	0	0.6-1.2	9	38	52	1	0	0	0
			1.2-3.2	5	29	65	1	0	0	0
			3.2-4.3	4	26	69	1	0	0	0
			Mean	5	30	64	1	0	0	0

TL 67 NE 31	6684 7895	Starvegut Hall, Mildenhall	Block C
Surface level (+2.1 m) +7 ft			Overburden 0.5 m
Water struck at (+1.4 m) +5 ft			Mineral 3.0 m
March 1979			Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.5	0.5
First Terrace	Sand, predominantly medium with fine and some coarse, quartz with some flint and chalk, brown	3.0	3.5
Lower Chalk	Chalk, greyish white	0.5+	4.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
4	96	0		0.5-2.5	4	21	73	2	0	0
			2.5-3.5	3	11	83	3	0	0	0
			Mean	4	18	76	2	0	0	0

TL 67 NE 32

6662 7768

Highpost Farm, Mildenhall

Block C

Surface level (+1.8 m) +6 ft
 Water struck at (0.8 m) +3 ft
 March 1979

Overburden 0.6 m
 Mineral 5.4 m
 Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.6	0.6
First Terrace	Sand Gravel: fine, subangular to subrounded, chalk with flint Sand: medium with fine and some coarse, mainly quartz with some flint and chalk, pale brown	5.4	6.0
Lower Chalk	Chalk, white	0.5+	6.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
5	94	1		0.6-2.6	6	27	66	1	0	0
			2.6-4.6	5	25	65	3	2	0	0
			4.6-6.0	3	25	67	5	0	0	0
			Mean	5	25	66	3	1	0	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
2.6-4.6	20	19	58	0	0	0	3

Surface level (+1.8 m) +6 ft
 Water struck at (+1.1 m) +4 ft
 March 1979

Overburden 0.5 m
 Mineral 4.0 m
 Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, pale brown	0.5	0.5
First Terrace	Sand with some gravel Gravel: fine with some coarse, rounded to subangular, chalk and flint Sand: predominantly medium with fine and some coarse, quartz with some flint and chalk, pale brown	4.0	4.5
Lower Chalk	Chalk, grey	0.5+	5.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ - 1	+1 - 4	+4 - 16	+16 - 64	+64 mm
5	91	4	0.5-2.5	5	23	66	3	2	1	0
			2.5-4.5	4	12	76	3	3	2	0
			Mean	5	17	71	3	3	1	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction							
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others	
	Black/Brown	White						
0.5-2.5	51	40	2	5	0	0	2	
2.5-4.5	5	4	90	0	1	0	1	
Mean	23	18	55	2	1	0	1	

Surface level (+3.0 m) +10 ft
 Water struck at (2.4 m) +8 ft
 March 1979

Overburden 0.6 m
 Mineral 5.0 m
 Bedrock 0.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.6	0.6
Second Terrace	Sand Gravel: fine, well rounded chalk with some subangular to subrounded flint Sand: medium with fine and some coarse, mainly quartz with flint and chalk, brown	5.0	5.6
Lower Chalk	Chalk, greyish white	0.4+	6.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
6	93	1	0.6-2.6	No data						
			2.6-4.6	6	20	72	2	0	0	0
			4.6-5.6	6	29	59	3	3	0	0
			Mean	6	23	68	2	1	0	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
4.6-5.6	6	24	70	0	0	0	0

TL 67 NE 35

6875 7943

Near Skeltons Plantation, Mildenhall

Block C

Surface level (+2.1 m) +7 ft
 Water struck at (+0.5 m) +2 ft
 March 1979

Overburden 0.6 m
 Mineral 3.4 m
 Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.6	0.6
First Terrace	Sand, predominantly medium with fine and some coarse, mainly quartz with some flint and chalk, pale brown	3.4	4.0
Lower Chalk	Chalk, white	0.5+	4.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
3	97	0	0.6-2.6	4	17	77	2	0	0	0
			2.6-4.0	2	20	77	1	0	0	0
			Mean	3	18	77	2	0	0	0

TL 67 NE 36 6873 7848 Skeltons Drove, Mildenhall

Block C

Surface level (+2.7 m) +9 ft
Water struck at (+1.1 m) +4 ft
March 1979

Overburden 0.2 m
Mineral 2.7 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.2	0.2
Second Terrace	Sand with some gravel Gravel: fine with some coarse, well rounded to subangular, mainly flint with quartz, quartzite and some chalk and ironstone Sand: predominantly medium with fine and some coarse, quartz with some flint and chalk, brown	2.7	2.9
Lower Chalk	Chalk, white	0.6+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
3	93	4	0.2-2.2	3	20	72	1	2	2	0
			2.2-2.9	4	12	79	2	3	0	0
			Mean	3	18	74	1	2	2	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction							
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others	
	Black/Brown	White						
0.2-2.2	41	22	0	11	26	0	0	
2.2-2.9	20	57	16	0	6	0	1	
Mean	37	29	3	9	22	0	trace	

TL 67 NE 37 6807 7766 North-west of Mildenhall Airfield, Mildenhall

Block C

Surface level (+3.9 m) +13 ft
Water not encountered
March 1979

Overburden 0.4 m
Mineral 2.1 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4
Second Terrace	Pebbly sand Gravel: fine, subangular to subrounded flint with some chalk Sand: mainly medium with fine and some coarse, quartz with some flint and quartz, brown	2.1	2.5
Lower Chalk	Chalk, white	0.5+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				- $\frac{1}{16}$	$+\frac{1}{16}$ - $\frac{1}{4}$	$+\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
5	90	5	0.4-1.4	4	16	70	3	6	1	0
			1.4-2.5	7	25	64	1	2	1	0
			Mean	5	21	67	2	4	1	0

