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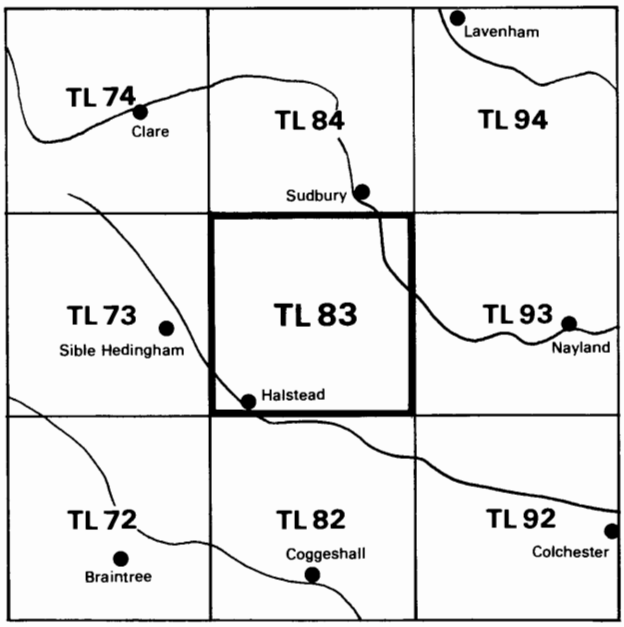

The sand and gravel resources of the country north-east of Halstead, Essex

Description of 1:25 000 resource sheet TL 83

R. J. Marks and J. W. Merritt

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The first twelve reports on the assessment of British sand and gravel resources appeared in the Report series of the Institute of Geological Sciences as a subseries. Report 13 and subsequent reports appear as Mineral Assessment Reports of the Institute.

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

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PREFACE

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

Sand and gravel, considered together as naturally occurring aggregate, was selected as the bulk mineral demanding the most urgent attention, initially in the south-east of England, where about half the national output is won and very few resources 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 co-operation of the Sand and Gravel Association of Great Britain.

This report describes the resources of sand and gravel of 100 km^2 of country to the north-east of Halstead, Essex, shown on the accompanying 1:25 000 resorce sheet TL 83. The survey was conducted by Mr J. W. Merritt and Mr R. J. Marks in 1975. The work is based on a geological survey at 1:10 560 carried out by Mr M. J. Heath and Mr S. R. Mills of the Institute' Field Staff in 1974–75. Mr J. W. Gardner, CBE, (Land Agent) has been responsible for negotiating access to land for drilling. The ready cooperation of land owners and tennants in this work is gratefully acknowledged.

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The sand and gravel resources of the country north-east of Halstead, Essex

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R. J. MARKS and J. W. MERRITT

SUMMARY

The assessment of sand and gravel resources in the Halstead area is based on the geological maps and pre-existing borehole records of the Institute of Geological Sciences, together with 102 boreholes drilled for the Industrial Minerals Assessment Unit.

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

The area has been divided into eight resource blocks containing between 4.1 and 12.9 km^2 of sand and gravel. For these blocks the geology of the deposits is described and the mineral-bearing area, the mean thickness of overburden and mineral, and the mean grading of the mineral are stated. Detailed borehole data are given. The geology, the position of the boreholes and outlines of the resource blocks are shown on the accompanying map.

Bibliographic reference

MARKS, R. J. and MERRITT, J. W. 1981. The sand and gravel resources of the country north-east of Halstead, Essex. Description of 1:25 000 sheet TL 83. *Miner. Assess. Rep. Inst. Geol. Sci.*, No. 68.

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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 be assessed only in the light of current, locally prevailing, economic considerations. Clearly, both the economic and the social factors used to decide whether a deposit may be workable in the future cannot be predicted; they are likely to change with time. Deposits not currently economically workable may be exploited as demand increases, as higher-grade or alternative materials become scarce, or as improved processing techniques are applied to them. The improved knowledge of the main physical properties of the resource and their variability which this survey seeks to provide, will add significantly to the factual background against which planning policies can be decided (Archer, 1969; Thurrell, 1971; Harris and others, 1974).

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

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

The following arbitrary physical criteria have been adopted:

a The deposit should average at least 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. 200 mesh BS sieve, about $\frac{1}{16}$ mm) should not exceed 40 per cent.
d The deposit must lie within 25 m of the surface, this being taken as the likely maximum working depth under most circumstances. It follows from the second criterion that boreholes are drilled no deeper than 18 m if no sand and gravel has been proved.

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

For the particular needs of assessing sand and gravel resources, a grain-size classification based on the geometric scale $\frac{1}{16}$ mm, $\frac{1}{4}$ mm, 1 mm, 4 mm, 16 mm has been adopted. The boundaries between fines (that is, the clay and silt fractions) and sand, and between sand and gravel

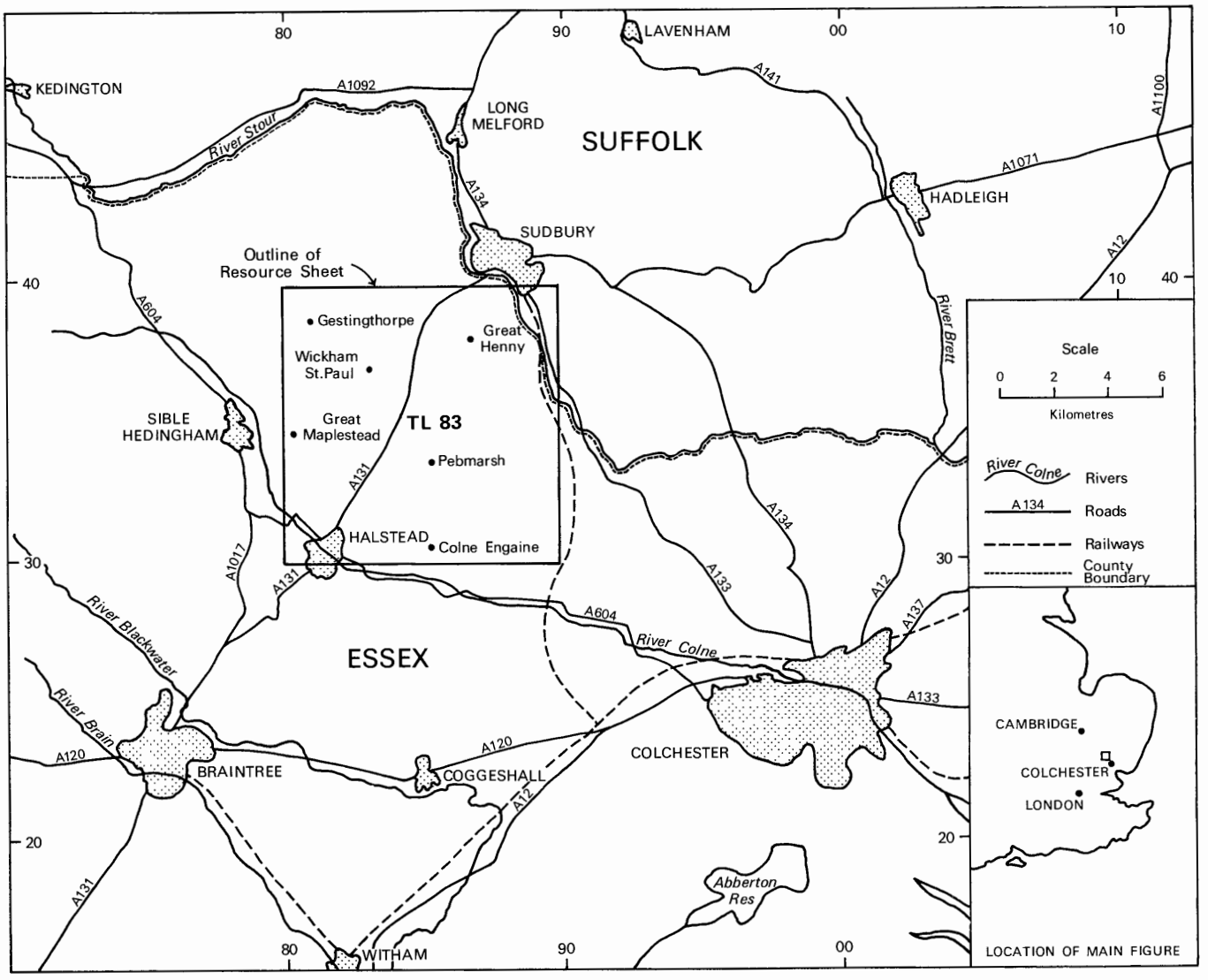


Figure 1 Map showing the location of the resource sheet

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

The volume and other characteristics are assessed within resource blocks, each of which, ideally, contains approximately 10 km^2 of sand and gravel. No account is taken of any factors, for example, roads, villages and high agricultural or landscape value, which might stand in the way of the exploitation of sand and gravel, 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 blocks as a whole. Valid conclusions cannot be drawn about the mineral in parts of a block, except in the immediate vicinity of the actual sample points.

DESCRIPTION OF THE DISTRICT

The 1:25 000 resource sheet covers 100 km^2 of country which straddles the border of Suffolk and Essex between the market town of Sudbury (one kilometre to the north of the sheet) and Halstead, a small town situated in the extreme south-west (Figure 1). The district lies in an area of predominantly arable farming, based on a combination of heavy soils and a relatively low rainfall.

The area is part of the gently undulating plateau of north Essex and west Suffolk; it slopes gently from just over 76 m above OD in the north and west to around 61 m above OD in the south-east (Figure 2). The plateau is dissected in the north-west by the Belchamp Brook, in the east by the River Stour (which is followed by the county boundary) and in the south by the River Colne and its tributaries.

Apart from the built-up area of Halstead (2 km^2) which is excluded, the assessment reveals that 78.8 km^2 of mineral-bearing ground is present within the eight resource blocks into which the district has been divided (Table 3). Currently sand and gravel is being extracted from one pit at the Ferriers [895 342].

GEOLOGY

Parts of two Old Series memoirs (Whitaker and others, 1878, and Dalton, 1880) describe the geology of most of

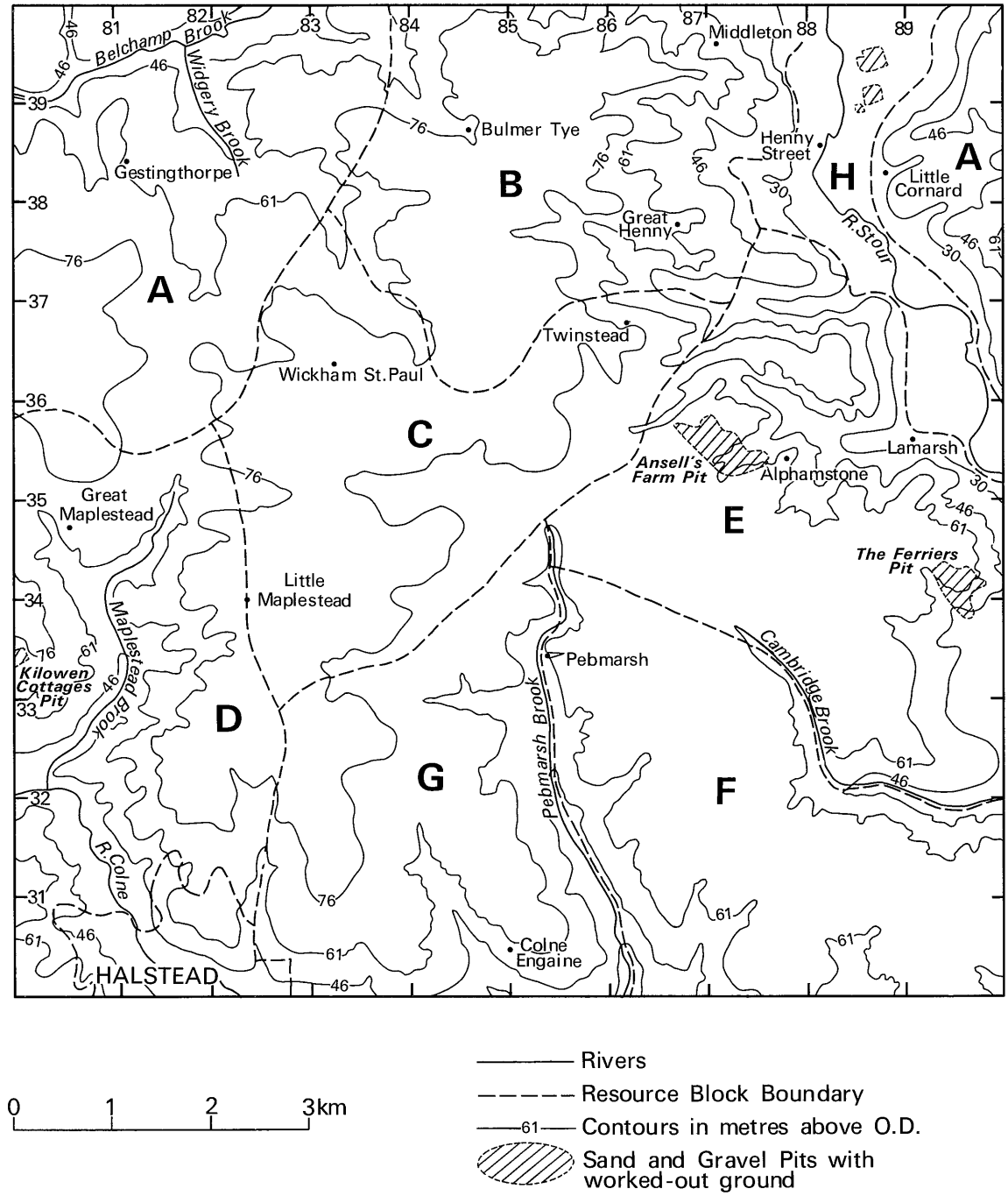


Figure 2 Locality map with contours and resource blocks

the district. The northern quarter is covered by the New Series 1:63 360 sheet 206 (Sudbury) and described in the corresponding memoir (Boswell, 1929). The resource sheet is based on geological mapping at the scale of 1:10 560 carried out by M. J. Heath and S. R. Mills of the Institute's Field Staff in 1974–75.

The geological sequence is summarised in Table 1, where deposits are listed, as far as possible, in order of increasing age. The relationship between the deposits is illustrated in the geological sections (Figures 3 and 4).

Because of the difficulty of mapping individual deposits of sand and gravel where they overlie one another, the sub-Boulder Clay sand and gravel-bearing deposits of Red Crag, Kesgrave Sands and Gravels and Barham Sands and Gravels have been mapped as a single undivided unit (see resource map). However, IMAU borehole records separately identify these deposits and demonstrate their continuity under much of the area.

SOLID

Outcrops of the solid formations are restricted to the deeper valleys by the extensive cover of thick drift sequences; their presence elsewhere is recorded in boreholes. The sub-drift surface is shown in Figure 5.

Upper Chalk

Upper Chalk forms the bedrock in the north-west, outcropping from beneath the drift deposits to the south of the Belchamp Brook. Its subcrop also floors the alluvial plain and first terrace of the Stour Valley, there are small outcrops near Middleton [871 396]. The white limestone of the Upper Chalk proved in assessment boreholes to be very soft and putty-like at its contact with the overlying sand and gravel.

Table 1 Geological sequence

DRIFT	
Recent and Pleistocene	Peat
	Calcareous Tufa
	Alluvium
	River Terrace Deposits
	Head
	Lacustrine Deposits
	Glacial Sand and Gravel, upper Boulder Clay
	Glacial Silt
	Barham Sands and Gravels
	Kesgrave Sands and Gravels
SOLID	
Pleistocene	Red Crag
Eocene	London Clay
Palaeocene	Lower London Tertiaries
	Woolwich and Reading Beds
	Thanet Beds
Cretaceous	Upper Chalk

Lower London Tertiaries

These strata subcrop along a largely drift-covered escarpment feature, stretching from Three Corner Wood [802 385] in the west to Lower Houses [836 397] in the east, and along each side of the Stour Valley. Borehole records show them to vary between 11 m and 24 m in thickness, thinning gradually towards the north-west. They rest upon an eroded surface of Upper Chalk and are overlain by London Clay.

The Lower London Tertiaries comprise two formations, the Thanet Beds and the Woolwich and Reading Beds (Hester, 1965). The Thanet Beds are subdivided into two. The lower division, the Thanet Sands, is a dark green to black, clayey, fine grained glauconitic sand, with, at the base, a bed of irregular to well rounded flints, the Bullhead Bed. The upper, thicker, subdivision generally consists of dark pinkish grey to olive-grey sandy silt.

The upper formation of the lower London Tertiaries, the Woolwich and Reading Beds, has been divided into three subdivisions. The Bottom Bed is a slightly micaceous yellowish green, glauconitic silty fine sand or fine sandy silt. Above, the middle sandy subdivision (Woolwich Beds) is typically a yellowish brown fine sand. The upper division (Reading Beds) usually consists of stiff 'waxy' clay. This chestnut-brown clay has vivid mottlings and veins of red, blue and green and contains secondary calcareous nodules ('race').

London Clay

The bedrock over the remaining three quarters of the area is London Clay dipping gently towards the south-east. It consists of an olive-grey to bluish grey silty clay, with the lowest 10 m to 15 m becoming increasingly sandy towards the base. The London Clay contains small selenite crystals in the weathered zone and, at some levels, shows evidence of burrows some of which have been pyritised. The London Clay is commonly weathered brown or orange-brown to a depth of about 0.2 m where overlain by drift deposits and Red Crag, and to a depth of several metres where exposed in the base and sides of the major valleys.

Red Crag

Apart from a small area in the north-west, the Red Crag has been proved in boreholes to be invariably present overlying London Clay and underlying the drift sequence. It varies in thickness up to 8.5 m and has a mean thickness of 3.6 m as proved in the assessment boreholes; characteristically it consists of iron-stained medium and

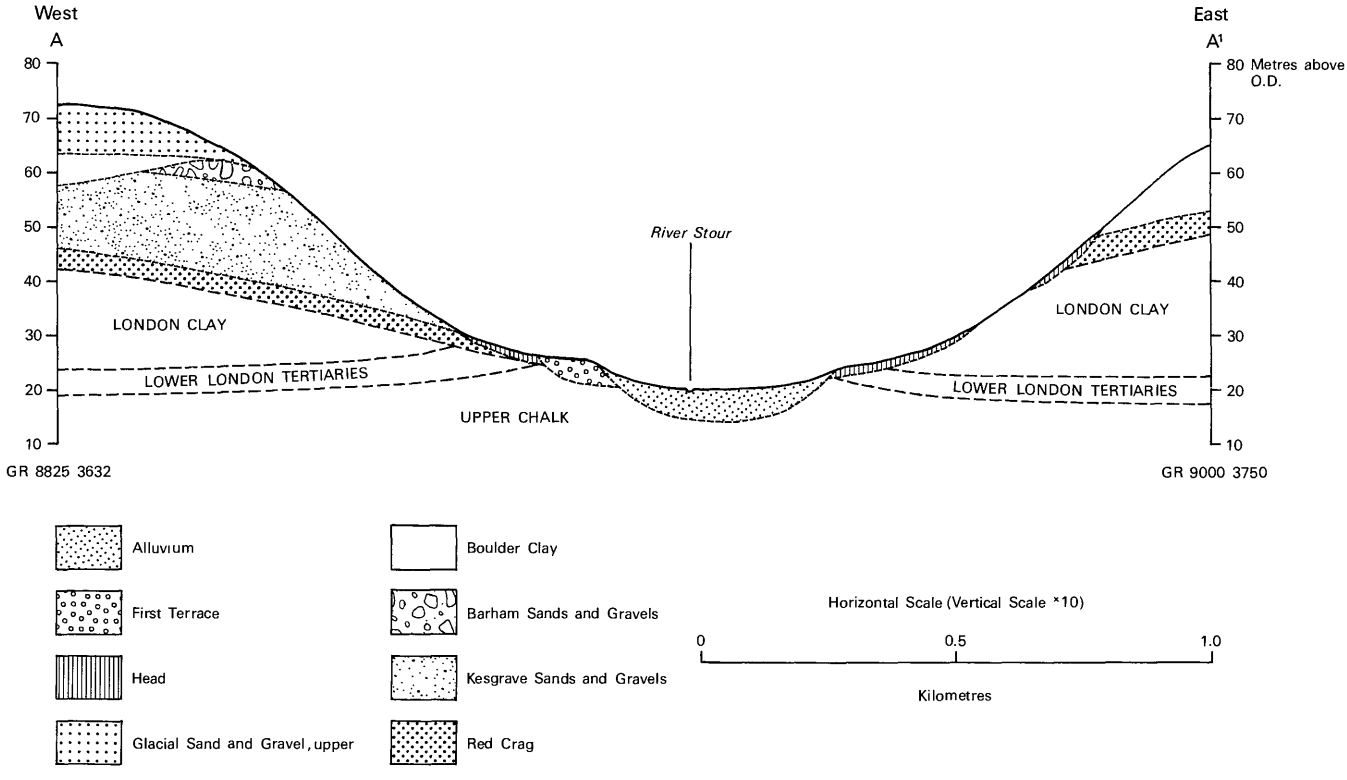


Figure 3 Schematic section showing the relationship between the drift deposits and solid formations. The line of section is shown on the resource map

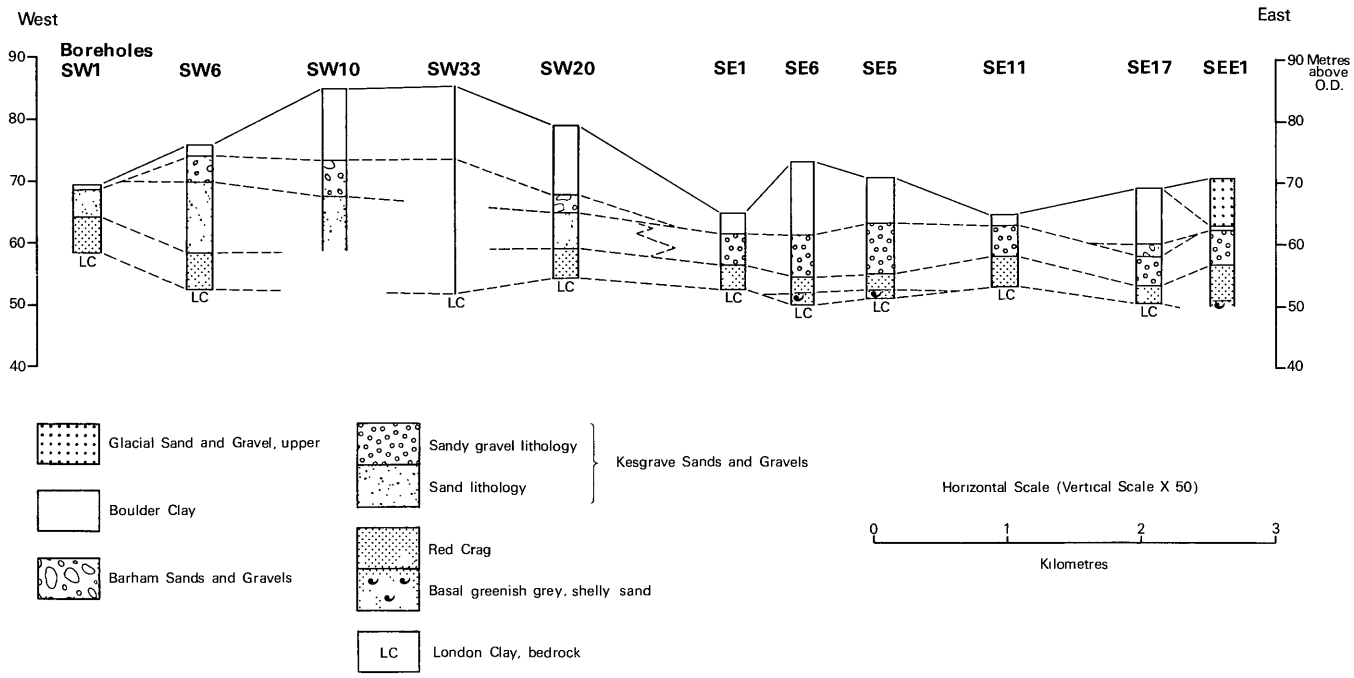


Figure 4 Diagrammatic section of graphic borehole logs from Great Maplestead to Ferriers Pit

fine sand, ranging to pebbly sand, containing some generally fine, blackened, well rounded and subangular flints with rounded quartz pebbles. Iron-pan, iron-cemented sandstone and siltstone also occur in the Red Crag together with some sandy clay and clay seams. In some boreholes, sands have been found to be leached to brown, orange and yellow especially near the top of the deposit. The Red Crag at the base of the Ferriers Pit is sandy gravel, containing a very high percentage of iron-oxides which have cemented the deposits into a ferruginous conglomerate. In boreholes SW 16, SE 5, SE 12 and SE 13, however, the base of the formation remains unoxidised and is greenish grey with some shell detritus (Figure 4).

DRIFT

The main subdivisions of the drift are Kesgrave Sands and Gravels, Barham Sands and Gravels and Boulder Clay which together form a thick sequence over most of the district. These deposits have been the subject of a number of regional studies, of which the most recently published are by Bristow and Cox (1973) and Rose and Allen (1977).

Kesgrave Sands and Gravels

The Kesgrave Sands and Gravels are widespread beneath the plateau, with a mean thickness of 7.3 m. They overlie the solid formations and are in turn, overlain by Barham Sands and Gravels and Boulder Clay so that their outcrop is usually restricted to the valley sides. The lithology is not uniform and sand and sandy gravel developments can be distinguished (Figure 4). The sandy gravel lithology is locally known as 'Essex White Ballast' and is restricted to blocks E, F and G with a zone of interdigitation with the more common sandy form which covers much of the remaining area.

Both lithologies are characteristically 'clean', having a low disseminated silt and clay content whilst including some clay and clayey seams. Typically the colour ranges from light grey to yellow. The sand lithology was formerly exposed at the Kilowen Cottages Pit [801 334], now reinstated, where it consisted predominantly of very well sorted fine and medium-grained soft quartz sand containing rare stringers of coarse sand and fine gravel together with micaceous grey clay laminae. This section exhibited both large-scale trough cross-bedding and planar bedding, the latter often containing units several metres thick showing little obvious lamination. Borehole records show this deposit to be particularly clayey in block B and to a lesser degree in block C, where seams of laminated clay are present, in places to the exclusion of the sand as seen in borehole NE 8.

The sandy gravel lithology ranges through to a pebbly sand and is exposed at both the Ferriers Pit and Ansell's Farm Pit [873 355], now disused; it consists of moderately well sorted sand and gravel with infrequent partings and lenses of silt and clay. The gravel is chiefly flint with subordinate quartz and quartzite. The pit sections exhibit trough cross-bedding, some planar bedding, numerous gravel infills and seams of finely laminated micaceous silt and clay.

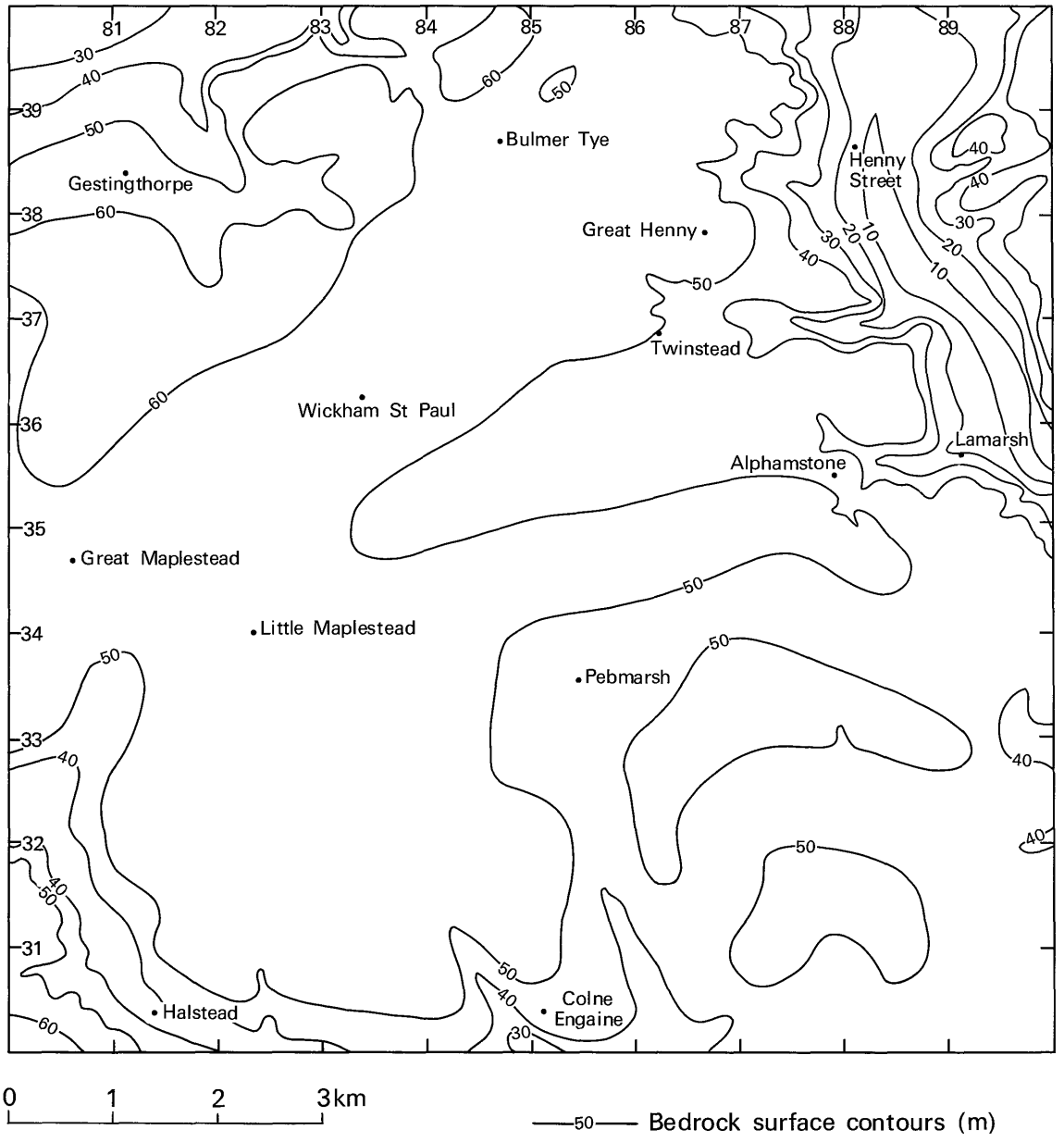


Figure 5 Map showing the bedrock surface contours

Barham Sands and Gravels

This formation originally so-called by Rose and Allen (1977) includes in this text their Rubified Sol Lessivé and associated deposits, where present. The Barham Sands and Gravels underlie most of the district, occurring beneath the Boulder Clay and resting unconformably on Kesgrave Sands and Gravels. They have a mean thickness of 3.5 m (as proved by boreholes) and are absent in the south-east of the district and to the south of Great Maplestead [807 345]. In the north-west they lie directly on Lower London Tertiaries and London Clay.

This deposit has a variable lithology, though it is commonly clayey. The most characteristic form is orange-brown 'clayey' or 'very clayey' medium sand, often reddened and with light grey veining. Less frequently it is pebbly clay or 'clayey' sandy gravel composed chiefly of flint with mottled colouring from orange, red, bluish grey, light grey to black. To the north, the Barham Sands and Gravels are less clayey and more gravelly commonly containing some chalk pebbles and sand.

Glacial Silt

Several small patches of Glacial Silt are present within the broad, shallow valley north-east of Gestingthorpe [812 384]. The deposits were once worked commercially for brick making and are described in detail in the memoir (Boswell, 1929). Borehole evidence reveals an extensive spread beneath the Boulder Clay in the north-west where it was proved in boreholes NW 2, NW 3, NW 7 and NW 9.

The deposit consists chiefly of soft to firm, yellowish brown, very sandy clayey silt containing some coarse sand-size grains of chalk and fine pebbles of angular to well rounded flint and rare quartz. Parts of the deposit are finely laminated with frequent seams of chalk sand up to 10 cm thick.

Boulder Clay

The Boulder Clay blankets the plateau (Figure 6), extending down into the valleys at few localities, its sheet-like form giving rise to the characteristic form of the relief.

The deposit is predominantly firm to stiff, pebbly, slightly sandy silty clay that contains abundant rounded chalk pebbles, much angular flint, some quartzite, quartz and rare grey limestone cobbles. Near the surface it is usually weathered to orange-brown, decalcified pebbly

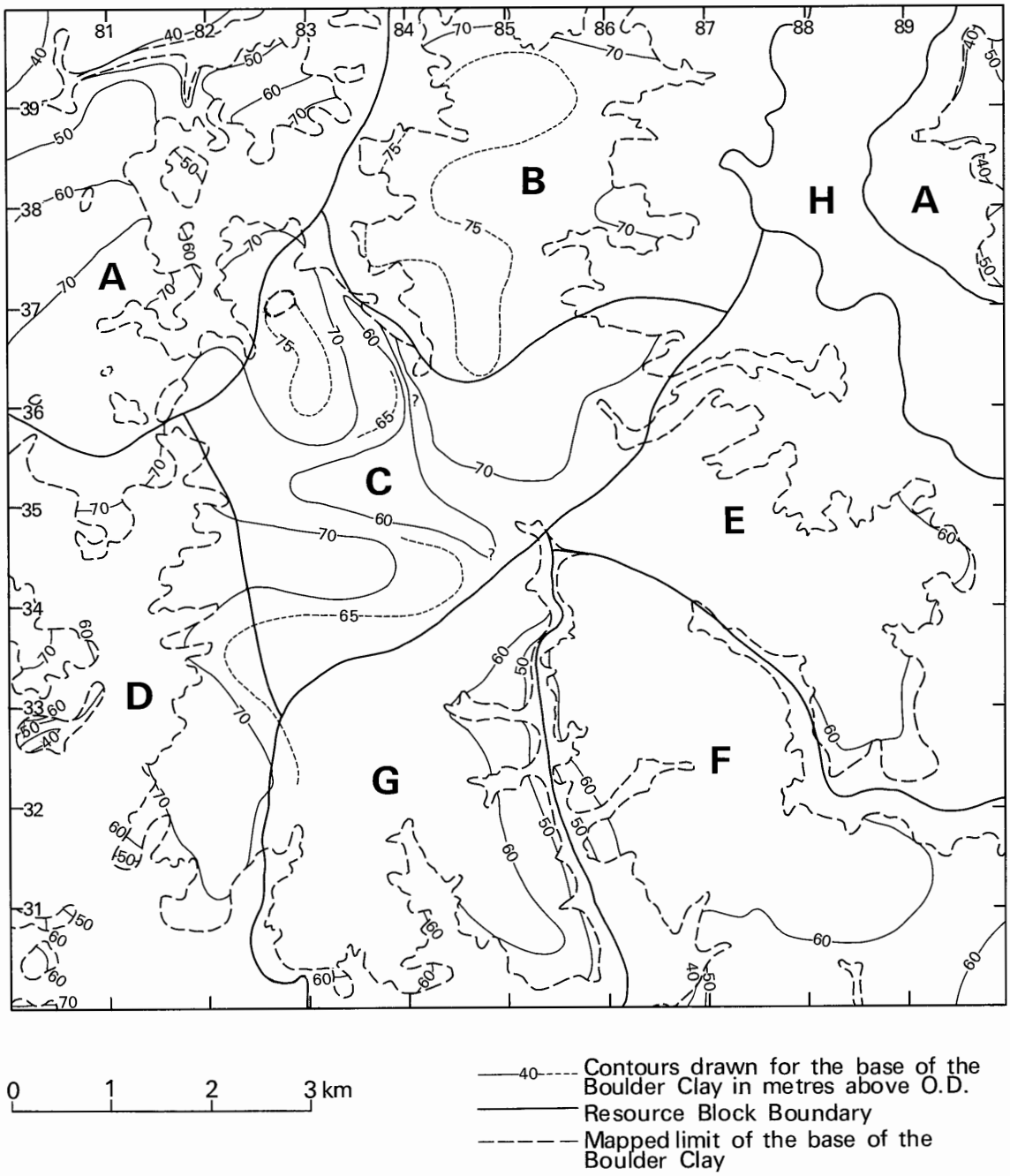


Figure 6 Map showing the sub-Boulder Clay topography

sandy clay, becoming typically brown and extremely chalky in the upper parts of the formation. Below, the deposit becomes first grey and then dark bluish grey and olive-black with additional pebbles of black mudstone and shale. The basal 20 to 30 cm generally is rather sandy and orange-brown in colour. Although the Boulder Clay is generally structureless, thin seams or partings of 'clayey' sand and gravel do occur within the deposit.

Glacial Sand and Gravel, upper
This deposit has three outcrops capping the interfluves on the western slopes of the Stour Valley between Great Henny and the Ferriers Pit, where the deposit is worked in conjunction with the underlying Kesgrave Sands and Gravels and Red Crag. Two IMAU boreholes as well as the pit section prove the deposit in this area. These show the deposit both overlying the Boulder Clay as seen in borehole NE 18 and section SE E1 and also resting directly on Kesgrave Sands and Gravels as proved in borehole NE 14. In the north-west, borehole NW 6 proved the deposit underlying 13.5 m of Boulder Clay. It consistently forms a sandy gravel and the pit section shows it to be predominantly planar bedded with small-scale tabular and trough cross bedding whilst seams of clay and silt are rare.