TL 67 NE 38 6954 7982 Hicks House, Mildenhall Block C

Surface level (+1.8 m) +6 ft Overburden 0.5 m
 Water struck at (-0.2 m) -1 ft Mineral 2.5 m
 March 1979 Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.5	0.5
First Terrace	Sand with some fine gravel Gravel: fine, subrounded to subangular, mainly flint with chalk and some quartz and quartzite Sand: medium with fine and some coarse, mainly quartz with some flint and chalk, yellowish brown	2.5	3.0
Lower Chalk	Chalk, greyish white	0.5+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				- $\frac{1}{16}$	$+\frac{1}{16}$ - $\frac{1}{4}$	$+\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
4	93	3	0.5-0.3	4	26	65	2	3	0	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-3.0	32	44	19	1	4	0	0

TL 67 NE 39 6915 7773 Beck Row, Mildenhall

Block C

Surface level (+5.7 m) +19 ft
Water not encountered
March 1979

Overburden 0.5 m
Mineral 2.5 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.5	0.5
Second Terrace	Sand with some pebbles Gravel: mainly fine subangular to well rounded flint and chalk, with quartz, quartzite and sandstone Sand: medium with fine and some coarse mainly quartz with some flint and chalk, yellowish brown	2.5	3.0
Lower Chalk	Chalk, white	0.5+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
9	87	4	0.5-3.0	9	21	64	2	3	1	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-3.0	13	38	29	0	1	19	0

TL 67 NE 40 6960 7870 Near Breach Drove, Mildenhall

Block C

Surface level (+3.0 m) +10 ft
Water struck at (+1.6 m) +5 ft
March 1979

Overburden 0.5 m
Mineral 2.7 m
Bedrock 0.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown	0.5	0.5
Second Terrace	Sand with some fine gravel Gravel: fine, subangular to well rounded, predominantly flint with chalk and some sandstone Sand: predominantly medium with fine and some coarse, quartz with some flint and chalk, yellowish brown	2.7	3.2
Lower Chalk	Chalk, pale grey	0.3+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
4	94	2	0.5-2.5	4	19	72	2	3	0	0
			2.5-3.2	3	13	80	4	0	0	0
			Mean	4	18	74	2	2	0	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-2.5	62	20	12	1	trace	5	0

TL 67 NE 41 6537 7539 Near Ferry Drove, Isleham

Surface level (c.+2.0 m) c.+7 ft
 Water struck at (c+1.0 m)c+3 ft
 Hand auger 152 mm diameter
 June 1979

Waste 3.5 m
 Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black	2.8	2.8
Alluvium	Silt, grey, sandy, some flint pebbles, chalky fines	0.7	3.5
Lower Chalk	Chalk, pale grey	0.5+	4.0

TL 67 SW 14 6014 7395 Thrift Drove, Soham

Block A

Surface level (+3.7 m)+12 ft
 Water not encountered
 March 1979

Overburden 0.4 m
 Mineral 0.9 m
 Bedrock 1.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4

First Terrace	'Clayey' sandy gravel Gravel: fine to coarse, angular to subrounded, mainly flint with some chalk and sandstone Sand: medium with some fine and coarse, mainly quartz with some flint and chalk, yellowish brown	0.9	1.3
Gault	Clay, bluish grey	1.2	2.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
19	49	32	0.4-1.3	19	11	31	7	15	17	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.4-1.3	39	53	4	1	trace	3	0

TL 67 SW 15	6066 7303	Little Bank Drove, Soham	Block A
Surface level (+4.3 m)+14 ft			Overburden 0.5 m
Water not encountered			Mineral 1.5 m
March 1979			Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown	0.5	0.5
First Terrace	Sandy gravel Gravel: fine to coarse, angular to subrounded, predominantly flint with some chalk, ironstone, quartz and quartzite Sand: mainly medium with fine and some coarse, quartz with flint and chalk, yellowish brown	1.5	2.0
Lower Chalk	Chalk, greyish white	0.5+	2.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
9	67	24	0.5-1.5	9	15	47	5	14	10	0
			1.5-2.0	10	15	46	6	13	10	0
			Mean	9	15	47	5	14	10	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-1.5	23	65	4	2	4	2	0
1.5-2.0	24	68	6	1	1	trace	0
Mean	23	66	5	2	3	1	0

TL 67 SW 16

6078 7215

Green Hills, Soham

Block A

Surface level (+5.2 m)+17 ft
Water not encountered
March 1979

Overburden 0.4 m
Mineral 2.1 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4
Second Terrace	'Clayey' sandy gravel Gravel: fine to coarse, angular to subrounded, predominantly flint with some chalk Sand: mainly medium with fine and some coarse, quartz with some flint and chalk, yellowish brown	2.1	2.5
Lower Chalk	Chalk, greyish white	1.0+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
18	51	31	0.4-2.5	18	11	33	7	14	17	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.4-2.5	30	65	3	trace	1	1	0

TL 67 SW 17 6106 7486 Random Farm, Soham

Block A

Surface level (+3.0 m)+10 ft
Water struck at (+2.0 m)+7 ft
March 1979

Overburden 0.5 m
Mineral 2.0 m
Waste 0.5 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown	0.5	0.5
First Terrace	'Clayey' pebbly sand Gravel: fine with some coarse, well rounded to subrounded, predominantly flint with chalk and some ironstone, quartz and quartzite Sand: mainly medium with fine and some coarse, quartz with flint and some chalk, pale grey	2.0	2.5
	Clay, grey	0.5	3.0
Lower Chalk	Chalk, pale grey	1.0+	4.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand		Gravel			
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
13	72	15	0.5-2.5	13	23	40	9	12	3	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-2.5	35	42	16	4	2	0	1