Head
This solifluxion deposit is developed as spreads along the lower slopes and floors of the valleys where it rests on older drift and solid formations. The lithology is extremely variable; depending on the parent rock from which it was derived. Though it generally forms an orange-brown pebbly sandy clay.

River Terrace Deposits
Stour Valley Two terraces are developed in this valley. The higher Second Terrace is of limited extent occurring between 7.6 and 10.6 m above the floodplain. There are

two small outcrops on the west of the valley between Middleton and Lamarsh [890 356] and a larger outcrop on the east at Wrong Farm [893 398]. Borehole NE 13 was sited in the most extensive outcrop of Second Terrace and proved (including soil) 3.5 m of pebbly clayey silt resting on Upper Chalk.

The First Terrace lies adjacent to the river floodplain, and up to 3.7 m above it, with only small breaks in continuity of outcrop. It is particularly well developed to the east of the Stour, north of Little Cornard [888 384], where it forms a crescent-shaped embayment that is a relict meander 'cut-off' (Boswell, 1929). The First Terrace deposits are characteristically gravels composed largely of angular flint with a thin cover of pebbly silty clay; they have a mean thickness of 6.0 m. In the past, three pits [at 887 395, 887 391 and 885 389] have exploited these terrace deposits between Little Cornard and Great Cornard [887 392].

Colne Valley The two terraces associated with the Colne Valley are more clearly defined but far less extensive than those of the Stour. The Second Terrace, approximately 4.6 m above the present floodplain level, is sandy where it outcrops [805 316] west of the River Colne and gravelly near Colne Engaine [851 305] to the north of the river. The First Terrace, its surface 1.5 to 1.8 m above the present floodplain level, forms a good feature either side of the river and is composed predominantly of silt and rare deposits of gravel.

Belchamp Valley Deposits of First Terrace, rising to 1.8 m above the present floodplain, form small isolated patches composed of silt, sand and gravel.

Alluvium

Floodplains underlain by Alluvium are associated with most of the larger streams. By far the most extensive floodplain is that of the Stour Valley. The Alluvium consists chiefly of very soft, clayey fine sandy silt, mottled yellowish grey and orange in the upper part, becoming dark grey or bluish grey with depth. Fragments of wood are present within seams of peat which also contain fresh-water gastropod shell debris. The basal sequence typically includes pebbles and in places may be a gravel as recorded in the Stour Valley in boreholes NE 17 and NE 23.

Other drift deposits in the district are of very limited extent and include *Calcareous Tufa* [844 308 and 869 305] associated with tributaries of the River Colne, and *Peat* [888 389] in a silted-up oxbow lake in the Stour Valley north of Little Cornard. A series of lacustrine clays, silts and fine sands grouped as *Lacustrine Deposits* are present [890 382] south of Little Cornard in the Stour Valley.

COMPOSITION OF SAND AND GRAVEL

Five of the drift deposits and two solid formations include potentially workable sand and gravel: they are the Kesgrave Sands and Gravels, Barham Sands and Gravels, Glacial Sand and Gravel, upper, River Terrace Deposits and Alluvium and the Red Crag and Lower London Tertiaries respectively. The mean grading of the different deposits is illustrated in Figure 7 and an indication of their composition is displayed in Table 2. This shows the gravel fraction of the deposits to be predominantly composed of flint with subordinate quartz and quartzite. With the exception of the well rounded examples the flints are predominantly patinated, bearing white, porcellain-textured 'skins' that may constitute the whole of a pebble, particularly in the fine gravel fraction.

Lower London Tertiaries Only the middle, 'sandy', subdivision (Woolwich Beds) of the Woolwich and Reading Beds falls within the definition of mineral, with a mean grading of fines 15% and sand 85%: a 'clayey' sand. A few fine well-rounded flint pebbles are also present in boreholes NW 11 and NE 25. The sand fraction is predominantly subrounded quartz with an average grading of fine sand 68%, medium sand 31% and coarse sand 1%. Laminae of dark grey plastic clay are common, especially towards the base.

Red Crag The Red Crag is potentially workable and grades as a pebbly sand with a mean grading of fines 5%, sand 87% and gravel 8%. This deposit is more gravelly in the south with borehole SW 14 grading exceptionally as a gravel (Table 10), whereas many boreholes in the north prove that the mineral grades as sand. Iron-pan layers are common in this typically iron-stained deposit while the base is occasionally cemented into a sandstone containing siltstone seams.

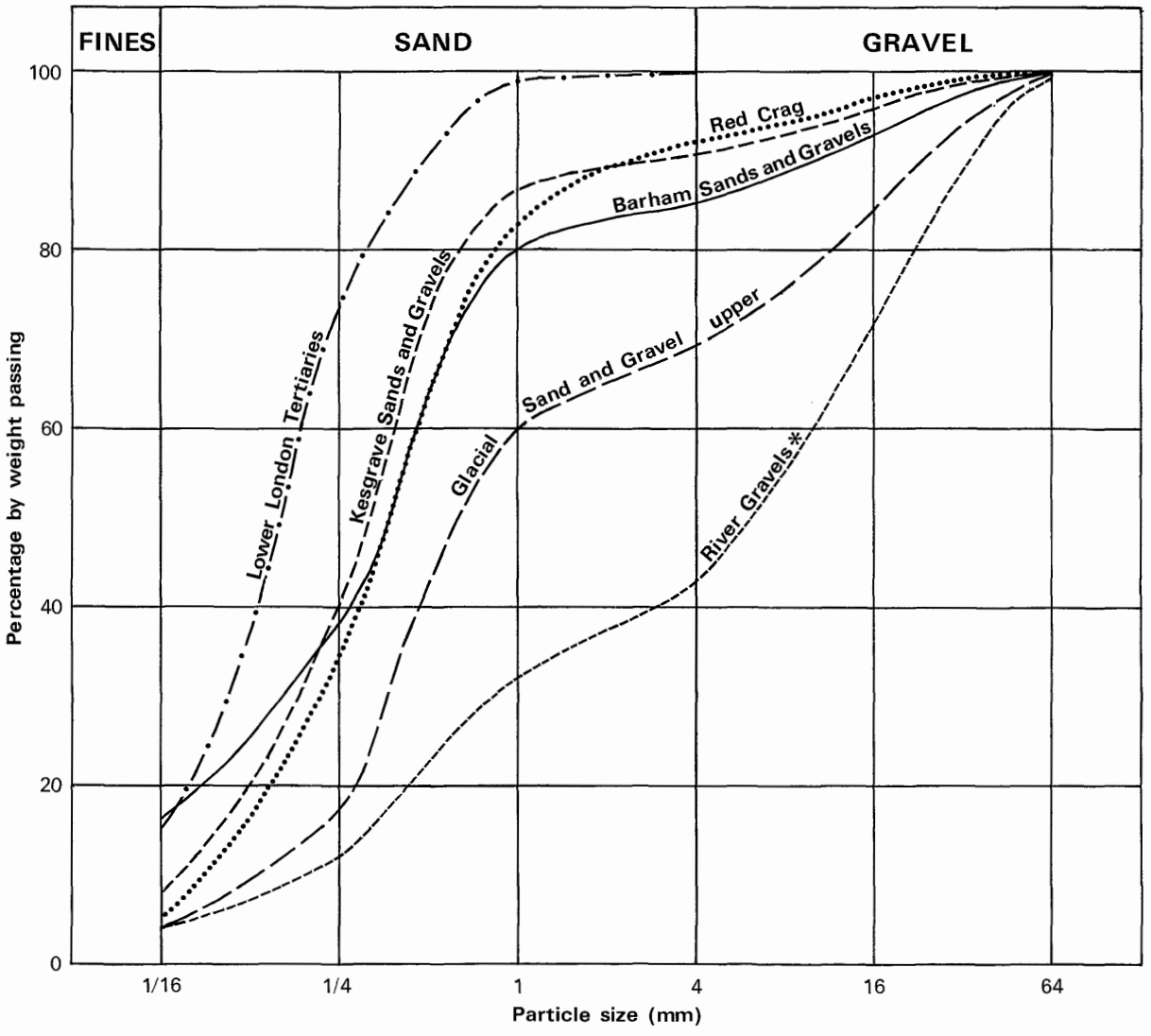
The gravel fraction is predominantly fine in grade with cobbles reported only from boreholes SW 14 and SE 22. This fraction is largely composed of both well rounded and subangular flint with rounded quartzite and generally fine rounded quartz which grades down into sand. However, boreholes SW 16, SE 5, SE 12 and SE 13 show the gravel in the base of this deposit to be largely composed of shell debris which is also present in the sand fraction.

The sand fraction has an average grading of fine sand 35%, medium sand 55% and coarse sand 10% and is largely composed of subangular to subrounded iron-stained quartz. Seams of clay and sandy clay about 10 cm thick are present, but the percentage of disseminated fines is low.

Kesgrave Sands and Gravels The mineral-bearing Kesgrave Sands and Gravels are divisible into two characteristic lithologies; the mineral in blocks A, B, C and D commonly grades as sand, whereas that in blocks E, F and G is classified as pebbly sand or sandy gravel. Of the 77 boreholes which sampled this deposit, 55% proved sand, 'clayey' sand or 'very clayey' sand categories, 22% the pebbly sand range of categories, 21% the sandy gravel categories and 2% proved gravel. Of those in the sand categories, 40% proved to be 'clayey' or 'very clayey', but this fell to 18% in the pebbly sand categories and 6% in the sandy gravel categories. Overall, the deposit is classified as pebbly sand with a mean grading of fines 8%, sand 83% and gravel 9%.

The gravel fraction is composed of both fine and coarse grades with a trace of cobbles. It consists of angular to subrounded with well rounded flints, generally fine rounded to well rounded quartz and largely coarse subrounded to rounded light grey quartzite. Some pebbles of friable greenish grey sandstone and tough chert are present while igneous and metamorphic rock types occur in trace amounts.

The fine and medium sand fractions consist almost exclusively of quartz. Flint constitutes a small proportion of the coarse sand fraction especially in the poorly sorted parts of the deposit where angular chips of flint create a sharp texture. Flakes of white mica are conspicuous especially where the deposit is a sand, which is also characterised by seams of laminated clay that are



DEPOSIT	Percentage by weight passing					
	1/16mm	1/4mm	1mm	4mm	16mm	64mm
River Gravels *	4	12	32	43	72	99
Glacial Sand and Gravel Upper	4	17	60	69	84	100
Barham Sands and Gravels	16	38	80	85	93	100
Kesgrave Sands and Gravels	8	41	87	91	96	100
Red Crag	5	35	83	92	97	100
Lower London Tertiaries	15	73	99	100	100	100

* River Terrace Deposits including Alluvium

Figure 7 Mean particle-size distribution of the mineral-bearing deposits. The River Gravels in the table comprise River Terrace Deposits including Alluvium

particularly prominant in the area of block B. The sand fraction has a mean grading of fine sand 40%, medium sand 55% and coarse sand 5%.

Barham Sands and Gravels This deposit is particularly variable ranging from 'very clayey' sand to sandy gravel, and has a mean grading of fines 16%, sand 69% and gravel 15%, forming a 'clayey' pebbly sand overall.

The gravel fraction, fine and coarse with a trace of cobbles, consists largely of angular to subangular flint with well rounded flint, generally fine subrounded to rounded quartz and subrounded quartzite. A small pro-

Table 2 Pebble count analyses

Deposit	Sample details	Size range of material (mm)	Number of pebbles counted	Composition (percentage)						
				Flint			Quartz chiefly rounded to well rounded	Quartzite chiefly rounded to well rounded	Sandstone chiefly subrounded to well rounded	Others chiefly rounded to well rounded
				angular to subangular	subangular to subrounded	subrounded to well rounded*				
Alluvium	Amalgamated samples taken from the sub-alluvial sand and gravel at borehole NE 23 on the flood-plain of the Stour	+16–37.5	72	35	47	6	1	3	3	5†
		+10–16	389	59	24	2	4	5	–	6‡
River Terrace Deposits	Amalgamated samples taken from the 'First' Terrace of the Stour at borehole NE 24	+16–37.5	256	50	20	13	7	9	–	1
		+10–16	329	56	14	10	9	5	2	4
Glacial Sand and Gravel, upper	The Ferriers Pit [8946 3437]. Sample taken from between 6 m and 8 m§	+19–37.5	66	26	50	13	5	5		1
		+9.5–19	285	23	27	17	21	3	3	6
Kesgrave Sands and Gravels	Ansell's Farm Pit [8700 3588]. Sample taken between 11.0 m and 13.0 m§	+19–37.5	127	16	23	21	16	14	5	5
		+9.5–19	407	9	29	9	29	14	5	5
	The Ferriers Pit [8946 3437]. Amalgamated samples taken from between 12 m and 14 m§	+19–37.5	150	33		33	13	9	4	8
		+9.5–19	427	9	30	15	28	13	3	2
Red Crag	The Ferriers Pit [8946 8437]. Sample taken from basal ferruginous gravel between 18 m and 20 m§	+19–37.5	369	6	20	36	6	29		3
		+9.5–19	528	6	21	20	23	21	3	6

* Chiefly well rounded.
† Includes 1% chalk.
‡ Includes 4% chalk.
§ Depth below ground level.

portion of chalk pebbles is present in some boreholes. Other deleterious rock types are rare. Igneous and metamorphic rocks occur in trace amounts.

The sand fraction is predominantly of medium grade and has a mean grading of fine sand 30%, medium sand 61% and coarse sand 9%. This is composed of subangular to rounded quartz with angular flint and quartzite grains in the coarse fraction giving the deposit a sharp texture. A trace of chalk occurs in some boreholes. Typically the deposit includes a prominant percentage of fines, developed in places as a matrix between the grains of sand and gravel and elsewhere forms as clay 'skins' on pebbles. However, in three boreholes the fines content is less than 5%.

Glacial Sand and Gravel, upper Potentially workable sand and gravel within this deposit has a mean grading of fines 4%, sand 65% and gravel 31% giving a mineral classification of sandy gravel.

The gravel fraction, coarse and fine, is predominantly composed of angular with subrounded and well rounded flint, rounded to well rounded quartz and some rounded brown and red quartzite (Table 2). Pebbles of friable greenish grey sandstone, ironstone, tough chert and igneous and metamorphic rock types occur in trace amounts.

The fine and medium sand fraction consists entirely of subangular to subrounded grains of quartz. Flint constitutes a small proportion of the coarse sand fraction where it creates a sharp texture. The sand fraction has a mean grading of fine sand 20%, medium sand 66% and coarse sand 14%.

River Terrace Deposits including Alluvium (River Gravel)

Potentially workable sand and gravel within these deposits is restricted to the First Terrace and Alluvium of the Stour Valley; this mineral grades as gravel with a mean grading of fines 4%, sand 39% and gravel 57%.

The gravel fraction consists of both fine and coarse grades with some cobbles and is composed chiefly of angular to subangular flint with some subrounded to well rounded flint, rounded chalk, rounded quartz and subrounded quartzite. Pebbles of sandstone, chert, jasper and other exotic rock types occur in only trace amounts. The chalk content is more prominent at the base of the Alluvium where it rests on Upper Chalk.

The sand fraction has a sharp texture and a mean grading of fine sand 21%, medium sand 51% and coarse sand 28%. Though largely composed of subangular to subrounded quartz it contains significant proportions of subangular flint especially in the coarse fraction and some subrounded chalk which is prominent towards the base of the Alluvium.

THE MAP

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

Geological data

The geological boundary lines and most of the symbols are taken from the geological map of the area which was recently surveyed at the scale of 1:10 560 by Field Staff in the Institute's East Anglia and South-East England Unit. Borehole data, which include the stratigraphic relations, thicknesses and mean particle-size distribution of the sand and gravel samples collected during the assessment, are also shown.

The geological boundaries are regarded as the best interpretation of the information available at the time of survey. However, it is inevitable, particularly with drift deposits which change rapidly vertically and laterally, that local discrepancies will be revealed by some boreholes.

Mineral resource information

The mineral-bearing ground is subdivided into resource blocks (see Appendix A). Within a resource block the mineral is subdivided into areas where it is exposed and areas where it is present beneath overburden. The mineral is identified as exposed where the overburden, commonly consisting only of soil and subsoil, averages less than 1.0 m in thickness. Beneath overburden the mineral may be continuous (or almost continuous) or discontinuous. The recognition of these categories is dependent upon the importance attached to the proportion of boreholes which did not find potentially workable sand and gravel and the distribution of barren boreholes within a block. The mineral is described as 'almost continuous' if it is present in 75 per cent or more of the boreholes in a resource block. The 'discontinuous' category has not been recognised on the present sheet.

Areas where bedrock crops out and where the borehole evidence indicates that sand and gravel is not potentially workable or is absent, are uncoloured on the Map; where appropriate the reason is given. In such areas it has been assumed that mineral is absent except in infrequent and relatively minor patches which can neither be outlined nor assessed quantitatively in the context of this survey. Areas of unassessed sand and gravel are indicated by a red stipple.

The area of the exposed sand and gravel is measured from the mapped geological boundary lines. The whole of this area is considered as mineral, although it may include small areas where sand and gravel is not present or is not potentially workable. Inferred boundaries have been inserted where sand and gravel beneath cover is interpreted to be not potentially workable or absent. Such boundaries (for which a distinctive symbol is used) 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 7 and 8 and Tables 4 to 11.

Accuracy of results

For the eight resource blocks, the confidence limits at the symmetrical 95 per cent probability level varies between 12 per cent and 39 per cent (that is, it is probable that nineteen times out of twenty the true volumes present lie within these limits). However, the true values are more likely to be nearer the figures estimated than the limits. Moreover, it is probable that in each block roughly the same percentage limits would apply for the estimate of volume of a very much smaller parcel of ground (say, 200 acres) 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 reserves of 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 volume (867 million m^3) can be estimated to limits of ± 9 per cent at the 95 per cent probability level, by a calculation based on the data from sample points in the eight resource blocks.

However, it must be emphasised that the quoted volume of sand and gravel has no simple relationship with the amount that could be extracted in practice, as no allowance has been made in the calculations for any restraints (such as existing buildings and roads) on the use of the land for mineral working.

NOTES ON RESOURCE BLOCKS

The district is divided into eight resource blocks (Figure 2) the boundaries of which have been drawn primarily to separate the two lithologies of the Kesgrave Sands and Gravels and the River Gravels. Blocks A, B, C and D circumscribe the sandy lithology of the Kesgrave Sands and Gravels, while blocks G, E and F demarcate the sandy gravel lithology. Block H encompasses the River Gravels of the Stour Valley (Figures 7 and 8).

As the Red Crag, Kesgrave Sands and Gravels, and Barham Sands and Gravels typically rest above each other and are not readily separable at outcrop they are dealt with as one mineral unit in this section. Figure 6 may be used with caution to estimate the thickness across the area of Boulder Clay (overburden) and of the sub-Boulder Clay sand and gravel deposits (mineral) if read in conjunction with Figures 2 and 5.

Block A

This block has a total area of 15.9 km^2 of which 8.5 km^2 is mineral-bearing; it is composed of two separate parts that are combined in one block because of their similar geological setting. The larger part situated in the north-west of the district, includes the valleys of the Belchamp Brook and Widgery Brook [822 386]; the smaller part lies to the east of the River Stour. Mineral-bearing Lower London Tertiaries are restricted to this block, but they have not been assessed due to the limited number of sample points (Table 4).

The mineral included in the western part of the block largely comprises Barham Sands and Gravels although Red Crag and Kesgrave Sands and Gravels are present in the south and Glacial Sand and Gravel, upper, in the north. In this sector the buried bedrock surface (Figure 5) falls rapidly from over 60 m above OD in the south, the crest of a buried escarpment of Tertiary strata, to less than 30 m above OD in the north. The ridge of Tertiary beds appears to form a barrier influencing deposition to the south as shown by boreholes NW 4, NW 8, NW 9 and NW 15 which proved respectively 11.4 m, 11.3 m, 7.0 m and 11.1 m of mineral. In the vicinity of the buried escarpment these deposits become patchy in their distribution and extremely variable both in thickness and composition. For example, at borehole NW 2, NW 3 and NW 7 either Boulder Clay or Glacial Silt rests directly on bedrock, at borehole NW 12 only 1.2 m of 'clayey' sand overlies bedrock and at borehole NW 18, 4.1 m of 'clayey' pebbly sand rests on bedrock. At borehole NW 13, 2.9 m of non-mineral sand and gravel rests on London Clay.

These mineral and non-mineral areas are separated on the resource map by an inferred boundary which closely coincides with the 60 m contour, leaving the valleys barren.

To the north of the Belchamp Brook there is an exceptional thickness of drift as indicated by boreholes NW 1 and 6. The former was terminated in Boulder Clay at 19.7 m while the latter proved 13.5 m of Boulder Clay to overlie sand and gravel in excess of 13.2 m thick.

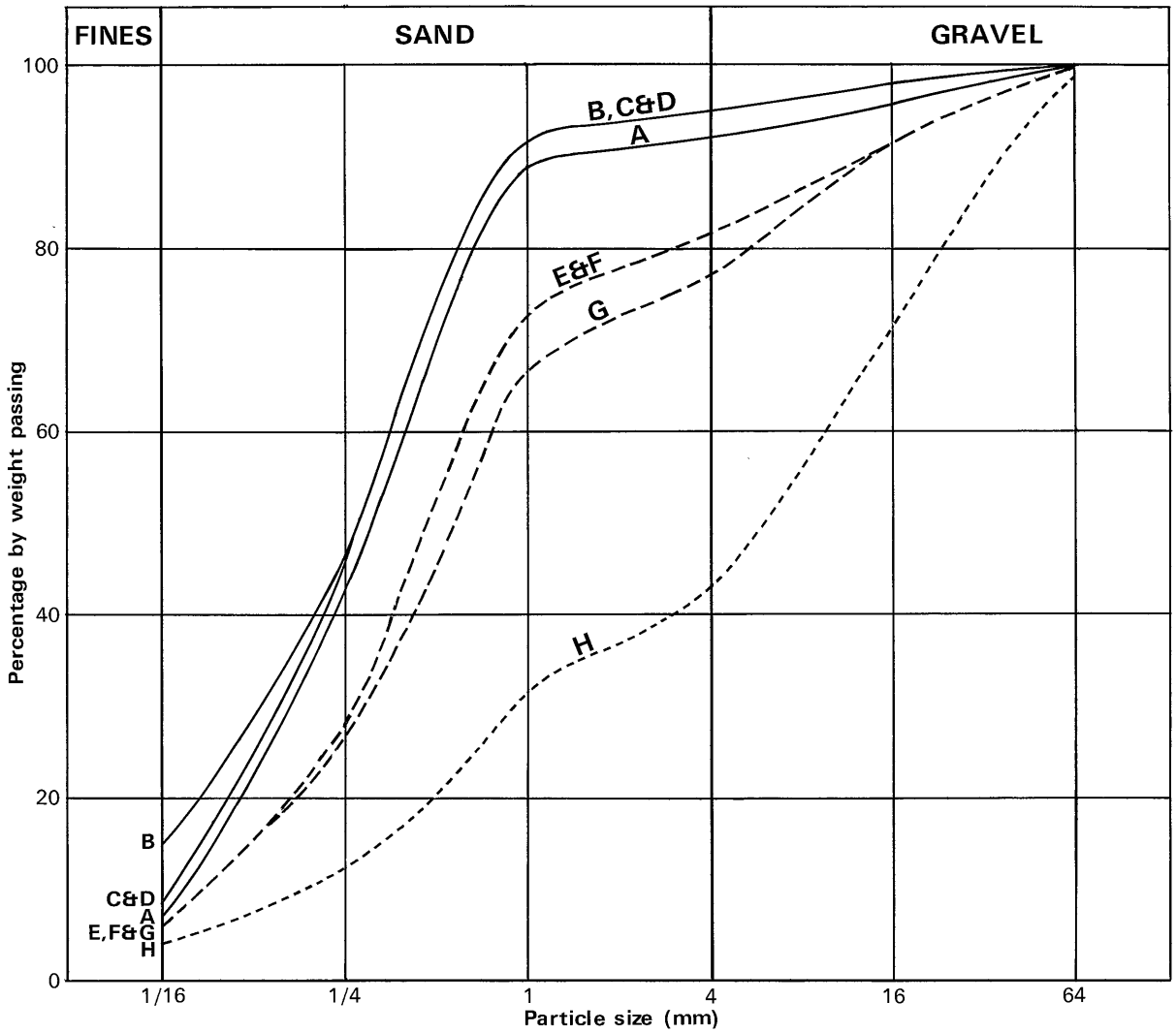
Patches of River Gravel associated with the Belchamp Brook consist chiefly of very silty pebbly sand or loam but they are too small in extent to warrant assessment.

The eastern part of the block includes part of the much-dissected eastern slopes of the Stour Valley. Here the assessment is complicated by extensive spreads of Head which mask the variable sediments beneath. In the vicinity of Lower Farm [895 380], for example, an outcrop of Head rests upon London Clay in the valley and continues to the top of the ridge to the north where it rests on Boulder Clay. The combined sand and gravel unit is probably concealed along the valley. Borehole records support this complex picture with borehole NE 21 showing 4.8 m of Boulder Clay on 4.3 m of mineral, while at borehole NE 20 to the north 5.7 m of till rests directly on Reading Beds' clay.

For resource calculations, ten IMAU boreholes (Table 4) and two other borehole records have been

Table 3 Assessment of resources: Summary of statistical results

Resource Block	Area		Mean thickness		Volume of sand and gravel			Mean grading percentages		
	Block	Mineral	Over-burden	Mineral		Limits at the 95% confidence level		Fines $-\frac{1}{16}$ mm	Sand $+\frac{1}{16}$ -4 mm	Gravel $+4$ mm
	km^2	km^2	m	m	$m^3 \times 10^6$	$\pm\%$	$\pm m^3 \times 10^6$			
A	15.9	8.5	5.5	7.8	66	39	26	7	85	8
B	13.2	10.9	5.7	13.7	149	16	24	15	80	5
C	12.2	10.2	7.5	13.3	136	26	35	9	87	4
D	11.7	10.7	3.0	13.1	140	23	32	8	89	3
E	14.4	11.6	5.2	12.4	144	15	22	6	76	18
F	13.7	12.9	6.4	11.8	153	12	18	6	76	18
G	11.6	9.9	8.8	8.3	82	25	21	5	72	23
H	5.2	4.1	2.1	4.0	17	39	6	4	39	57
Total (A to H)	98.0	78.8	5.6	11.0	867	9	78	8	79	13



Where values are within two percentage points they are represented as a single line

RESOURCE BLOCK	Percentage by weight passing					
	1/16mm	1/4mm	1mm	4mm	16mm	64mm
A	7	43	89	92	96	100
B	15	46	92	95	98	100
C	9	45	93	96	98	100
D	8	46	93	97	99	100
E	6	28	74	82	92	100
F	6	29	73	82	92	100
G	5	26	67	77	91	100
H	4	12	32	43	72	99

Figure 8 Mean particle-size distribution for the assessed thickness of sand and gravel in the resource blocks. Where values for two resource blocks lie within two percentage points of each other, they are represented by a single line on the graph

Table 4 Data from IMAU boreholes: Block A

Borehole	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines $-\frac{1}{16}$ mm	Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm	Medium sand $+\frac{1}{4}-1$ mm	Coarse sand $+1-4$ mm	Fine gravel $+4-16$ mm	Coarse gravel $+16$ mm
NW 4	12.9	9.7	6	33	58	2	1	0
NW 6	13.2	13.5	3	20	41	6	13	17
NW 8	11.3	2.3	6	49	41	1	1	2
NW 9	7.0	6.2	12	44	42	2	0	0
NW 11	4.2	2.5	6	48	46	0	0	0
NW 12	1.2	3.1	16	26	53	3	1	1
NW 13	Mineral absent							
NW 15	11.1	5.8	8	41	49	2	0	0
NW 18	4.1	0.6	12	20	45	5	11	7
NE 21	4.3	4.8	6	43	29	8	8	6
Mean	7.8*	5.5*	7	36	46	3	4	4
LOWER LONDON TERTIARIES								
NW 2	3.2	13.2	20	75	5	0	0	0
NW 11	3.2	2.9	14	71	14	1	0	0
NE 25	5.8	4.7	12	42	44	2	0	0
Mean	4.1	6.9	15	58	26	1	0	0

* Figures include data from 2 non-IMAU boreholes.

used. They show a mean mineral thickness of 7.8 m with a maximum recorded thickness of 13.7 m. The mineral has a mean grading of fines 7%, sand 85% and gravel 8% and a volume of 66 million $m^3 \pm 39\%$ at the 95% probability level. The overburden has a mean thickness of 5.5 m and reaches a maximum recorded thickness of 13.5 m in borehole NW 6.

Block B

In contrast to block A this region is less complex. It is situated on the interfluve between the valleys of the Belchamp Brook and River Stour and has an area of 13.2 km^2 of which 10.9 km^2 is mineral-bearing. Bedrock is exposed along both the west and east margins, with exposed mineral in the north, west and east, while the central area is characterised by mineral beneath overburden. The mineral comprises Red Crag, Kesgrave Sands and Gravels and Barham Sands and Gravels.

To the north-east of Bulmer Tye [849 389] a depression in the bedrock surface (Figure 5) is reflected in a dramatic increase in the sand and gravel thickness as shown by two boreholes, NE 38 and 40 where 20.4 m and 29.3 m respectively of sand and gravel was proved. Six IMAU boreholes (NW 24, NW 25, NE 1, NE 2, NE 3 and NE 4) sited on the plateau were terminated in mineral at the maximum depth of 24.4 m.

The quality of the mineral within this block is comparatively low. The Barham Sands and Gravels are thick and laterally persistent, while the Red Crag is absent over the western half of the block; the Kesgrave Sands and Gravels are of a sandy lithology, commonly containing beds of highly micaceous interlaminated silt and clay

Table 5 Data from IMAU boreholes: Block B

Borehole	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines $-\frac{1}{16}$ mm	Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm	Medium sand $+\frac{1}{4}-1$ mm	Coarse sand $+1-4$ mm	Fine gravel $+4-16$ mm	Coarse gravel $+16$ mm
NW 22	11.5	9.0	13	45	39	2	1	0
NW 23	15.9	4.3	10	22	63	4	1	0
NW 24	13.9	10.5	19	33	42	3	2	1
NW 25	9.5	10.3	19	18	34	5	9	15
NW 28	1.9	0.8	No grading data					
NE 1	14.0	10.4	14	28	54	2	1	1
NE 2	11.9	12.6	19	26	43	3	7	2
NE 3	10.6	12.1	10	39	48	2	1	0
NE 4	12.9	11.5	22	34	32	5	5	2
NE 7	20.7	1.4	12	37	44	3	2	2
NE 8	16.4	1.3	16	37	42	2	2	1
NE 9	16.0	0.8	11	25	58	3	2	1
Mean	13.7*	5.7*	15	31	46	3	3	2

* Figures include data from 8 non-IMAU boreholes.

which are regarded as waste where they exceed one metre in thickness, as, for example, in boreholes NW 22, NW 25, NE 3, NE 8 and NE 9. The mean grading is fines 15%, sand 80% and gravel 5%.

Twelve IMAU boreholes (Table 5) and eight other borehole records were used in the assessment. They prove a mean mineral thickness of 13.7 m, a maximum recorded thickness of 20.7 m and an estimated volume of 149 million $m^3 \pm 16\%$ at the 95% probability level. The overburden has a mean thickness of 5.7 m and a maximum recorded thickness of 12.6 m.

Block C

This block encompasses the plateau lying between Wickham St Paul [831 364], Twinstead [863 366] and Little Maplestead [825 341]. It has an area of 12.3 km^2 which includes 10.2 km^2 of mineral-bearing ground. Beneath the plateau, mineral is typically concealed by thick overburden. As for previous blocks the Red Crag, Kesgrave Sands and Gravels (sandy lithology) and Barham Sands and Gravels are grouped together for assessment purposes.

Mineral has proved to be discontinuous beneath overburden and two barren areas are delineated on the resource map by inferred boundaries. The smaller area, situated in the extreme south of the block, is barren due to excessive overburden. However, in the larger area there is a Boulder Clay-filled channel (Figure 6) which has caused a general thinning and local absence of the mineral-bearing deposits. Though mineral was absent at borehole NW 19 this was regarded as exceptional, and so the area is considered to be in the 'continuous or almost continuous mineral' category.

The drift sequence is relatively thick beneath much of the block and as a consequence boreholes NW 16, NW 26, SW 10, SW 15, NE 5 and NE 6 were all terminated within mineral at the maximum prescribed drilling depth of 24.4 m. As these IMAU boreholes did not prove bedrock the full thickness of sand and gravel can only be inferred from auxiliary boreholes, which record a maximum thickness of 22.9 m at borehole NE 28. The mean thickness of mineral proved is 13.3 m. A number of waste horizons of laminated silt and clay are present in the Kesgrave Sands and Gravels encountered in boreholes NW 14, NW 16, NW 26, NE 6 and SW 10.

This assessment is based on a total of eleven IMAU boreholes (Table 6) and two others and gives an estimated volume of 136 million $m^3 \pm 26\%$ at the 95% probability level. The mineral has a mean grading of fines 9%, sand 87% and gravel 4%, while the overburden has a mean thickness of 7.5 m with a maximum recorded thickness at borehole SW 15 of 14.6 m.

Block D

The Colne Valley in the south dominates this block along with a tributary valley to the south of Great Maplestead. The urban area of Halstead lies in the south-east. This block of 11.7 km^2 contains 10.7 km^2 of mineral-bearing ground of which 5.5 km^2 is exposed (that is, it carries less than one metre overburden) in the valley sides. In the floor of the tributary valley a thin layer of Head masks the mineral deposits, while on the plateau the mineral is overlain by Boulder Clay which proved to be in excess of 18.0 m thick in the east about borehole SW 11. None of the mineral-bearing formations, the Red Crag, Kesgrave Sands and Gravels and Barham Sands and Gravels, is present beneath the Colne Valley. The River Gravels in this area were considered to be too limited in area to be included in the assessment.

Borehole SW 3 provided an anomalous record within the area classified as 'continuous or almost continuous mineral'. It showed 8.2 m of sandy, decalcified till and very clayey sand and gravel on 9.1 m of fresh chalky till, on London Clay. This is surprising as the undivided unit of sand and gravel is mapped only 40 m to the south of the borehole. Thick developments of laminated silt and clay are fewer in the Kesgrave Sands and Gravels of this block than in blocks B and C, being restricted to boreholes NW 5 and SW 1. Nevertheless, thin seams of tenaceous clay and highly micaceous silt occur at intervals throughout the deposit. The bulk of the mineral in this block is yellowish pale grey, fine- to medium-grained soft sand which has been worked on a small scale at numerous localities. It was formerly exposed in a nine-metre face at Kilowen Cottages Pit.

The mean thickness of mineral is 13.1 m and the maximum recorded thickness is 21.1 m proved in borehole SW 6; while the overburden has a mean thickness of 3.0 m and a maximum recorded thickness of 12.2 m. Only at borehole SW 12 does the sand and gravel extend below

Table 6 Data from IMAU boreholes: Block C

Borehole	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines $-\frac{1}{16}$ mm	Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm	Medium sand $+\frac{1}{4}-1$ mm	Coarse sand $+1-4$ mm	Fine gravel $+4-16$ mm	Coarse gravel $+16$ mm
NW 14	12.4	1.0	13	31	53	2	1	0
NW 16	16.9	5.1	10	34	50	2	2	1
NW 17	11.9	4.8	5	39	55	1	0	0
NW 19	Mineral absent							
NW 26	12.6	11.8	8	54	37	1	0	0
NE 5	20.1	4.3	10	39	43	3	3	2
NE 6	17.0	3.8	8	40	43	3	3	3
NE 11	15.9	6.3	9	34	47	6	3	1
SW 10	11.3	11.6	13	24	50	2	5	6
SW 15	9.8	14.6	5	38	50	4	2	1
SW 20	13.3	11.1	7	26	61	5	1	0
Mean	13.3*	7.5*	9	36	48	3	2	2

* Figures include data from 2 non-IMAU boreholes.

Table 7 Data from IMAU boreholes: Block D

Borehole	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines $-\frac{1}{16}$ mm	Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm	Medium sand $+\frac{1}{4}-1$ mm	Coarse sand $+1-4$ mm	Fine gravel $+4-16$ mm	Coarse gravel $+16$ mm
NW 5	15.7	2.0	9	37	48	3	1	2
NW 10	15.7	0.3	9	38	51	2	0	0
SW 1	10.5	0.9	6	36	55	2	1	0
SW 2	16.5	4.9	8	56	32	2	1	1
SW 3	Mineral absent							
SW 4	14.6	1.5	7	34	50	3	2	4
SW 5	6.1	0.9	12	46	29	7	4	2
SW 6	20.5	1.1	6	35	54	3	1	1
SW 7	16.1	0.3	6	37	50	5	1	1
SW 8	17.5	6.4	8	49	35	4	2	2
SW 9	9.9	0.5	9	18	51	7	9	6
SW 12	16.0	8.4	9	43	42	4	1	1
SW 13	14.0	4.1	7	28	56	5	3	1
Mean	13.1*	3.0*	8	38	47	4	2	1

* Figures include data from 2 non-IMAU boreholes.