TL 67 SW 18 6120 7350 Near Moor Farm, Soham

Block A

Surface level (+3.7 m)+12 ft
Water struck at (+0.3)+1 ft
March 1979

Overburden 0.4 m
Mineral 4.3 m
Bedrock 0.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown	0.4	0.4
First Terrace	Pebbly sand Gravel: fine to coarse, well rounded to subangular, predominantly flint with chalk and some quartz and quartzite Sand: mainly medium with some fine and coarse, quartz with some flint and chalk, yellowish brown	4.3	4.7
Lower Chalk	Chalk, white	0.3+	5.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
9	74	17	0.4-1.4	11	19	52	4	10	4	0
			1.4-2.4	8	20	48	7	11	6	0
			2.4-4.7	9	16	49	8	13	5	0
			Mean	9	18	49	7	12	5	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction							
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others	
	Black/Brown	White						
0.4-1.4	35	52	11	trace	1	0	1	
1.4-2.4	34	52	12	1	1	0	0	
2.4-4.7	66	20	10	0	2	0	2	
Mean	53	33	11	trace	2	0	1	

TL 67 SW 19	6187 7159	Small Path Hill, Fordham	Block A
Surface level (+8.0 m)+26 ft			Overburden 0.3 m
Water not encountered			Mineral 1.7 m
March 1979			Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.3	0.3
Third Terrace	Pebbly sand Gravel: fine with coarse, well rounded to angular, mainly flint with some chalk and sandstone Sand: predominantly medium with some fine and coarse, mainly quartz with some flint and chalk, yellowish brown	1.7	2.0
Lower Chalk	Chalk, white	1.0+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
8	81	11	0.3-1.3	11	9	64	5	8	3	0
			1.3-2.0	5	9	68	7	7	4	0
			Mean	8	9	66	6	8	3	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.3-1.3	65	10	1	trace	trace	24	0
1.3-2.0	30	51	11	2	1	3	2
Mean	51	26	5	1	trace	16	1

TL 67 SW 20	6189 7447	Common Gate Drove, Isleham	Block A
Surface level (+2.1 m)+7 ft			Overburden 1.2 m
Water struck at (+0.6 m)+2 ft			Mineral 4.3 m
March 1979			Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.5	0.5
First Terrace	Clay, brown, sandy and pebbly	0.7	1.2
	Pebbly sand Gravel: mainly fine with coarse, well rounded to subangular, flint and chalk with some ironstone, quartz, quartzite and sandstone Sand: mainly medium with fine and coarse, quartz with some flint, chalky fines, pale grey	4.3	5.5
Lower Chalk	Chalk, greyish white	1.0+	6.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ - 1	+1 - 4	+4 - 16	+16 - 64	+64 mm
4	79	17	1.2-2.2	6	12	54	10	14	4	0
			2.2-3.2	5	14	48	13	17	3	0
			3.2-4.2	3	10	50	18	16	3	0
			4.2-5.5	4	8	62	14	11	1	0
			Mean	4	11	54	14	14	3	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
1.2-2.2	27	50	17	3	2	1	0
2.2-3.2	14	47	34	1	2	2	0
3.2-4.2	18	61	19	trace	1	1	0
4.2-5.5	28	31	33	trace	2	6	0
Mean	21	48	26	1	2	2	0

TL 67 SW 21 6322 7160 Lords Barn, Fordham

Surface level (+6.0 m)+20 ft
 Water not encountered
 March 1979

Waste 0.5 m
 Bedrock 1.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Alluvium	Clay, dark brown, silty	0.5	0.5
Lower Chalk	Chalk, greyish white	1.5+	2.0

TL 67 SW 22 6391 7085 Near Bassingbourn Manor Farm, Fordham

Block D

Surface level (+19.0 m)+62 ft
 Water not encountered
 March 2979

Overburden 0.4 m
 Mineral 5.4 m
 Waste 0.7 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4
Fourth Terrace	'Clayey' pebbly sand Gravel: fine to coarse, angular to subrounded, predominantly flint with some chalk, ironstone, quartz, quartzite and sandstone Sand: mainly medium with fine and some coarse, quartz with some flint and chalk, reddish brown	5.4	5.8
	Clay, reddish brown, pebbly	0.7	6.5
Lower Chalk	Chalk, greyish white	1.0+	7.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ - 1	+1 - 4	+4 - 16	+16 - 64	+64 mm
14	70	16	0.4-1.4	15	16	51	4	10	4	0
			1.4-2.4	18	17	50	3	6	6	0
			2.4-3.4	15	10	53	4	13	5	0
			3.4-4.4	15	9	62	3	9	2	0
			4.4-5.8	10	16	46	7	14	7	0
			Mean	14	14	52	4	11	5	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.4-1.4	8	78	trace	0	1	13	0
1.4-2.4	24	71	0	0	3	2	0
2.4-3.4	10	79	2	0	1	8	0
3.4-4.4	43	44	4	trace	1	8	0
4.4-5.8	60	19	5	8	7	1	0
Mean	33	53	2	3	3	6	0

TL 67 SW 23	6305 7011	Fordham Abbey, Fordham	Block D
Surface level (+10.2 m)+33 ft			Overburden 2.0 m
Water not encountered			Mineral 1.8 m
February 1979			Bedrock 0.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, grey	0.5	0.5
First Terrace	Clay, brown,	1.5	2.0
	'Very clayey' pebbly sand Gravel: fine to coarse, angular to subangular, mainly flint with some chalk Sand: mainly medium with fine and some coarse, quartz with flint and some fine chalk, brown	1.8	3.8
Lower Chalk	Chalk, greyish white	0.7+	4.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
20	65	15	2.0-3.8	20	14	45	6	9	6	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
2.0-3.8	31	61	8	0	trace	0	trace