24.4 m from the surface. The assessment was based on thirteen IMAU boreholes (Table 7) and two other borehole records, which give an estimated volume of 140 million $m^3 \pm 23\%$ at the 95% probability level, and a mean grading for the block of fines 8%, sand 89% and gravel 3%.

Block E

The block lies between the valleys of the Stour and Cambridge Brook and comprises plateau country that has been deeply dissected in the north by tributary valleys of the River Stour. Of this area (14.4 km^2), mineral-bearing ground covers 11.6 km^2 and includes deposits of Red Crag, Kesgrave Sands and Gravels, Barham Sands and Gravels and Glacial Sand and Gravel, upper. The bulk of the mineral-bearing Kesgrave Sands and Gravels is of the sandy gravel lithology (Essex White Ballast) while sands of the type described in blocks B, C and D occur towards the western boundary where there is interdigitation of the two lithologies. Mineral-bearing Barham Sands and Gravels are only present across the centre of the block. While potentially workable Glacial Sand and Gravel, upper occurs in the north-east capping interfluves on the west of the Stour Valley.

Mineral is generally absent from the floors of the dissecting valleys whose streams have removed the mineral-bearing deposits. In places deposits of Head mask the mineral-bedrock boundary. West of Blake Hall [900 334] Head conceals the contact between the undivided sand and gravel unit and London Clay, necessitating the use of an inferred boundary on the resource map. Both Ansell's Farm Pit (now disused), and the Ferriers Pit occur in this block with a total area of worked-out ground of 0.4 km^2. Their location is at least in part a reflection of the locally relatively high percentage of gravel in the mineral which, for the block as a whole, has a mean grading of fines 6%, sand 76% and gravel 18%.

The mean thickness of mineral, 12.4 m, is based on

Table 8 Data from IMAU boreholes: Block E

Borehole and Sections	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines $-\frac{1}{16}$ mm	Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm	Medium sand $+\frac{1}{4}-1$ mm	Coarse sand $+1-4$ mm	Fine gravel $+4-16$ mm	Coarse gravel $+16$ mm
NE 10	15.8	4.2	7	30	54	6	2	1
NE 14	13.0	0.1	11	16	50	6	10	7
NE 18	16.6	0.4	6	12	47	11	14	10
NE E1	8.0	8.0	7	20	62	4	5	2
SE 1	9.1	3.0	6	37	45	8	2	2
SE 5	11.8	8.2	5	33	40	11	7	4
SE 11	9.5	1.8	5	29	51	8	5	2
SE 12	10.0	12.0	7	28	45	9	7	4
SE 17	10.5	8.4	6	17	37	10	16	4
SE 18	13.2	3.3	5	33	43	7	6	6
SE 19	10.0	8.6	5	15	36	13	21	10
SE 22	7.5	1.3	4	16	41	8	16	15
SE E1	21.1	0.5	5	12	41	7	14	21
Mean	12.4*	5.2*	6	22	46	8	10	8

* Mean figures embrace data from non-IMAU boreholes.

thirteen IMAU boreholes (Table 8), five auxiliary borehole records, commercial records and two pit sections from which a continuous series of bulk samples were taken (Appendix F, NE E1 and SE E1). The estimated volume of mineral is 144 million $m^3 \pm 15\%$ at the 95% probability level. Overburden reaches a maximum in borehole SE 12 of 12.0 m while the mean is 5.2 m.

Block F

Pebmarsh, White Colne and Wakes Colne lie within this block, which is composed chiefly of plateau country lying between the Cambridge and Pebmarsh brooks. The block has an area of 13.7 km^2 of which 12.9 km^2 is mineral-bearing. The assessment of sand and gravel resources is based on thirteen IMAU boreholes (Table 9) and three other borehole records which prove that the Red Crag, Kesgrave Sands and Gravels and Barham Sands and Gravels include mineral, to an average thickness of 11.8 m. The calculated volume of mineral is 153 million $m^3 \pm 12\%$ at the 95% probability level; it has a mean grading of fines 6%, sand 76% and gravel 18%.

Mineral is continuous beneath the thick mantle of Boulder Clay on the plateau and crops out in the valley sides above the bedrock floor. In the extreme south of the block, mineral is absent at two localities [866 300 and 884 300] near White Colne. At both localities Boulder Clay rests directly upon London Clay in the valley, while boreholes prove thick deposits of mineral beneath the plateau only a few hundred metres away. Though the mineral thickness is fairly constant it does thicken locally at boreholes SE 31 and SE 10 where 16.5 m and 14.8 m of mineral were proved, respectively. Overburden ranges within the block up to 14.2 m thick while the mean thickness is 6.4 m.

Block G

The block is bounded by the Colne Valley to the south and by the valley of the Pebmarsh Brook to the east, with the ground level rising to the north-west. Boulder Clay overburden overlies the combined mineral of the Red Crag, Kesgrave Sands and Gravels and Barham Sands and Gravels. London Clay floors the valleys and underlies the mineral. The assessment is based on ten IMAU boreholes and three other records. Thickness of overburden and mineral together with grading data for individual IMAU boreholes are listed in Table 10.

Mineral is present over most of the block. However, to the north-east of Halstead the relatively high topography, coupled with the slight drop in elevation of the Boulder Clay and sub-Boulder Clay sands and gravels contact, gives an overburden to mineral ratio that exceeds 3:1 locally. Thus a small area of 'barren' ground is delineated on the resource map. Immediately west of the Pebmarsh Brook there is a narrow area of barren ground in which sand and gravel is either absent or is of insufficient thickness to be classified as mineral.

Boreholes SE 2 and SE 3 proved non-mineral and SE 4 proved only 2.4 m of mineral beneath 3.0 m of overburden. The bulk of the mineral in the block is composed of the Kesgrave Sands and Gravels, which for the most part is of the sandy gravel type or 'Essex White Ballast'. In the north-west of the block and in the vicinity of borehole SW 25 the sandy form is prevalent suggesting that there may be an interdigitation between the two lithologies.

This block of 11.6 km^2 contains some 9.9 km^2 of mineral-bearing ground, which has a mean thickness of 8.3 m and an estimated volume of 82 million $m^3 \pm 25\%$ at the 95% probability level. The mean grading of the mineral is fines 5%, sand 72% and gravel 23%. Within this block overburden has a mean thickness of 8.8 m while borehole SW 37 recorded the maximum thickness of 16.8 m.

Block H

This block encloses the broad alluvial plain and the two river terraces of the Stour Valley, stretching from Great Cornard in the north to Lamarsh in the south. It covers an area of 5.2 km^2. Only the First Terrace and Alluvium with an area of 4.1 km^2 were proved to be mineral-bearing. The First Terrace was formerly worked at three pits situated between Little Cornard and Great Cornard; these have a worked-out area of 0.1 km^2 from which 0.5 million m^3 of sand and gravel is estimated to have been extracted. Outcrops of Second Terrace proved to be both too small to be assessed and also of non-mineral quality as seen in borehole NE 13 where 3.5 m of pebbly clayey silt rests on Chalk.

Table 9 Data from IMAU boreholes: Block F

Borehole	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines $-\frac{1}{16}$ mm	Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm	Medium sand $+\frac{1}{4}-1$ mm	Coarse sand $+1-4$ mm	Fine gravel $+4-16$ mm	Coarse gravel $+16$ mm
SE 6	11.0	11.0	4	18	45	12	15	6
SE 7	12.5	1.8	9	26	49	7	6	3
SE 8	8.0	9.5	5	22	42	11	12	8
SE 9	10.5	8.4	6	21	48	10	9	6
SE 10	14.8	0.2	6	11	35	14	20	14
SE 13	11.3	12.1	4	30	45	9	6	6
SE 14	11.6	6.1	10	32	22	7	15	14
SE 15	11.2	8.0	5	12	49	11	14	9
SE 16	9.2	2.8	7	27	41	8	10	7
SE 20	11.3	5.0	6	23	44	8	11	8
SE 21	12.1	5.7	6	20	49	9	6	10
SE 23	9.7	14.2	6	25	48	8	7	6
SE 24	12.2	1.8	8	34	50	4	2	2
Mean	11.8*	6.4*	6	23	44	9	10	8

* Figures include data from 3 non-IMAU boreholes.

Table 10 Data from IMAU boreholes: Block G

Borehole	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines $-\frac{1}{16}$ mm	Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm	Medium sand $+\frac{1}{4}-1$ mm	Coarse sand $+1-4$ mm	Fine gravel $+4-16$ mm	Coarse gravel $+16$ mm
SW 14	4.9	12.5	2	5	27	12	28	26
SW 16	10.3	12.6	7	32	42	9	6	4
SW 18	4.6	10.7	1	4	22	12	32	29
SW 19	8.5	6.7	5	16	42	9	17	11
SW 21	13.2	7.6	5	23	48	11	8	5
SW 22	10.7	2.6	5	16	41	13	16	9
SW 23	10.1	8.6	6	33	40	9	9	3
SW 24	7.7	5.3	5	25	32	6	16	16
SW 25	8.7	3.9	7	22	54	7	8	2
SE 4	2.4	3.0	5	12	41	9	17	16
Mean	8.3*	8.8*	5	21	41	10	14	9

* Figures include data from 3 non-IMAU boreholes.

The assessment of the sand and gravel resources is based on eight IMAU boreholes (Table 11) and one other borehole record. Five of the IMAU boreholes are sited on the First Terrace while the remaining three are on the floodplain. The combined area of Alluvium and First Terrace is identified as 'continuous or almost continuous mineral beneath overburden' as the mean thickness of overburden is greater than one metre. The First Terrace proved to have a mean thickness of 1.1 m of overburden consisting of sand and gravel too clayey to be classed as mineral. The Alluvium has a mean thickness of 11.0 m and consists of very soft, clayey, peat and silt overlying mineral which ranges in thickness from 5.6 m at borehole NE 22 to nil at borehole NE 16 and has a mean thickness of 4.0 m.

The composition of the mineral samples from the First Terrace and Alluvium is basically similar (Table 2) and the mean grading of the block is fines 4%, sand 39% and gravel 57%; the block contains an estimated volume of 17 million $m^3 \pm 39\%$ at the 95% probability level.

Table 11 Data from IMAU boreholes: Block H

Borehole	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines $-\frac{1}{16}$ mm	Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm	Medium sand $+\frac{1}{4}-1$ mm	Coarse sand $+1-4$ mm	Fine gravel $+4-16$ mm	Coarse gravel $+16$ mm
NE 12	4.8	0.5	3	3	15	14	33	32
NE 15	2.5	2.0	8	12	16	8	29	27
NE 16	Mineral absent							
NE 17	4.3	5.4	1	4	21	11	26	37
NE 19	5.1	1.9	7	10	23	12	28	20
NE 22	5.6	1.3	4	13	27	9	28	19
NE 23	2.6	6.5	3	15	25	16	27	14
NE 24	5.3	1.0	2	4	14	10	32	38
Mean*	4.0	2.1	4	8	20	11	29	28

* Figures include data from one non-IMAU borehole.

APPENDIX A

FIELD AND LABORATORY PROCEDURES

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

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

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

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

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

A continuous series of bulk samples is taken throughout the sand and gravel. Ideally samples are composed exclusively of the whole of the material encountered in the borehole between stated depths. However, care is taken to discard, as far as possible, material which has caved or has been pumped from the bottom of the hole. A new sample is commenced whenever there is an appreciable lithological change within the sand and gravel, or ideally 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 British Standard 1377 (1975). Random checks on the accuracy of the grading are made in the laboratories of the Industrial Minerals Assessment Unit.

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

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

APPENDIX B

STATISTICAL PROCEDURE

Statistical assessment

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

2 The simple methods used in the calculations are consistent with the amount of data provided by the survey. Conventional symmetrical confidence limits are calculated for the 95 per cent probability level, that is, there is a 5 per cent or one in twenty chance of a result falling outside the stated limits.

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

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

4 The above relationship may be transposed such that

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

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

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

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

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

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

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

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

6 The sampled area in each resource block is coloured pink on the map. Wherever possible, calculations relate to the mineral within mapped geological boundaries (which may not necessarily correspond to the limits of deposit). Where the area is not defined by a mapped boundary, that is, where the boundary is inferred, a distinctive symbol is used. Experience suggests that the errors in determining area are small relative to those in thickness. The relationship $S_A/S_{\bar{l}_m} \leqslant \frac{1}{3}$ is assumed in all cases. It follows from equation [2] that

$$S_{\bar{l}_m} \leqslant S_V \leqslant 1.05\, S_{\bar{l}_m} \quad . \qquad [3]$$

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

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

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

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

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

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

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

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

per cent, and when n is greater than 20, as

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

per cent (weighting factors may be included: see paragraph 15).

11 The application of this procedure to a fictitious area is illustrated in Figures 9 and 10.

Inferred assessment

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

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

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

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

APPENDIX C

CLASSIFICATION AND DESCRIPTION OF SAND AND GRAVEL

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

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

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

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

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

Thus it is possible to classify the mineral into one of twelve descriptive categories (see Figure 11). The procedure is as follows:

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

For example, a deposit grading 11 per cent gravel, 70 per cent sand and 19 per cent fines is classified as 'clayey' pebbly sand. This short description is included in the borehole log (see Note 10, Appendix D).

Many differing proposals exist for the classification of the grain size of sediments (Atterberg, 1905; Udden, 1914; Wentworth, 1922; Wentworth, 1935; Allen, 1936; Twenhofel, 1937; Lane and others, 1947). As Archer (1970a, b) has emphasised, there is a pressing need for a simple metric scale acceptable to both scientific and engineering interests, for which the class limit sizes correspond closely with certain marked changes in the natural properties of mineral particles. For example, there is an important change in the degree of cohesion between particles at about the $\frac{1}{16}$-mm size, which approximates to the generally accepted boundary between silt and sand. These and other requirements are met by a system based on Udden's geometric scale and a simplified form of Wentworth's terminology (Table 12), which is used in this Report.

The fairly wide intervals in the scale are consistent with the general level of accuracy of the qualitative assessments of the resource blocks. Three sizes of sand are recognised, fine ($+\frac{1}{16}$ $-\frac{1}{4}$ 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 Standard 1377: 1975). In this report the grading is tabulated on the borehole record sheets (Appendix F), the intercepts corresponding with the simple geometric scale $\frac{1}{16}$ mm, $\frac{1}{4}$ mm,

Block calculation 1:25 000 / Block } Fictitious

Area
Block: 11.08 km²
Mineral: 8.32 km²

Mean thickness
Overburden: 2.5 m
Mineral: 6.5 m

Volume
Overburden: 21 million m³
Mineral: 54 million m³

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

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

Sample point	Weighting w	Overburden l_o	Overburden wl_o	Mineral l_m	Mineral wl_m	Remarks
SE 14	1	1.5	1.5	9.4	9.4	IMAU boreholes
SE 18	1	3.3	3.3	5.8	5.8	
SE 20	1	nil	–	6.9	6.9	
SE 22	1	0.7	0.7	6.4	6.4	
SE 23	1	6.2	6.2	4.1	4.1	
SE 24	1	4.3	4.3	6.4	6.4	
SE 25	½	1.2	1.6	9.8	7.2	Auxiliary borehole
SE 26	½	2.0		4.6		
1	¼	2.7	2.6	7.3	5.8	Close group of four boreholes (commercial)
2	¼	4.5		3.2		
3	¼	0.4		6.8		
4	¼	2.8		5.9		
Totals	$\Sigma w = 8$	$\Sigma wl_o = 20.2$		$\Sigma wl_m = 52.0$		
Means		$\overline{wl_o} = 2.5$		$\overline{wl_m} = 6.5$		

Calculation of confidence limits

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

$\Sigma(wl_m - \overline{wl_m})^2 = 15.82$
$n = 8$
t = 2.365

L_V is calculated as

$$1.05(t/\overline{wl_m})\sqrt{[\Sigma(wl_m - \overline{wl_m}^2/n(n-1)]} \times 100$$
$$= 1.05 \times (2.365/6.5)\ \sqrt{[15.82/(8 \times 7)]} \times 100$$
$$= 20.3$$
$$\simeq 20 \text{ per cent.}$$

Figure 9 Example of resource block: assessments calculation and results

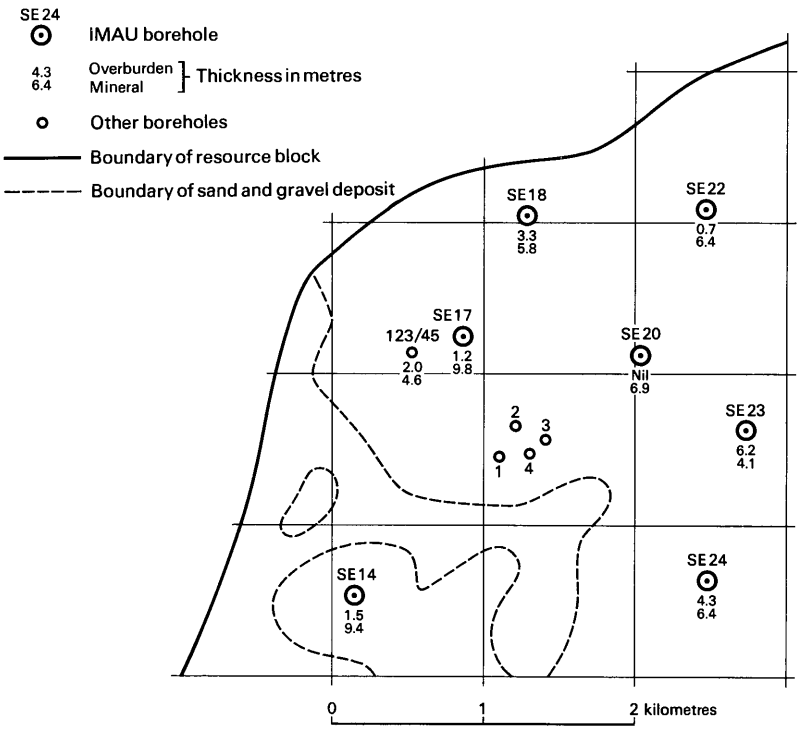


Figure 10 Example of resource block assessment: map of fictitious block

1 mm, 4 mm, 16 mm and so on as required. Original sample grading curves are available for reference at the appropriate office of the Institute.

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

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

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

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

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

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

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

Well-rounded: no original faces, edges or corners left. The entire surface consists of broad curves; flat areas are absent. The original shape is suggested by the present form of the grain.

Table 12 Classification of gravel, sand and fines

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

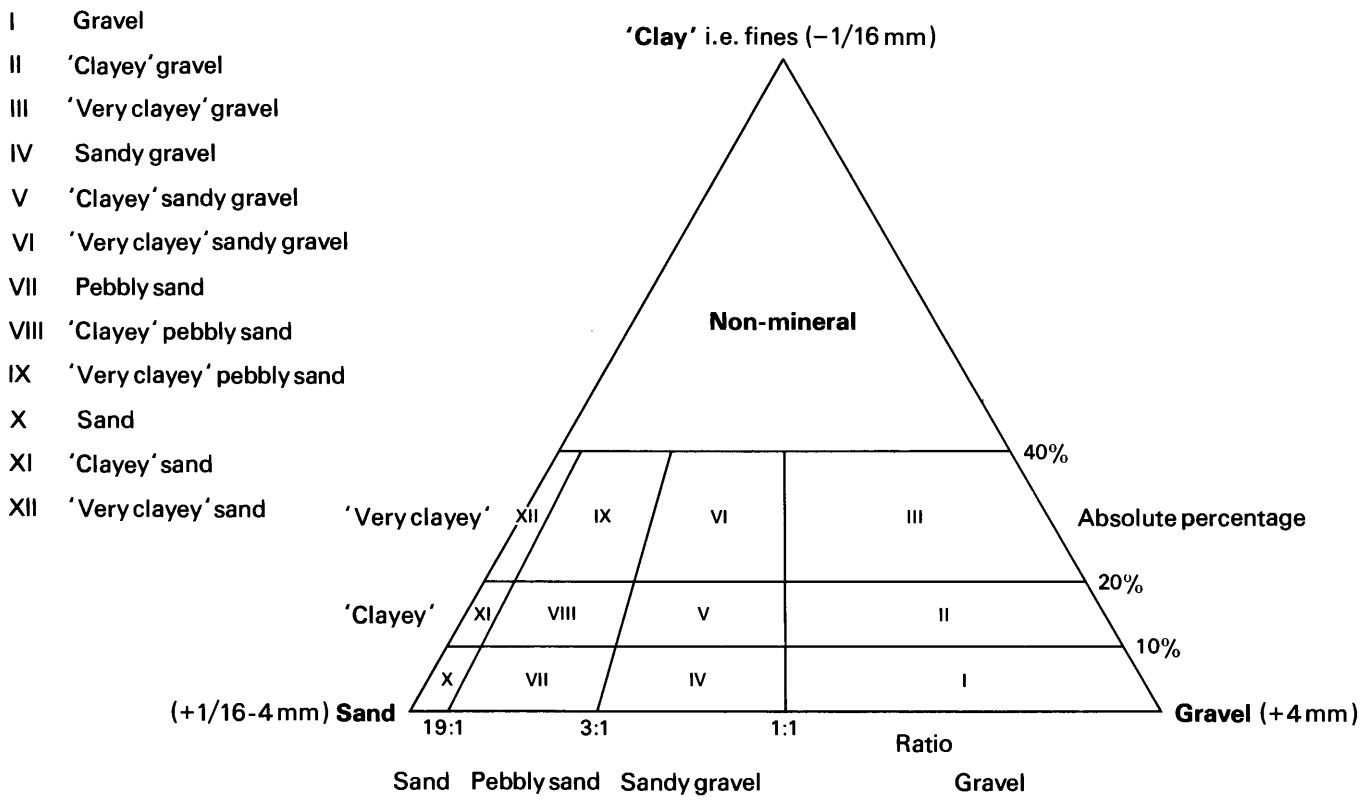


Figure 11 Diagram to show the descriptive categories used in the classification of sand and gravel

APPENDIX D

EXPLANATION OF THE BOREHOLE RECORDS

ANNOTATED EXAMPLE

TL 83 NW 9[1] **8134 3681**[2] **Odwells**[3] **Block A**

Surface level (+73.8 m) +242 ft[4]
Water struck at +66.8 m[5]
152-mm percussion[6]
September 1975

Overburden[7] 6.2 m
Mineral 7.0 m
Bedrock 0.6 m+[8]

LOG

Geological classification[9]	Lithology[10]	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown with pebbles of chalk and flint	2.1	2.4
Glacial Silt	'Clayey' Sand Gravel: some flint pebbles Sand: medium chalky	1.2	3.6
Barham Sands and Gravels	**a** Pebbly Sand Gravel: fine and coarse, subangular to well rounded flint and well rounded quartz Sand: medium with fine and coarse, yellow	0.9	4.5
	Clay, sandy, streaked orange and light grey with pebbles of flint, quartz and chalk	1.7	6.2
Kesgrave Sands and Gravels	**b** 'Very Clayey' Sand with clay seams Sand: fine and medium, yellow–grey	3.0	9.2
Red Crag	**c** Sand Gravel: fine with some coarse, subangular flint and quartz Sand: medium and fine with some coarse, yellow–grey	4.0	13.2
London Clay	Clay, silty, orange and grey, top weathered to orange–brown	0.6+	13.8

GRADING

	Mean for deposit[14] *percentages*			Depth below[11] surface (m)	*percentages*[12]					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	4	89	7	3.6–4.5	4	9	76	4	4	3
b	23	77	0	6.2–7.2	23	32	45	0	0	0
				7.2–8.2	33	46	21	0	0	0
				8.2–9.2	14	62	24	0	0	0
				Mean	23	47	30	0	0	0
c	4	95	1	9.2–12.2	3	43	50	3	1	0
				12.2–13.2	*7*	*34*	*53*	*5*	*1*	*1*[13]
				Mean	4	41	51	3	1	0

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

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

1 The number of the 1:25 000 sheet on which the record lies, for example TL 83
2 The quarter of the 1:25 000 sheet on which the record is identified by a Registration Number. This consists of two statements.

Thus the full Registration Number is TL 83 NW 9. Usually this is abbreviated to NW 9 in the text.

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

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

4 Surface level
The surface level at the borehole site is given in metres and feet above Ordnance Datum. All measurements were made in 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 above OD).

6 Type of drill and date of drilling
The type of machine, the diameter of the casing, and the month and year of completion of the hole are stated.

7 Overburden, mineral, waste and bedrock
Mineral is sand and gravel which, as part of a deposit, falls within the arbitrary definition of potentially workable material (see p. 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 (+) indicates that the base of the deposit was not reached during drilling.

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

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

11 Sampling
A continuous series of bulk samples is taken through 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.

12 Grading results
For each bulk sample the percentages of fines ($-\frac{1}{16}$ mm), fine sand ($+\frac{1}{16}-\frac{1}{4}$ mm), medium sand ($+\frac{1}{4}$–1 mm), coarse sand (+1–4 mm), fine gravel (+4–16 mm) and coarse gravel (+16 mm) are stated.

13 Estimate grading
If, exceptionally, grading results are not available, an attempt is made to give grading information by comparing the grading and field descriptions of adjacent samples with the samples in question. Such estimates are shown in *italics*.

14 Mean grading
The grading of the full thickness of the mineral horizon identified in the log is the mean of the individual sample gradings weighted by the thicknesses represented, if these vary. The classification used is shown in Table 12.

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

APPENDIX E

BOREHOLES AND EXPOSURES USED IN THE ASSESSMENT OF RESOURCES

Borehole*	Grid reference
INDUSTRIAL MINERALS ASSESSMENT UNIT BOREHOLES	
NW 1	8010 3942
2	8031 3853
3	8029 3761
4	8040 3643
5	8033 3536
6	8095 3978
7	8136 3906
8	8130 3733
9	8134 3618
10	8124 3521
11	8220 3925
12	8276 3893
13	8228 3784
14	8262 3702
15	8203 3640
16	8295 3611
17	8214 3574
18	8352 3934
19	8359 3686
20	8384 3598
21	8300 3524
22	8481 3959
23	8411 3871
24	8431 3747
25	8470 3646
26	8455 3558
27	8401 3508
28	8340 3791
NE 1	8572 3960
2	8533 3864
3	8598 3795
4	8527 3736
5	8576 3650
6	8522 3560
7	8682 3931
8	8648 3874
9	8695 3739
10	8667 3620
11	8613 3548
12	8794 3960
13	8790 3793
14	8786 3726
15	8833 3980
16	8822 3865
17	8857 3775
18	8827 3647
NE 19	8906 3936
20	8965 3895
21	8994 3784
22	8922 3733
23	8942 3677
24	8931 3594
25	8899 3863
SW 1	8067 3470
2	8028 3344
3	8029 3270
4	8013 3123
5	8019 3013
6	8148 3397
7	8150 3322
8	8147 3247
9	8110 3182
10	8251 3450
11	8236 3344
12	8252 3232
13	8204 3155
14	8279 3098
15	8369 3379
16	8320 3323
17	8332 3248
18	8368 3180
19	8366 3080
20	8414 3431
21	8482 3377
22	8447 3308
23	8423 3246
24	8444 3156
25	8477 3084
SE 1	8556 3462
2	8510 3275
3	8518 3200
4	8576 3077
5	8671 3468
6	8605 3399
7	8675 3362
8	8610 3268
9	8626 3177
10	8665 3073
11	8764 3494
12	8786 3388
13	8723 3283
14	8739 3164
15	8785 3095
16	8729 3005
SE 17	8887 3488
18	8880 3359
19	8859 3287
20	8866 3175
21	8874 3057
22	8955 3229
23	8972 3124
24	8980 3031
OTHER BOREHOLES	
NW 29	8028 3703
32	8325 3622
34	8365 3752
37	8172 3986
39	8383 3806
41	8458 3845
NE 28	8507 3634
38	8512 3888
40	8515 3929
41	8704 3950
42	8736 3929
44	8640 3761
47	8850 3917
SW 31	8052 3402
33	8341 3442
35	8220 3304
36	8368 3279
37	8327 3175
40	c839 306
SE 25	8624 3487
26	8745 3442
27	8810 3445
28	8879 3430
31	8546 3329
34	8734 3419
44	8854 3075
45	8812 3030
COMMERCIAL RECORDS	
Several records made available by gravel companies are held in confidence	
EXPOSURES	
NE E1†	8700 3588
SE E1†	8946 3437

* All lie in 100-km square TL 83: a full reference is TL 83 NW 1.
† Exposure number.

APPENDIX F

INDUSTRIAL MINERALS ASSESSMENT UNIT BOREHOLE AND EXPOSURE RECORDS

TL 83 NW 1 8010 3942 St Mary Hall **Block A**

Surface level (+60 m) +197 ft
Water struck at +58.4 m
152-mm percussion
May 1975

Waste 19.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, mottled brown and orange–grey with pebbles of chalk and flint	2.3	2.5
	Silt, laminated	0.5	3.0
	Clay, dark grey with pebbles of chalk, flint and shale	16.7+	19.7

TL 83 NW 2 8031 3853 Three Cornered Wood **Block A**

Surface level (+66.1 m) +217 ft
Water struck at +43.1 m
152-mm percussion
August 1975

Waste 16.4 m
Bedrock 6.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, sandy, brown with pebbles of chalk and flint, becoming dark grey with additional pebbles of quartzite and shale below 3.3 m	9.7	10.0
Glacial Silt	Clay, very silty, sandy, mottled brown and olive-grey with some fine pebbles of quartz, flint and quartzite	3.2	13.2
Lower London Tertiaries	'Very Clayey' Sand, with thin clay laminae Sand: fine, mottled yellow–green and light grey	3.2	16.4
	Silt, sandy, laminated dark green and light grey, becoming pink grey from 16.7 m and shades of pink, maroon and brown below 20.9 m	5.6	22.0
	'Very Clayey' Sand, with brown clay Gravel: flint pebbles at the base Sand: fine, dark green to black	1.0	23.0
Upper Chalk	Chalk, soft	0.3+	23.3

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
20	80	0	13.2–16.4	20	75	5	0	0	0

TL 83 NW 3 8029 3761 Edeys Farm **Block A**

Surface level (+73.5 m) +241 ft
Water not struck
152-mm percussion
May 1975

Waste 9.1 m
Bedrock 5.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, orange–grey with pebbles of flint and chalk	6.4	6.6
Glacial Silt	Sand, very silty, light brown with some fine pebbles of flint, quartz and chalk, becoming clay by the base	2.0	8.6
Barham Sands and Gravels	'Clayey' Sand Gravel: some flint pebbles Sand: fine to coarse, orange–brown	0.5	9.1
London Clay	Silt, sandy, slightly micaceous, banded green–grey, brown and orange, becoming silt, clayey, olive–grey below 13.8 m	5.7+	14.8

TL 83 NW 4 8040 3643 Ramacre Wood **Block A**

Surface level (+84.4 m) +277 ft
Water struck at +74.7 m and 68.4 m
152-mm percussion
September 1975

Overburden 9.7 m
Mineral 1.5 m
Waste 1.0 m
Mineral 11.4 m
Bedrock 0.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.4	0.4
Boulder Clay	Clay, yellow–grey with pebbles of chalk and flint, becoming dark grey with additional pebbles of shale and quartz below 6.0 m	9.3	9.7
Barham Sands and Gravels	**a** 'Very Clayey' Sand Gravel: fine subangular flint and quartz Sand: medium with fine and coarse, light grey	1.5	11.2
	Clay, sandy, pink grey with race and patinated flint	1.0	12.2
Kesgrave Sands and Gravels	**b** Sand, with seams of laminated clay Sand: medium and fine with a trace of coarse, yellow and orange	10.0	22.2
Red Crag	**c** Sand Gravel: fine and coarse, rounded to well rounded flint and quartz Sand: medium and fine with coarse, heavily iron-stained	1.4	23.6
London Clay	Clay, sandy, orange–brown	0.8+	24.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	25	72	3	9.7–11.2	25	12	51	9	3	0	
b	3	97	0	12.2–13.2	15	57	28	0	0	0	
				13.2–16.2	3	35	62	0	0	0	
				16.2–19.2	1	28	71	0	0	0	
				19.2–22.2	3	39	56	2	0	0	
				Mean	3	36	60	1	0	0	
c	4	93	3	22.2–23.6	4	34	53	6	2	1	

TL 83 NW 5 8033 3536 Chelmshoe House **Block D**

Surface level (+77.1 m) +253 ft
Water struck at +64.5 m
152-mm percussion
April 1975

Overburden 2.0 m
Mineral 15.7 m
Waste 0.1 m
Bedrock 0.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, orange–brown with flint pebbles	1.7	2.0
Barham Sands and Gravels	**a** 'Clayey' Pebbly Sand with laminated clay towards the base Gravel: coarse with some fine, angular and well rounded flint and rounded quartz Sand: medium with some fine and a little coarse, orange–brown	2.9	4.9
Kesgrave Sands and Gravels	**b** Sand, with laminated clay Sand: medium with fine and a little coarse, micaceous, light grey	12.8	17.7
	Clay, orange–brown with sand partings and a pebble bed of flint and ironstone at the base	0.1	17.8
London Clay	Silt, sandy mottled red–brown and grey–brown, becoming clay, silty, olive–grey from 18.1 m	0.7+	18.5

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	15	66	19	2.0–3.1	15	27	53	1	0	4
				3.1–4.4	14	4	43	8	6	25
				4.4–4.9	20	10	45	6	16	3
				Mean	15	14	47	5	8	11
b	8	92	0	4.9–5.9	6	68	26	0	0	0
				5.9–6.9	6	50	44	0	0	0
				6.9–7.9	5	35	60	0	0	0
				7.9–8.9	8	90	2	0	0	0
				8.9–9.9	6	56	38	0	0	0
				9.9–10.9	6	26	66	2	0	0
				10.9–11.9	6	33	59	2	0	0
				11.9–12.9	5	44	51	0	0	0
				12.9–13.9	4	25	66	5	0	0
				13.9–14.9	19	16	61	4	0	0
				14.9–15.9	6	37	51	6	0	0
				15.9–16.9	11	34	51	4	0	0
				16.9–17.7	11	33	54	2	0	0
				Mean	8	42	48	2	0	0

TL 83 NW 6 **8095 3978** **Chapel Hill** **Block A**

Surface level (+56.7 m) +186 ft
Water struck at +38.7 m
152-mm percussion
May 1975

Overburden 13.5 m
Mineral 13.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, brown with pebbles of chalk and flint, becoming grey with additional pebbles of shale below 3.8 m	12.3	12.5
Glacial Sand and Gravel, upper	Clay, sandy, brown	1.0	13.5
	Sandy Gravel Gravel: coarse and fine, angular to subrounded flint with fine well rounded flints and some rounded to well rounded quartz and quartzite. Some chalk present below 20.6 m Sand: medium and fine with coarse, quartz with angular flint, yellow–orange	13.2+	26.7

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
3	67	30	13.5–14.6	3	25	71	1	0	0
			14.6–15.6	3	6	26	6	21	38
			15.6–16.6	2	6	46	5	17	24
			16.6–17.6	4	16	43	4	13	20
			17.6–18.6	0	12	32	4	16	36
			18.6–19.6	2	4	15	8	30	41
			19.6–20.6	4	16	35	7	15	23
			20.6–21.6	6	13	56	9	7	9
			21.6–22.6	2	8	47	9	16	18
			22.6–23.6	2	8	65	8	10	7
			23.6–24.7	5	9	69	7	5	5
			24.7–26.7	2	69	14	5	8	2
			Mean	3	20	41	6	13	17

TL 83 NW 7 8136 3906 Pound Farm **Block A**

Surface level (+57.9 m) +190 ft
Water struck at +41.9 m
152-mm percussion
August 1975

Waste 8.8 m
Bedrock 7.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown, with pebbles of chalk and flint, becoming grey with additional pebbles of quartzite and shale below 3.7 m	5.8	6.1
Glacial Silt	Clay, sandy and silty with fine pebbles of flint, quartzite and chalk. Several chalk sand seams are present	2.7	8.8
Lower London Tertiaries	Silt, sandy, olive–grey with streaks of yellow and orange, becoming dark grey from 10.5 m	6.2	15.0
	'Very Clayey' Sand Gravel: some fine flint Sand: fine with some coarse glauconite grains	0.4	15.4
	Silt, sandy, green–grey with fine well rounded flint pebbles	0.6	16.0
Upper Chalk	Chalk, soft	0.4+	16.4

TL 83 NW 8 8130 3733 Rectory Farm **Block A**

Surface level (+75.3 m) +247 ft
Water struck at +66.4 m
152-mm percussion
April 1975