TL 67 SW 24 6468 7020 Kings Path, Fordham

Block D

Surface level (+18.8 m)+62 ft
 Water not encountered
 March 1979

Overburden 0.4 m
 Mineral 2.6 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4
Third Terrace	'Clayey' sandy gravel Gravel: fine with coarse angular to subrounded, predominantly flint with sporadic chalk and some quartz, quartzite and sandstone Sand: mainly medium with fine and coarse quartz with some flint and fine chalk, pale brown	2.6	3.0
Middle Chalk	Chalk, white	1.0+	4.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
13	58	29	0.4-1.4	11	10	38	11	20	10	0
			1.4-3.0	14	10	35	13	21	7	0
			Mean	13	10	36	12	21	8	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.4-1.4	17	66	13	trace	4	trace	0
1.4-3.0	35	51	10	0	1	3	0
Mean	28	57	11	0	2	2	0

TL 67 SW 25 6491 7096 Slate Farm, Fordham

Block D

Surface level (+16.5 m)+54 ft
 Water not encountered
 March 1979

Overburden 0.3 m
 Mineral 6.2 m
 Waste 0.5 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.3	0.3

Third Terrace	Pebbly sand Gravel: mainly fine with some coarse in upper 1.7 m, subangular to subrounded, mainly flint with chalk Sand: medium with fine and some coarse, mainly quartz with some flint and chalk, brown	6.2	6.5
	Clay, pale brown, silty, pebbly	0.5	7.0
Middle Chalk	Chalk, white	1.0+	8.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
9	81	10	0.3-1.0	7	9	58	9	13	4	0
			1.0-2.0	6	15	53	8	12	6	0
			2.0-3.0	14	33	47	2	4	0	0
			3.0-4.0	13	35	47	2	3	0	0
			4.0-6.5	8	18	59	7	8	0	0
			Mean	9	21	54	6	8	2	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction								
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others		
	Black/Brown	White							
0.3-1.0	13	73	8	1	4	0	1		
1.0-2.0	38	37	23	trace	1	0	1		
2.0-3.0	9	49	41	0	1	0	1		
3.0-4.0	13	49	36	1	1	0	0		
4.0-6.5	15	47	35	2	0	0	1		
Mean	21	50	26	1	1	0	1		

TL 67 SW 26	6126 7410	East Fen Drove, Fordham	Block D
Surface level (+2.8 m)+9 ft			Overburden 0.5 m
Water struck at (+1.4 m)+5 ft			Mineral 5.1 m
March 1979			Bedrock 0.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.5	0.5
First Terrace	Pebbly sand Gravel: fine to coarse, well rounded to subangular, predominantly flint with sporadic chalk and some ironstone, quartz, quartzite and sandstone Sand: medium with fine and coarse, mainly quartz with some flint and chalk, pale grey	5.1	5.6
Lower Chalk	Chalk, white	0.9+	6.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
5	74	21	0.5-1.5	6	21	48	9	10	6	0
			1.5-2.5	3	10	44	14	19	10	0
			2.5-3.5	6	13	51	11	14	5	0
			3.5-4.5	6	16	46	10	13	9	0
			4.5-5.6	4	16	49	13	14	4	0
			Mean	5	15	48	11	14	7	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-1.5	49	37	12	1	1	0	0
1.5-2.5	35	47	14	0	2	0	2
2.5-3.5	38	32	28	1	1	0	trace
3.5-4.5	33	47	18	trace	2	0	0
4.5-5.6	25	40	27	2	4	0	2
Mean	35	41	20	1	2	0	1

TL 67 SE 25

6641 7387

Lee Farm, Freckenham

Block D

Surface level (+6.3 m)+21 ft
 Water not encountered
 March 1979

Overburden 0.4 m
 Mineral 1.6 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4
Head Gravel	Pebbly sand Gravel: fine with coarse, subrounded to subangular, mainly flint with chalk and some quartz and quartzite Sand: medium with fine and some coarse, mainly quartz with some flint and chalk, pale brown	1.6	2.0
Lower Chalk	Chalk, white	1.0+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
1	86	13	0.4-1.4	1	10	70	7	9	3	0
			1.4-2.0	1	21	58	5	9	6	0
			Mean	1	14	66	6	9	4	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.4-1.4	38	33	25	0	3	1	0
1.4-2.0	13	51	29	0	6	1	0
Mean	27	41	27	0	4	1	0

TL 67 SE 26 6648 7194 Near Freckenham Hall, Freckenham Block D

Surface level (+7.5 m)+25 ft Waste 8.0 m
 Water struck at (+6.0 m)+20 ft Bedrock 1.0 m+
 March 1979

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark grey	0.2	0.2
Alluvium	Clay, grey, silty, with some chalk	7.8	8.0
Lower chalk	Chalk, greyish white	1.0+	9.0

TL 67 SE 27 6666 7079 Brook Slip, Chippenham Block D

Surface level (+14.6 m)+48 ft Waste 0.4 m
 Water not encountered Bedrock 1.6 m+
 March 1979

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown, pebbly	0.4	0.4
Lower Chalk	Chalk, white	1.6+	2.0

TL 67 SE 28 6618 7024 Manor Farm, Chippenham Block D

Surface level (+16.1 m)+53 ft Overburden 0.6 m
 Water struck at (+10.1 m)+33 ft Mineral 8.4 m
 March 1979 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.6	0.6
Second Terrace	'Clayey' pebbly sand Gravel: fine to coarse well rounded to subangular, predominantly flint with sporadic chalk and some quartz and quartzite Sand: mainly medium with fine and some coarse, quartz with some flint and fine chalk, brown becoming pale brown	8.4	9.0
Middle Chalk	Chalk, white	1.0+	10.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
15	65	20		0.6-1.6	10	18	55	3	8	6
			1.6-2.6	9	16	48	3	17	7	0
			2.6-3.6	10	6	30	12	29	13	0
			3.6-4.6	21	23	47	4	2	3	0
			4.6-5.6	16	9	44	7	16	8	0
			5.6-6.6	14	16	51	6	11	2	0
			6.6-7.6	28	17	34	5	11	5	0
			7.6-8.6	No data						
			8.6-9.0	10	12	47	7	16	8	0
			Mean	15	15	44	6	14	6	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.6-1.6	51	33	12	1	3	0	0
1.6-2.6	48	38	13	trace	1	0	0
2.6-3.6	48	47	4	trace	trace	0	1
3.6-4.6	42	27	14	0	1	0	16
4.6-5.6	63	20	15	0	1	0	1
5.6-6.6	30	46	23	trace	1	0	0
6.6-7.6	33	49	15	1	2	0	0
8.6-9.0	42	43	14	1	trace	0	trace
Mean	47	39	12	trace	1	0	1

TL 67 SE 29 6779 7377 East of Rectory Farm, Worlington

Block D

Surface level (+8.2 m)+27 ft
Water not encountered
March 1979

Overburden 0.3 m
Mineral 1.7 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.3	0.3
Head Gravel	'Clayey' pebbly sand Gravel: fine with coarse, well rounded to subangular, flint and chalk with some ironstone and quartz and quartzite Sand: predominantly medium with fine and some coarse, quartz with some flint and chalk, reddish brown	1.7	2.0
Lower Chalk	Chalk, white	1.0+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
12	76	12	0.3-1.3	9	19	55	3	10	4	0
			1.3-2.0	16	11	59	5	6	3	0
			Mean	12	15	57	4	8	4	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.3-1.3	11	32	54	2	1	0	0
1.3-2.0	37	45	14	2	1	0	1
Mean	12	43	42	2	1	0	0

TL 67 SE 30

6721 7295

North of Freckenham House, Freckenham

Block D

Surface level (+13.4 m)+44 ft
Water not encountered
March 1979

Overburden 0.5 m
Mineral 2.5 m
Waste 2.0 m
Bedrock 2.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.5	0.5
Second Terrace	'Clayey' pebbly sand Gravel: mainly fine with some coarse, scattered cobbles, angular to subrounded, predominantly flint with chalk and some ironstone, quartz, quartzite and sandstone Sand: mainly medium with some fine and coarse, quartz with some flint and chalk, pale brown	2.5	3.0
	Clay, brown, sandy and pebbly	2.0	5.0
Lower Chalk	Chalk, grey	2.0+	7.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
16	63	21	0.5-1.5	9	10	58	6	15	2	0
			1.5-2.5	25	4	36	7	20	8	0
			2.5-3.0	10	9	56	11	13	1	0
			Mean	16	7	49	7	17	4	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-1.5	8	68	13	1	1	9	0
1.5-2.5	34	42	15	3	5	1	0
2.5-3.0	12	56	31	0	1	trace	0
Mean	22	53	17	2	3	3	0

TL 67 SE 31	6807 7275	Surprise Hill, Freckenham	Block D
Surface level (+10.6 m)+35 ft			Overburden 0.4 m
Water not encountered			Mineral 1.6 m
March 1979			Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4
Second Terrace	'Clayey' pebbly sand Gravel: fine with coarse, subangular to subrounded, predominantly flint with sporadic chalk and some quartz, quartzite and sandstone Sand: medium with coarse and fine, mainly quartz with some flint and chalk, brown	1.6	2.0
Middle Chalk	Chalk, white	1.0+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
18	71	11	0.4-0.2	18	10	45	16	9	2	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.4-2.0	44	37	14	0	2	3	0

Surface level (+19.5 m)+64 ft
 Water not encountered
 Martch 1979

Overburden 1.5 m
 Mineral 1.0 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.5	0.5
Third Terrace	Clay, reddish brown, sandy and pebbly	1.0	1.5
	'Very clayey' pebbly sand Gravel: fine to coarse, subangular to subrounded, predominantly flint with some quartz, quartzite, sandstone and chalk Sand: medium with fine and some coarse, mainly quartz with some flint and chalk, reddish brown	1.0	2.5
Middle Chalk	Chalk, white	1.0+	3.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
21	61	18	1.5-2.5	21	16	39	6	13	5	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction							
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others	
	Black/Brown	White						
1.5-2.5	24	69	2	0	trace	5	0	

Surface level (+8.5 m)+28 ft
 Water not encountered
 March 1979

Overburden 0.4 m
 Mineral 4.6 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4
First Terrace	Pebbly sand Gravel: fine to coarse, well rounded to subangular, predominantly flint with some chalk and quartz and quartzite Sand: mainly medium with fine and some coarse, quartz with flint and some fine chalk; brown	4.6	5.0
Lower Chalk	Chalk, white	1.0+	6.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
6	78	16	0.4-2.5	4	20	65	3	4	4	0
			2.5-5.0	8	15	49	6	13	9	0
			Mean	6	17	57	4	9	7	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction								
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others		
	Black/Brown	White							
0.4-2.5	8	90	1	trace	1	0	trace		
2.5-5.0	56	37	5	trace	1	0	1		
Mean	45	49	4	0	1	0	1		

TL 67 SE 34 6955 7402 Church Farm, Worlington Block

Surface level (+3.9 m)+13 ft Waste 6.0 m
 Water struck at (-1.3 m)-4 ft Bedrock 1.5 m+
 March 1979

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, soft with coarse vegetable matter	5.0	5.0
Alluvium	Silt, grey with chalk and some fine flint pebbles	1.0	6.0
Lower Chalk	Chalk, white	1.5+	7.5