Overburden 2.3 m
Mineral 11.3 m
Bedrock 4.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown, with pebbles of chalk and flint	2.0	2.3
Barham Sands and Gravels	**a** Pebbly Sand, with clayey seams Gravel: coarse and fine, angular flint, subangular to rounded chalk and rounded quartz Sand: medium with fine and coarse, flint, chalk and quartz	1.9	4.2
Kesgrave Sands and Gravels	**b** Sand, with laminated clay and clayey seams Gravel: coarse angular and well rounded flint and quartz found below 12.2 m Sand: fine and medium, orange and light grey	9.4	13.6
London Clay	Clay, sandy, blue–grey, top weathered to brown–purple	4.6+	18.2

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	9	79	12	2.3–3.2	14	26	45	8	3	4
				3.2–4.2	5	11	59	8	3	14
				Mean	9	18	53	8	3	9
b	6	93	1	4.2–5.2	7	44	49	0	0	0
				5.2–6.2	4	57	39	0	0	0
				6.2–7.2	5	50	45	0	0	0
				7.2–8.2	6	75	19	0	0	0
				8.2–9.2	3	78	19	0	0	0
				9.2–10.2	4	63	33	0	0	0
				10.2–11.2	3	31	66	0	0	0
				11.2–12.2	12	47	41	0	0	0
				12.2–13.6	6	55	31	2	0	6
				Mean	6	55	38	0	0	1

TL 83 NW 9 8134 3618 Odwells **Block A**

Surface level (+73.8 m) +242 ft
Water struck at +66.8 m
152-mm percussion
September 1975

Overburden 6.2 m
Mineral 7.0 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown with pebbles of chalk and flint	2.1	2.4
Glacial Silt	'Clayey' Sand Gravel: some flint pebbles Sand: medium chalky	1.2	3.6
Barham Sands and Gravels	**a** Pebbly Sand Gravel: fine and coarse, subangular to well rounded flint and well rounded quartz Sand: medium with fine and coarse, yellow	0.9	4.5
	Clay, sandy, streaked orange and light grey with pebbles of flint, quartz and chalk	1.7	6.2
Kesgrave Sands and Gravels	**b** 'Very Clayey' Sand, with clay seams Sand: fine and medium, yellow–grey	3.0	9.2
Red Crag	**c** Sand Gravel: fine with some coarse, subangular flint and quartz Sand: medium and fine with some coarse, yellow–grey	4.0	13.2
London Clay	Clay, silty, orange and grey, top weathered to orange–brown	0.6+	13.8

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	4	89	7	3.6–4.5	4	9	76	4	4	3	
b	23	77	0	6.2–7.2	23	32	45	0	0	0	
				7.2–8.2	33	46	21	0	0	0	
				8.2–9.2	14	62	24	0	0	0	
				Mean	23	47	30	0	0	0	
c	4	95	1	9.2–12.2	3	43	50	3	1	0	
				12.2–13.2	7	34	53	5	1	1	
				Mean	4	41	51	3	1	0	

TL 83 NW 10 8124 3521 Monks Lodge **Block D**

Surface level (+68.6 m) +225 ft
Water struck at +62.7 m
152-mm percussion
August 1975

Overburden 0.3 m
Mineral 15.7 m
Bedrock 0.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Barham Sands and Gravels	**a** 'Very Clayey' Sand, with a clay matrix in parts Gravel: fine and coarse, subangular and well rounded flint with well rounded quartz Sand: medium and fine with some coarse, subangular, brown and grey	3.1	3.4
Kesgrave Sands and Gravels	**b** Sand, with laminated clay seams Sand: fine and medium with a trace of coarse, yellow–grey	8.0	11.4
Red Crag	**c** Sand, with clay seams Sand: medium with fine and some coarse	4.6	16.0
London Clay	Clay, silty, olive–grey, top weathered to orange–brown	0.7+	16.7

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	20	77	3	0.3–1.3	21	36	32	3	4	4
				1.3–2.3	18	30	48	2	2	0
				2.3–3.4	19	33	47	1	0	0
				Mean	20	33	42	2	2	1
b	7	93	0	3.4–4.4	10	55	35	0	0	0
				4.4–5.4	13	62	25	0	0	0
				5.4–6.4	8	43	49	0	0	0
				6.4–7.4	5	37	57	0	0	0
				7.4–8.4	5	48	47	0	0	0
				8.4–9.4	6	44	49	1	0	0
				9.4–10.4	4	43	52	1	0	0
				10.4–11.4	4	40	55	1	0	0
				Mean	7	47	46	0	0	0
c	5	95	0	11.4–12.4	5	25	67	3	0	0
				12.4–13.4	4	21	71	4	0	0
				13.4–14.4	4	27	66	4	0	0
				14.4–16.0	5	30	63	2	0	0
				Mean	5	26	66	3	0	0

TL 83 NW 11 8220 3925 Hill Farm **Block A**

Surface level (+60.4 m) +198 ft
Water struck at +54.4 m
152-mm percussion
May 1975

Overburden 2.5 m
Mineral 4.2 m
Waste 0.4 m
Mineral 3.2 m
Bedrock 10.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, yellow–brown with pebbles of chalk and flint	2.2	2.5
Kesgrave Sands and Gravels	**a** Sand, with clayey seams Sand: fine and medium	4.2	6.7
Lower London Tertiaries	Clay, sandy, mottled olive–grey and brown	0.4	7.1
	b 'Clayey' Sand Sand: fine with medium and a trace of coarse, yellow–brown with black speckling	3.2	10.3
	Clay, sandy; various shades of green, olive, brown and red, becoming sand, clayey, yellow–green	1.9	12.2
	'Clayey' Sand Gravel: fine Sand: medium	0.2	12.4
	Silt, sandy, slightly laminated, yellow–grey, becoming mottled olive–grey from 14.0 m	6.3	18.7
	Sand, fine, very silty, glauconitic, mottled olive–green with flint pebbles at the base	0.8	19.5
Upper Chalk	Chalk, soft	1.5+	21.0

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	6	94	0	2.5–3.5	6	56	37	1	0	0
				3.5–4.5	8	51	41	0	0	0
				4.5–5.5	6	49	45	0	0	0
				5.5–6.7	5	36	59	0	0	0
				Mean	6	48	46	0	0	0
b	14	86	0	7.1–8.1	10	73	15	1	1	0
				8.1–9.0	12	68	19	1	0	0
				9.0–10.3	18	71	10	1	0	0
				Mean	14	71	14	1	0	0

TL 83 NW 12 8276 3893 New Barn **Block A**

Surface level (+68.3 m) +224 ft
Water struck at +65.2 m
152-mm percussion
May 1975

Overburden 3.1 m
Mineral 1.2 m
Bedrock 5.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	1.2	1.2
Boulder Clay	Clay, mottled orange–brown and grey with pebbles of flint and quartz	1.9	3.1
Barham Sands and Gravels	'Clayey' Sand Gravel: fine and coarse subangular flint Sand: medium and fine with some coarse, subangular, orange–brown	1.2	4.3
London Clay	Clay, with fine well rounded flint pebbles	0.2	4.5
Lower London Tertiaries	Silt, sandy with ironstone nodules, becoming yellow–brown and grey–red from 5.6 m	4.5	9.0
	Clay, silty, yellow–brown	1.0+	10.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	
16	82	2	3.1–4.3	16	26	53	3	1	1	

TL 83 NW 13 8228 3784 Near Mill House **Block A**

Surface level (+65.5 m) +215 ft
Water not struck
152-mm percussion
September 1975

Waste 2.9 m
Bedrock 3.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.4	0.4
Barham Sands and Gravels	Clay, sandy, yellow–orange to light grey with pebbles of flint and quartz	2.5	2.9
London Clay	Silt, sandy, brown	3.1+	6.0

TL 83 NW 14 8262 3702 Wickham Hall **Block C**

Surface level (+75.0 m) +246 ft
Water struck at +65.5 m
152-mm percussion
October 1975

Overburden 1.0 m
Mineral 5.0 m
Waste 1.0 m
Mineral 7.4 m
Bedrock 1.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.1	0.1
Barham Sands and Gravels	Clay, sandy, brown	0.9	1.0
	a 'Clayey' Sand, with fine flint pebbles at the top Sand: medium with fine and a trace of coarse, mottled orange and yellow–brown	3.0	4.0
Kesgrave Sands and Gravels	**b** 'Clayey' Sand, with silt seams Sand: medium and fine, orange	2.0	6.0
	Silt, sandy, light olive–grey with clay laminae	1.0	7.0
	c 'Very Clayey' Sand, with silt and clay seams Sand: medium and fine with some coarse, orange–brown	5.0	12.0
Red Crag	**d** Sand Gravel: fine with coarse, flint and quartz Sand: medium and fine with coarse, rusty orange–brown	2.4	14.4
London Clay	Clay, silty brown, top weathered to orange–brown	1.3+	15.7

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	12	88	0	1.0–2.0	13	27	60	0	0	0	
				2.0–4.0	11	18	70	1	0	0	
				Mean	12	21	67	0	0	0	
b	11	89	0	4.0–6.0	11	29	60	0	0	0	
c	20	80	0	7.0–10.0	27	35	37	1	0	0	
				10.0–12.0	9	44	46	1	0	0	
				Mean	20	39	40	1	0	0	
d	4	92	4	12.0–14.4	4	30	55	7	3	1	

TL 83 NW 15 **8203 3640** **Newhouse Farm** **Block A**

Surface level (+75.6 m) +248 ft
Water struck at +62.6 m
152-mm percussion
April 1975

Overburden 5.8 m
Mineral 11.1 m
Bedrock 1.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.4	0.4
Boulder Clay	Clay, orange–brown with pebbles of flint and chalk, becoming brown–grey from 4.2 m	5.4	5.8
Barham Sands and Gravels	**a** 'Very Clayey' Sand, fine with medium and some coarse, light grey	0.9	6.7
Kesgrave Sands and Gravels	**b** Sand, with clay laminae Sand: medium and fine with a trace of coarse, orange–brown	5.0	11.7
Red Crag	**c** Sand, with a trace of gravel Sand: fine and medium with some coarse orange–brown	5.2	16.9
London Clay	Clay, olive–grey, top weathered to brown	1.3+	18.2

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	29	71	0	5.8–6.7	29	60	10	1	0	0
b	8	92	0	6.7–7.7	4	41	55	0	0	0
				7.7–8.7	5	31	64	0	0	0
				8.7–9.7	5	29	66	0	0	0
				9.7–10.7	7	23	70	0	0	0
				10.7–11.7	19	24	56	1	0	0
				Mean	8	30	62	0	0	0
c	4	96	0	11.7–12.7	7	42	48	2	1	0
				12.7–13.7	4	33	59	3	0	1
				13.7–14.7	4	54	37	5	0	0
				14.7–15.7	4	50	41	5	0	0
				15.7–16.9	3	58	34	4	1	0
				Mean	4	48	44	4	0	0

TL 83 NW 16 **8295 3611** **Wickham St Paul's** **Block C**

Surface level (+84.4 m) +277 ft
Water struck at +78.1 m and +76.4 m
152-mm percussion
September 1975

Overburden 5.1 m
Mineral 9.9 m
Waste 2.4 m
Mineral 7.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown with pebbles of chalk and flint	4.6	4.9
Barham Sands and Gravels	Clay, sandy, orange–brown with pebbles	0.2	5.1
	a 'Clayey' Pebbly Sand, sandy clay from 6.4 to 7.1 m Gravel: coarse and fine, angular and rounded flints with subrounded quartz Sand: fine and medium with coarse, orange–brown becoming brown	3.0	8.1
Kesgrave Sands and Gravels	**b** 'Clayey' Sand, sandy clay from 10.0 to 10.8 m Gravel: fine with coarse, subangular and well rounded flint Sand: medium and fine with some coarse, grey–orange	6.9	15.0
	Silt, with fine-sand partings, light grey and orange	2.4	17.4
	c Sand: medium and fine with some coarse, light grey	3.0	20.4
Red Crag	**d** Sand: medium and fine with some coarse, orange	4.0+	24.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
a	17	69	14	5.1–6.4	19	47	27	3	3	1
				6.4–7.1	Sandy Clay					
				7.1–8.1	13	37	16	6	11	17
				Mean	17	43	22	4	6	8
b	15	81	4	8.1–10.0	15	34	44	3	3	1
				10.0–10.8	Sandy Clay					
				10.8–11.7	20	17	45	10	7	1
				11.7–15.0	15	32	51	1	1	0
				Mean	15	30	48	3	3	1
c	6	94	0	17.4–20.4	6	44	49	1	0	0
d	3	97	0	20.4–24.4	3	27	68	2	0	0

TL 83 NW 17 **8214 3574** **Old House** **Block C**

Surface level (+74.0 m) +243 ft
Water struck at +63.5 m
152-mm percussion
May 1975

Overburden 4.8 m
Mineral 11.9 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown with pebbles of flint and quartz	4.5	4.8
Kesgrave Sands and Gravels	**a** Sand, with clay laminae seams Sand: medium and fine with a trace of coarse, light grey	11.0	15.8
Red Crag	**b** Pebbly Sand Gravel: coarse with fine, well-rounded flint Sand: medium and fine with some coarse, orange–brown	0.9	16.7
London Clay	Silty, clayey, olive–grey, top weathered to brown	1.0+	17.7

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	5	95	0	4.8–5.8	5	26	69	0	0	0
				5.8–6.8	3	20	77	0	0	0
				6.8–7.8	5	31	64	0	0	0
				7.8–8.8	2	27	71	0	0	0
				8.8–9.8	4	36	60	0	0	0
				9.8–10.8	5	49	45	1	0	0
				10.8–11.8	2	44	53	1	0	0
				11.8–12.8	2	53	45	0	0	0
				12.8–13.8	3	41	55	1	0	0
				13.8–14.8	7	63	29	1	0	0
				14.8–15.8	11	50	39	0	0	0
				Mean	5	40	55	0	0	0
b	8	85	7	15.8–16.7	8	30	53	2	1	6

TL 83 NW 18 8352 3934 Upper Houses **Block A**

Surface level (+68.3 m) +224 ft
Water not struck
152-mm percussion
September 1975

Overburden 0.6 m
Mineral 4.1 m
Bedrock 1.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Barham Sands and Gravels	Clay, sandy, brown becoming orange–brown, with some flint pebbles	0.4	0.6
	'Clayey' Pebbly Sand Gravel: fine and coarse, angular to rounded flint with rounded quartz Sand: medium and fine with coarse, brown becoming orange–brown	4.1	4.7
London Clay	Clay, sandy and silty, yellow–brown	1.4+	6.1

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
12	70	18	0.6–1.6	13	24	38	6	10	9
			1.6–2.6	11	25	51	4	5	4
			2.6–3.6	5	8	48	6	19	14
			3.6–4.7	19	23	43	3	8	4
			Mean	12	20	45	5	11	7

TL 83 NW 19 8359 3686 Bullock's Hole **Block C**

Surface level (+73.5 m) +241 ft
Water struck at +57.6 m
152-mm percussion
September 1975

Waste 16.0 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, brown with pebbles of chalk and flint, with seams of silt laminae	7.1	7.3
	'Very Clayey' Sand, chalky with some flint pebbles	0.9	8.2
	Clay, dark grey with pebbles of chalk, flint and shale	7.7	15.9
	'Clayey' Sand, chalky, dark grey	0.1	16.0
London Clay	Clay, silty, mottled green–grey and blue–grey	1.0+	17.0

TL 83 NW 20 **8384 3598** **Oldhouse Farm** **Block C**

Surface level (+82.9 m) +272 ft
Water not struck
152-mm percussion
August 1975

Waste 20.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, brown with pebbles of flint and quartz. Additional pebbles of chalk appear below 3.8 m	10.1	10.3
	Clay, dark grey with pebbles of chalk, flint, quartz and shale. Orange–brown below 16.9 m	7.5	17.8
Kesgrave Sands and Gravels	'Very Clayey' Sand Gravel: some flint pebbles Sand: coarse, quartz, with laminae of chalk sand, orange–brown	1.1	18.9
	Silt, very sandy, micaceous, laminated with seams of clay, yellow–grey	1.5+	20.4

TL 83 NW 21 **8300 3524** **Park's Farm** **Block C**

Surface level (+79.2 m) +260 ft
Water struck at +76.2 m
152-mm percussion
August 1975

Waste 18.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.8	0.8
Boulder Clay	Clay, brown with pebbles of chalk and flint, becoming olive–grey with additional pebbles of black shale below 5.0 m	16.0	16.8
Barham Sands and Gravels	Clay, sandy, dark brown with some pebbles of flint, quartzite and quartz	1.6+	18.4

TL 83 NW 22 8481 3959 Auberies **Block B**

Surface level (+82.0 m) +269 ft
Water struck at +63.0 m
152-mm percussion
September 1975

Overburden 9.0 m
Mineral 7.5 m
Waste 1.3 m
Mineral 4.0 m
Bedrock 2.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.8	0.8
Boulder Clay	Clay, brown, with pebbles of chalk, flint and quartz	6.6	7.4
Barham Sands and Gravels	Clay, sandy, orange–brown with pebbles of flint and quartz	1.6	9.0
	a 'Clayey' Pebbly Sand Gravel: fine with coarse, angular flint with some subrounded quartz Sand: medium and fine with coarse	1.7	10.7
Kesgrave Sands and Gravels	**b** 'Clayey' Sand, with clay seams Sand: fine and medium with some coarse	5.8	16.5
	Clay, light grey with seams of sand and clayey sand, orange	1.3	17.8
	c 'Clayey' Sand, with clay seams Gravel: fine flint Sand: medium and fine with some coarse	4.0	21.8
London Clay	Silt, sandy, olive–grey, top weathered to yellow–orange	2.5+	24.3

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	16	79	5	9.0–9.7	10	53	31	2	2	2	
				9.7–10.7	20	15	50	8	6	1	
				Mean	16	31	42	6	4	1	
b	12	88	0	10.7–12.7	10	76	14	0	0	0	
				12.7–15.7	8	56	34	2	0	0	
				15.7–16.5	30	48	20	2	0	0	
				Mean	12	61	26	1	0	0	
c	13	86	1	17.8–20.8	15	26	56	3	0	0	
				20.8–21.8	7	32	58	1	1	1	
				Mean	13	28	56	2	1	0	

TL 83 NW 23 8411 3871 Parsonage Wood **Block B**

Surface level (+78.0 m) +256 ft
Water struck at +64.0 m
152-mm percussion
May 1975