TL 67 SE 35 6965 7353 Near Coldwell Farm, Worlington Block D

Surface level (+9.3 m)+31 ft Overburden 0.4 m
 Water not encountered Mineral 1.6 m
 March 1979 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4
Second Terrace	'Clayey' pebbly sand Gravel: fine to coarse, angular to subrounded, predominantly flint with some chalk, sandstone, quartz and quartzite Sand: mainly medium with fine and some coarse, quartz with some flint and chalk, some iron oxide staining, yellowish brown	1.6	2.0
Middle Chalk	Chalk, white	1.0+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
18	63	19	0.4-2.0	18	15	42	6	12	7	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.4-2.0	26	62	5	trace	1	5	1

TL 67 SE 36

6938 7211

Near Swale's Plantation, Worlington

Block D

Surface level (+11.6 m)+38 ft
 Water struck at (+7.0 m)+23 ft
 March 1979

Overburden 0.5 m
 Mineral 4.2 m
 Bedrock 1.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.5	0.5
Head Gravel	Pebbly sand Gravel: fine to coarse, with cobbles in uppermost 1.0 m, subangular to well rounded, predominantly flint with some chalk, quartz, quartzite and sandstone Sand: predominantly medium, with some flint and chalk, brown	4.2	4.7
Middle Chalk	Chalk, white	1.3+	6.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
8	74	18	0.5-1.5	5	16	63	2	6	5	3
			1.5-2.5	4	11	57	4	10	14	0
			2.5-4.7	12	15	52	4	9	8	0
			Mean	8	14	56	4	8	9	1

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-1.5	22	72	3	1	1	1	0
1.5-2.5	12	85	2	trace	1	0	0
2.5-4.7	29	64	2	trace	3	1	1
Mean	22	72	2	trace	2	1	1

TL 67 SE 37 6908 7105 North of Heath Farm, Freckenham Block D

Surface level (+18.8 m)+62 ft Overburden 1.0 m
 Water not encountered Mineral 4.0 m
 March 1979 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	1.0	1.0
Second Terrace	Pebbly sand Gravel: fine to coarse with cobbles in the lower 2.0 m, subangular to well rounded, predominantly flint with some chalk, quartz and quartzite Sand: predominantly medium with fine and some coarse, mainly quartz with some flint and chalk, brown	4.0	5.0
Middle Chalk	Chalk, white	1.0+	6.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
3	81	16	1.0-2.0	4	19	57	4	9	7	0
			2.0-3.0	1	11	82	2	2	2	0
			3.0-5.0	4	10	59	3	7	12	5
			Mean	3	13	65	3	6	8	2

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
1.0-2.0	4	95	trace	1	trace	0	0
2.0-3.0	4	94	1	1	trace	0	trace
2.0-5.0	35	61	1	trace	3	0	trace
Mean	23	74	1	0	2	0	0

Surface level (+16.2 m)+53 ft
 Water struck at (+10.3 m)+34 ft
 March 1979

Overburden 0.5 m
 Mineral 5.5 m
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.5	0.5
Second Terrace	Sandy gravel Gravel: fine to coarse with sporadic cobbles, angular to well rounded, predominantly flint with some chalk, quartz and quartzite Sand: mainly medium with fine and some coarse, quartz with some flint and chalk, brown	5.5	6.0
Middle Chalk	Chalk, white	1.0+	7.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1 -4	+4 -16	+16 -64	+64 mm
7	64	29	0.5-1.5	5	16	63	2	6	8	0
			1.5-2.5	5	27	47	2	8	11	0
			2.5-3.5	5	12	40	9	20	14	0
			3.5-4.5	12	12	34	6	15	21	0
			4.5-6.0	6	8	40	7	21	18	0
			Mean	7	14	45	5	14	15	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-1.5	18	80	trace	trace	1	0	1
1.5-2.5	30	65	2	trace	3	0	0
2.5-3.5	69	22	4	trace	5	0	trace
3.5-4.5	41	55	4	0	trace	0	trace
4.5-6.0	63	30	6	0	1	0	trace
Mean	51	43	4	0	2	0	trace

Surface level (+16.8 m)+55 ft
 Water not encountered
 March 1979

Overburden 0.4 m
 Mineral 9.6 m
 Bedrock 1.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.4	0.4

Third Terrace	'Clayey' pebbly sand Gravel: mainly fine with coarse and some cobble between 6 m and 7 m, angular to subrounded predominantly flint with sporadic chalk and some quartz and quartzite Sand: dominantly medium with some fine and coarse, quartz with some flint and chalk, yellowish brown	9.6	10.0
Middle Chalk	Chalk, white	1.5+	11.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ - 1	+1 - 4	+4 - 16	+16 - 64	+64 mm
10	73	17	0.4-1.0	13	10	42	11	20	4	0
			1.0-2.0	12	11	39	13	21	4	0
			2.0-3.0	10	12	47	9	16	6	0
			3.0-4.0	11	11	58	7	11	2	0
			4.0-5.0	8	9	77	2	3	1	0
			5.0-6.0	7	14	59	5	12	3	0
			6.0-7.0	4	9	65	7	11	4	0
			7.0-9.0	No data						
			9.0-10.0	19	9	52	3	9	8	0
			Mean	10	10	56	7	13	4	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.4-1.0	37	39	16	1	4	3	0
1.0-2.0	18	56	14	0	8	0	4
2.0-3.0	16	72	11	trace	1	0	0
3.4-4.0	28	61	8	0	3	0	0
4.0-5.0	9	73	15	1	2	0	0
5.0-6.0	27	45	26	0	0	2	0
6.0-7.0	49	31	14	0	2	3	1
9.0-10.0	40	50	7	0	1	2	0
Mean	28	54	13	trace	3	2	trace

TL 67 SE 40	6642 7227	Mortimers Lane, Freckenham	Block D
Surface level (+8.3 m)+27 ft			Overburden 0.4 m
Water not encountered			Mineral 1.7 m
March 1979			Bedrock 0.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown	0.4	0.4
First Terrace	'Clayey' gravel Gravel: fine to coarse with cobbles, angular to well rounded, predominantly flint with some chalk, quartz and quartzite Sand: medium with fine and coarse, mainly quartz with some flint and chalk, grey	1.7	2.1
Lower Chalk	Chalk, white	0.9+	3.0

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
16	30	54	0.4-2.1	16	7	15	8	24	25	5

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.4-2.1	31	60	5	0	3	1	0

TL 67 SE 41	6712 7227	Near Freckenham House, Freckenham	Block D
Surface level (+14.1 m)+46 ft			Overburden 0.5 m
Water not encountered			Mineral 1.5 m
March 1979			Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown	0.5	0.5
Third Terrace	'Clayey' sand, with some gravel Gravel: fine with some coarse, subangular to subrounded, mainly flint with some chalk and sandstone Sand: predominantly medium with some fine and coarse, quartz with some flint and chalk, dark brown	1.5	2.0
Middle Chalk	Chalk, white	0.5+	2.5

GRADING

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+1 - 4$	$+4 - 16$	$+16 - 64$	$+64$ mm
16	80	4	0.5-2.0	16	8	69	3	3	1	0

COMPOSITION

Depth below surface (m)	percentages by weight in gravel fraction						
	Flint		Chalk	Ironstone	Quartz/ Quartzite	Sandstone	Others
	Black/Brown	White					
0.5-2.0	22	46	9	0	0	19	4

List of Other Registered Boreholes

66 NW 22 6291 6580
66 NW 39 6208 6506
66 NW 45 6215 6525
66 NW 51 6291 6576
66 NW 65 6327 6639
66 NW 73 6317 6602
66 NW 74 6316 6610

66 NE 28 6851 6710
66 NE 52 6822 6700
66 NE 65 6748 6692
66 NE 67 6759 6705
66 NE 98 6788 6801
66 NE 99 6635 6822
66 NE 100 6713 6892

67 NE 6 6785 7952

67 SW 27 6037 7337
67 SW 28 6061 7283
67 SW 29 6076 7276
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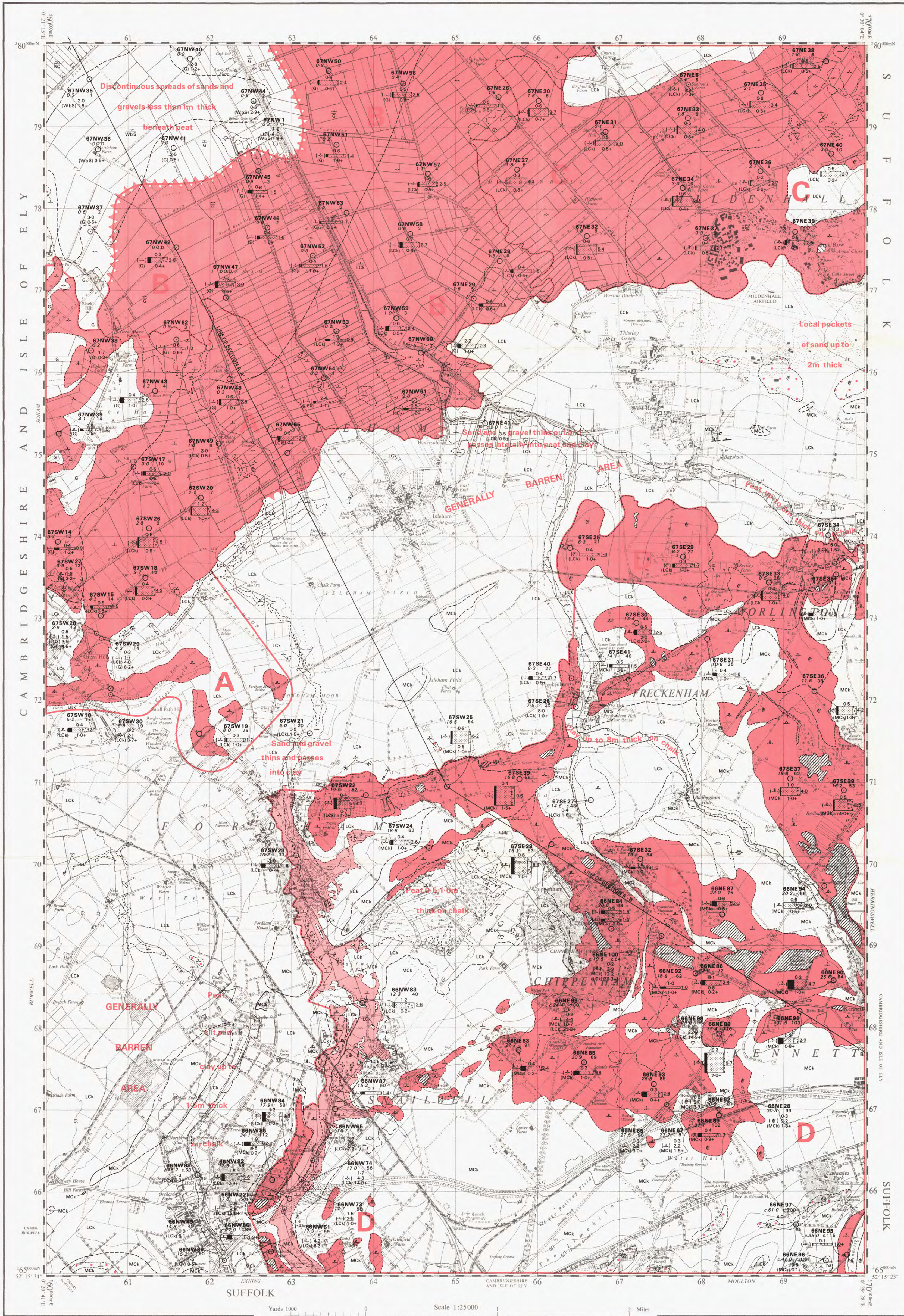
THE SAND AND GRAVEL RESOURCES OF THE COUNTRY NORTH OF NEWMARKET, SUFFOLK

110

Scale 1:25 000 or about 2 1/2 Inches to 1 Mile

ORDNANCE SURVEY
SHEET TL67 & PART OF TL66
PROVISIONAL EDITION

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



EXPLANATION OF SYMBOLS AND ABBREVIATIONS

DRIFT

- Blown Sand - clayey sand BS-12
- Shell Marl - shelly calcareous mud SM-4
- Alluvium - silt and clay A-35
- Peat, comprising mainly Norderfeld Peat P-10
- First Terrace - clayey pebbly sand 1T-28
- Second Terrace - clayey gravel 2T-27
- Third Terrace - clayey pebbly sands 3T-22
- Fourth Terrace - very clayey pebbly sands 4T-12
- Head Gravel - clayey pebbly sands H-46
- Glacial Sand and Gravel - sandy clay GS-74
- Boulder Clay - pebbly sandy clay BC-28
- Glacial Loam - sandy silt GLM-1

SOLID

- Upper Chalk - white chalk with flints LCK
- Middle Chalk - greyish white chalk MCK
- Lower Chalk - white chalk, (includes Totterhoe Stone, 'Chalk Marl' and Cambridge Greensand) LCL
- Gault - dark grey clay, fossiliferous G
- Woburn Sands (Lower Greensand) - glauconitic sand with some 'coprolite' seams WBS
- Kimmeridge Clay - bluish grey clay, fossiliferous KC

MADE GROUND

- Made Ground MG-2
- Worked out ground (sand and gravel - see Report) WO-4

BOUNDARY LINES

- Geological boundary, Drift
- Geological boundary, Solid
- Fault at surface; crossmark indicates downthrow side
- Resource Block boundary
- Inferred boundary between recognised categories of deposits

BROKEN LINE DENOTES UNCERTAINTY

BOREHOLE DATA

- Industrial Minerals Assessment Unit (I.M.A.U.) Boreholes (thick circles)
- Other Boreholes (thin circles)

I.M.A.U. BOREHOLES

Borehole Registration Number: 66NE 84
 Borehole site: 20.6 66
 Waste: 0.5 1.5
 Geological Classification: (MCK) 1.0+
 Grading Diagram Thicknesses in metres

NOTES

- Figures underlined denote thicknesses used in the assessment of resources.
- The '-' sign indicates that the base of the deposit was not reached.
- The figures in italics are the metric conversions of the measurements recorded in feet.
- The Geological Classification is given only for mineral and bedrock.
- Elevations below O.D. are indicated by minus figures (e.g. -0.8).
- Approximate elevations are indicated by the letter 'c' (circa).

Borehole Registration Number

Each I.M.A.U. borehole is identified by a Registration Number, e.g. 66NE 84. The first number and letters refer to quarter sheet, and the second number to the I.G.S. serial number for that quarter. The unique designation for borehole 66NE 84 is TL 66NE 84.

Grading Diagrams

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

OTHER BOREHOLES

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

CATEGORIES OF DEPOSITS

- Exposed mineral, assessed CAT-E2
- Continuous or almost continuous spreads of mineral beneath overburden CAT-C1
- Sand and gravel either not potentially workable or absent CAT-A2
- Sand and gravel not assessed CAT-N1

RESOURCE BLOCKS

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

HORIZONTAL SECTION drawn along line A-A', B-B', constitutes Figure 2 of the Report.

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

TL 58	TL 68	TL 78
	173 174	
TL 57	TL 67	TL 77
TL 56	TL 66	TL 76
	188 189	
TL 55	TL 65	TL 75
	205 206	

Diagram showing the relationship of this sheet with the National Grid 1:25,000 sheets and the published New Series One Inch and 1:50,000 scale Geological Sheets 173, 174, 188, 189, 205 and 206.

Derivation of geological lines

(a)	(b)	(c)
		Geological interpretation by R.W. Gallois of a six-inch soil survey by R.S. Sains in 1972. Published on 1:50,000 Geological Sheet 173 (Ely) R.A.B. Bazley, District Geologist.
		Six-inch geological survey by C.R. Bristow in 1979. Published on 1:50,000 Geological Sheet 174 (Thetford), R.A.B. Bazley, District Geologist.
		Six-inch geological survey by J.H. Taylor in 1936, S.C.A. Holmes in 1949-53 and B.C. Worsam in 1953. Published on 1:50,000 Geological Sheet 188 (Cambridge), F.H. Edmunds, District Geologist.

Sand and gravel survey by C.E. Corser in 1979.
R.G. Thurvell, Head, Industrial Minerals Assessment Unit.
1:25,000 Sand and Gravel Resource Sheet published 1982
G.M. Brown, D.Sc., F.R.S., Director, Institute of Geological Sciences

The GRID lines on this sheet are at 1 Kilometre intervals.
Heights are in feet above Mean Sea Level at Newlyn.
Contour values are in feet.
1 square inch on this map represents 99,000 acres on the ground.

Compiled from 4" sheets last fully revised 1960-25.
Other partial systematic revisions 1938-50 has been incorporated.
Major roads revised 1964-68.

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

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