Overburden 4.3 m
Mineral 15.9 m
Bedrock 1.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, grey–orange with pebbles of chalk and flint	1.5	1.8
Barham Sands and Gravels	Clay, sandy, orange–brown with pebbles of flint and quartz	2.5	4.3
Kesgrave Sands and Gravels	'Clayey' Sand, with clayey seams and clay laminae Gravel: fine, angular flint with well rounded flints below 11.9 m Sand: medium with fine and some coarse, orange and light grey	15.9	20.2
London Clay	Clay, silty, blue–grey and green–grey, top weathered to dark brown	1.3+	21.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
10	89	1	4.3–5.2	15	14	71	0	0	0
			5.2–6.2	5	17	78	0	0	0
			6.2–7.2	10	16	71	3	0	0
			7.2–8.2	9	15	76	0	0	0
			8.2–9.2	10	34	55	1	0	0
			9.2–10.2	4	49	47	0	0	0
			10.2–11.2	6	40	53	1	0	0
			11.2–12.2	9	24	66	1	0	0
			12.2–13.2	6	26	66	2	0	0
			13.2–14.3	15	5	68	10	2	0
			14.3–15.3	8	5	65	16	6	0
			15.3–16.3	2	9	70	13	6	0
			16.3–17.3	9	12	75	3	1	0
			17.3–18.3	11	32	51	2	1	3
			18.3–19.3	26	32	39	2	1	0
			19.3–20.2	10	30	54	2	1	3
			Mean	10	22	63	4	1	0

TL 83 NW 24 8431 3747 Butler's Wood **Block B**

Surface level (+84.4 m) +277 ft
Water not struck
152-mm percussion
June 1975

Overburden 10.5 m
Mineral 13.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.1	0.1
Boulder Clay	Clay, orange–brown with pebbles of flint and chalk, becoming blue–grey with additional pebbles of shale	10.1	10.2
	Sand, yellow–brown with chalk gravel	0.3	10.5
Barham Sands and Gravels	**a** 'Clayey' Pebbly Sand Gravel: fine and coarse, subangular to well rounded flint with some quartz and quartzite Sand: medium and fine with coarse, yellow to orange	3.9	14.4
Kesgrave Sands and Gravels	**b** 'Clayey' Sand, with clay laminae below 18.4 m Gravel: a trace of fine flint Sand: medium and fine with some coarse, micaceous, orange–yellow	10.0+	24.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64	
a	18	69	13	10.5–11.3	11	2	40	14	20	13	
				11.3–12.3	23	32	43	2	0	0	
				12.3–13.3	17	22	39	4	12	6	
				13.3–14.4	19	32	41	2	4	2	
				Mean	18	23	41	5	8	5	
b	19	81	0	14.4–15.4	12	37	49	2	0	0	
				15.4–16.4	16	4	78	2	0	0	
				16.4–17.4	16	26	53	4	1	0	
				17.4–18.4	11	44	43	1	1	0	
				18.4–19.4	12	21	65	2	0	0	
				19.4–20.4	27	46	24	3	0	0	
				20.4–21.4	27	62	10	1	0	0	
				21.4–22.4	17	38	44	1	0	0	
				22.4–23.4	23	56	20	1	0	0	
				23.4–24.4	27	29	43	1	0	0	
				Mean	19	36	43	2	0	0	

TL 83 NW 25 8470 3646 Twinstead Green **Block B**

Surface level (+86.0 m) +282 ft
Water struck at +78.9 m
152-mm percussion
April 1975

Overburden 10.3 m
Mineral 9.5 m
Waste 4.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown with pebbles of chalk and flint, becoming grey with additional pebbles of shale below 5.7 m	9.7	10.0
Barham Sands and Gravels	Clay, sandy, orange–brown with pebbles	0.3	10.3
	a 'Very Clayey' Sandy Gravel Gravel: coarse and fine with some cobbles, angular and well rounded flint, rounded quartz and quartzite with some ironstone and chalk Sand: medium and fine with coarse, brown, orange and light grey	7.5	17.8
Kesgrave Sands and Gravels	**b** 'Clayey' Sand, with some flint and quartz pebbles Sand: medium and fine, orange–brown	2.0	19.8
	Clay, sandy, light grey with numerous clay laminae	4.6+	24.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	+64
a	20	50	30	10.3–11.3	32	26	31	3	4	4	0
				11.3–12.3	38	27	23	2	6	4	0
				12.3–13.4	29	31	32	2	4	2	0
				13.4–14.4	18	3	22	9	16	32	0
				14.4–15.4	13	7	26	8	14	25	7
				15.4–16.4	10	6	35	12	19	18	0
				16.4–17.8	6	5	32	7	13	37	0
				Mean	20	15	29	6	11	18	1
b	13	87	0	17.8–18.8	8	6	86	0	0	0	0
				18.8–19.8	19	56	25	0	0	0	0
				Mean	13	31	56	0	0	0	0

TL 83 NW 26 **8455 3558** **Catley Cross** **Block C**

Surface level (+77.4 m) +254 ft
Water struck at +60.4 m
152-mm percussion
May 1975

Overburden 11.8 m
Mineral 12.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown, with pebbles of flint and quartz. Chalk abundant below 3.6 m	4.1	4.4
Barham Sands and Gravels	Clay, sandy, orange–brown with pebbles of flint, quartz and quartzite	6.2	10.6
	Clay, orange to scarlet, roughly laminated	1.2	11.8
Kesgrave Sands and Gravels	**a** Sand, with seams of clay laminae Sand: fine and medium with a trace of coarse, yellow–grey to orange	11.0	22.8
Red Crag	**b** Sand: medium with fine and coarse, light brown	1.6+	24.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	8	92	0	11.8–12.8	14	41	45	0	0	0	
				12.8–13.8	14	54	31	1	0	0	
				13.8–14.8	12	56	32	0	0	0	
				14.8–15.8	4	36	59	1	0	0	
				15.8–16.8	8	67	25	0	0	0	
				16.8–17.8	4	84	12	0	0	0	
				17.8–18.8	5	80	15	0	0	0	
				18.8–19.8	4	68	28	0	0	0	
				19.8–20.8	3	67	30	0	0	0	
				20.8–21.8	11	28	60	1	0	0	
				21.8–22.8	9	64	26	0	1	0	
				Mean	8	59	33	0	0	0	
b	7	93	0	22.8–24.4	7	21	67	5	0	0	

TL 83 NW 27 8401 3508 Collins Farm **Block C**

Surface level (+71.0 m) +233 ft
Water struck at +67.0 m
152-mm percussion
May 1975

Waste 20.9 m
Bedrock 0.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, mottled orange–brown and brown with pebbles of chalk and flint from 0.9 m becoming olive–grey with additional pebbles of shale from 10.0 m	14.9	15.1
Barham Sands and Gravels	Clay, sandy, yellow–orange with pebbles of flint and quartz	1.7	16.8
Kesgrave Sands and Gravels	Sand Gravel: fine rounded flint Sand: medium and fine with coarse, orange	4.1	20.9
London Clay	Clay, blue–grey, top weathered to brown	0.9+	21.8

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
7	92	1	16.8–17.8	7	35	52	6	0	0
			17.8–18.8	4	34	56	5	1	0
			18.8–19.8	9	32	56	2	1	0
			19.8–20.9	8	33	52	6	1	0
			Mean	7	33	54	5	1	0

TL 83 NW 28 8340 3791 Hole Farm **Block B**

Surface level (+62.5 m) +205 ft
Water struck at +61.0 m and 56.8 m
152-mm percussion
April 1975

Overburden 0.8 m
Mineral 1.9 m
Bedrock 17.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.8	0.8
Kesgrave Sands and Gravels	'Clayey' Pebbly Sand Gravel: well rounded with angular flint and subangular quartz Sand: medium with coarse and fine, micaceous, orange to grey	1.9	2.7
London Clay	Clay, silty mottled light grey and blue–grey, becoming a sandy silt from 9.8 m. Passing down into clayey sand with a basal pebble bed of flint and sandstone	11.5	14.2
Lower London Tertiaries	Clay, silty with sand partings, mottled red–brown and purple	5.9+	20.1

TL 83 NE 1 8572 3960 Armsey Farm **Block B**

Surface level (+79.6 m) +261 ft
Water struck at +75.7 m and 74.9 m
152-mm percussion
September 1975

Overburden 10.4 m
Mineral 14.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown with flint and chalk pebbles, becoming olive–grey with additional pebbles of shale from 5.7 m	9.0	9.3
Barham Sands and Gravels	Clay, sandy, orange–brown with some flint and chalk pebbles	1.1	10.4
	a 'Clayey' Pebbly Sand, with clayey seams near the base Gravel: coarse and fine, subangular with well rounded flint and quartz Sand: medium with fine and coarse, yellow to orange	2.8	13.2
Kesgrave Sands and Gravels	**b** Clayey Sand, with seams of clay laminae Gravel: fine rounded flint Sand: medium and fine with some coarse, yellow–grey	11.2+	24.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	15	73	12	10.4–11.1	18	11	67	3	1	0	
				11.1–12.1	12	10	64	5	3	6	
				12.1–13.2	15	9	49	5	8	14	
				Mean	15	10	59	4	4	8	
b	13	87	0	13.2–14.2	8	41	50	1	0	0	
				14.2–16.2	6	41	53	0	0	0	
				16.2–17.2	38	38	22	2	0	0	
				17.2–18.2	27	43	27	3	0	0	
				18.2–19.2	15	13	70	2	0	0	
				19.2–20.2	22	8	69	1	0	0	
				20.2–21.2	13	20	63	4	0	0	
				21.2–22.2	6	35	56	3	0	0	
				22.2–23.2	5	43	50	1	1	0	
				23.2–24.4	3	35	60	1	1	0	
				Mean	13	33	52	2	0	0	

TL 83 NE 2 **8533 3864** **Lodge Farm** **Block B**

Surface level (+85.6 m) +281 ft
Water struck at +83.6 m
152-mm percussion
June 1975

Overburden 12.6 m
Mineral 11.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.7	0.7
Boulder Clay	Clay, brown, with pebbles of chalk and flint	1.3	2.0
	Silt, sandy with fine chalk pebbles	2.1	4.1
	Clay, blue–grey with pebbles of chalk and flint	8.5	12.6
Barham Sands and Gravels	**a** 'Very Clayey' Pebbly Sand, with pebbly clay seams Gravel: fine and coarse, angular to well rounded flint with some well rounded quartzite and quartz Sand: medium and fine with coarse, including chalk grains, orange–brown	6.9	19.5
Kesgrave Sands and Gravels	**b** 'Clayey' Sand, clay seam between 23.9 and 24.3 m Gravel: some fine well rounded flint and quartz pebbles Sand: medium and fine with some coarse, yellow–grey	5.0+	24.5

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
a	22	66	12	12.6–13.6	21	40	28	3	5	3
				13.6–14.6	22	26	28	9	11	4
				14.6–15.7	22	25	40	5	6	2
				15.7–16.5	12	9	32	12	22	13
				16.5–17.5	16	25	40	6	10	3
				17.5–18.5	15	22	57	2	3	1
				18.5–19.5	46	11	42	1	0	0
				Mean	22	23	38	5	8	4
b	16	84	0	19.5–20.5	18	55	26	1	0	0
				20.5–21.5	6	16	76	1	1	0
				21.5–22.5	8	36	55	1	0	0
				22.5–23.5	13	28	58	1	0	0
				23.5–24.5	34	24	40	2	0	0
				Mean	16	32	51	1	0	0

TL 83 NE 3 8598 3795 Rectory (Little Hemny) **Block B**

Surface level (+80.2 m) +263 ft
Water struck at +58.7 m
152-mm percussion
September 1975

Overburden 12.1 m
Mineral 4.5 m
Waste 1.7 m
Mineral 6.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, brown with pebbles of chalk and flint, becoming olive–grey with additional pebbles of shale from 2.0 m	11.9	12.1
Barham Sands and Gravels	**a** 'Clayey' Pebbly Sand Gravel: fine and coarse, rounded flint, some quartz and a trace of chalk Sand: medium and fine with coarse, orange	2.0	14.1
Kesgrave Sands and Gravels	**b** 'Clayey' Sand: fine and medium, yellow–orange	2.5	16.6
	Silt and clay laminated, orange becoming olive–grey	1.7	18.3
	c Sand Gravel: some fine well rounded flints Sand: medium and fine with some coarse, orange–grey	4.1	22.4
Red Crag	**d** Sand Gravel: fine well rounded flint Sand: medium and fine with coarse, red–brown	2.0+	24.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	15	76	9	12.1–13.1	14	25	48	3	7	3	
				13.1–14.1	15	37	37	3	5	3	
				Mean	15	30	43	3	6	3	
b	19	81	0	14.1–16.6	19	51	30	0	0	0	
c	5	95	0	18.3–21.4	6	35	58	1	0	0	
				21.4–22.4	3	37	58	1	1	0	
				Mean	5	36	58	1	0	0	
d	3	96	1	22.4–23.4	2	14	79	3	1	1	
				23.4–24.4	4	63	30	3	0	0	
				Mean	3	39	54	3	1	0	

TL 83 NE 4 8527 3736 Gentry's Farm **Block B**

Surface level (+85.3 m) +280 ft
Water struck at +80.5 m
152-mm percussion
September 1975

Overburden 11.5 m
Mineral 12.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, light brown with pebbles of chalk and flint, becoming olive-grey with additional pebbles of shale from 6.8 m	10.9	11.2
Barham Sands and Gravels	Clay, sandy, orange-brown with some fine flint pebbles	0.3	11.5
	a 'Very Clayey' Pebbly Sand Gravel: fine and coarse, angular to well rounded flint with some subrounded quartz Sand: fine and medium with coarse, orange-brown	3.5	15.0
Kesgrave Sands and Gravels	**b** 'Very Clayey' Sand, with clayey seams Gravel: fine and coarse, flint with some round quartz and quartzite Sand: medium and fine with coarse, orange-brown to light grey	9.4+	24.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	22	62	16	11.5–12.8	22	36	25	4	8	5	
				12.8–14.0	22	15	25	10	22	6	
				14.0–15.0	21	44	24	4	4	3	
				Mean	22	31	25	6	11	5	
b	22	74	4	15.0–16.0	8	9	51	10	12	10	
				16.0–17.0	10	14	48	11	10	7	
				17.0–18.8	12	40	45	2	1	0	
				18.8–22.0	41	50	7	2	0	0	
				22.0–24.4	14	32	51	3	0	0	
				Mean	22	35	35	4	2	2	

TL 83 NE 5 8576 3650 Twinstead **Block C**

Surface level (+75.9 m) +249 ft
Water struck at +59.4 m
152-mm percussion
June 1975

Overburden 4.3 m
Mineral 20.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.5	0.5
Boulder Clay	Clay, mottled orange–brown and light grey with flint pebbles, becoming brown with additional pebbles of chalk	3.2	3.7
Barham Sands and Gravels	Clay, sandy, orange–brown with pebbles	0.6	4.3
	a 'Clayey' Sandy Gravel, with clay seams Gravel: fine and coarse, angular and well rounded flints with quartz, quartzite and a trace of chalk Sand: medium and fine with coarse, orange–brown	3.9	8.2
Kesgrave Sands and Gravels	**b** 'Clayey' Sand, with seams of clay laminae Gravel: fine rounded flints Sand: fine and medium with some coarse, yellow–orange	13.6	21.8
Red Crag	**c** Sand Gravel: fine rounded flints Sand: medium and fine with some coarse, red–brown	2.6+	24.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	13	64	23	4.3–5.3	23	23	48	3	1	2
				5.3–6.3	10	7	25	10	33	15
				6.3–7.2	8	5	34	14	22	17
				7.2–8.2	11	15	70	2	0	2
				Mean	13	13	44	7	14	9
b	10	89	1	8.2–8.8	14	22	62	1	1	0
				8.8–9.8	22	23	51	2	2	0
				9.8–10.8	12	26	59	1	1	1
				10.8–11.8	18	32	48	2	0	0
				11.8–12.8	9	73	16	2	0	0
				12.8–13.8	14	53	31	1	1	0
				13.8–14.8	10	56	32	1	1	0
				14.8–15.8	7	35	56	1	1	0
				15.8–16.8	7	41	50	2	0	0
				16.8–17.8	11	68	21	0	0	0
				17.8–18.8	6	66	26	2	0	0
				18.8–19.8	7	53	38	1	1	0
				19.8–20.8	5	43	48	3	1	0
				20.8–21.8	3	58	37	2	0	0
				Mean	10	47	40	2	1	0
c	2	97	1	21.8–22.8	3	42	51	4	0	0
				22.8–24.4	2	38	56	3	1	0
				Mean	2	40	54	3	1	0

TL 83 NE 6 8522 3560 Clarle's Farms **Block C**

Surface level (+79.6 m) +261 ft
Water struck at +60.6 m
152-mm percussion
June 1975

Overburden 3.8 m
Mineral 1.9 m
Waste 2.0 m
Mineral 3.1 m
Waste 1.6 m
Mineral 12.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown with pebbles of ironstone and flint, additional pebbles of chalk are present from 1.0 m	3.5	3.8
Barham Sands and Gravels	**a** 'Clayey' Sandy Gravel, with silt and clay seams below 4.7 m Gravel: coarse and fine with cobbles, angular and well rounded flints with rounded quartz Sand: fine and medium with coarse, yellow–orange	1.9	5.7
	Clay, sandy, mottled red and light grey with flint pebbles	2.0	7.7
	b 'Clayey' Pebbly Sand, with clay laminae towards the base Gravel: fine and coarse, angular and well rounded flints with rounded quartz and quartzite Sand: medium and fine with coarse, orange–brown	3.1	10.8
	Clay, micaceous interlaminated with sandy silt, pink to light grey	1.6	12.4
Kesgrave Sands and Gravels	**c** Sand, with clay laminae seams Sand: medium and fine with some coarse, yellow–orange	9.1	21.5
Red Crag	**d** Sand, with a trace of rounded quartz gravel Sand: medium and fine with coarse, orange–brown	2.9+	24.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	+64
a	17	55	28	3.8–4.7	12	19	22	5	18	17	7
				4.7–5.7	21	33	28	3	8	6	1
				Mean	17	26	25	4	13	11	4
b	11	73	16	7.7–9.4	13	9	46	7	16	9	0
				9.4–10.8	10	58	26	2	2	2	0
				Mean	11	31	37	5	10	6	0
c	8	92	0	12.4–13.5	18	66	14	1	1	0	0
				13.5–14.5	6	47	47	0	0	0	0
				14.5–15.5	5	31	63	1	0	0	0
				15.5–16.5	4	21	74	1	0	0	0
				16.5–17.5	6	36	56	2	0	0	0
				17.5–18.5	12	36	50	2	0	0	0
				18.5–19.5	7	33	58	1	1	0	0
				19.5–20.5	4	68	26	2	0	0	0
				20.5–21.5	3	75	21	1	0	0	0
				Mean	8	46	45	1	0	0	0
d	2	97	1	21.5–22.5	1	43	52	4	0	0	0
				22.5–23.5	2	32	59	6	1	0	0
				23.5–24.4	3	39	54	3	1	0	0
				Mean	2	38	55	4	1	0	0

TL 83 NE 7 8682 3931 Middleton **Block B**

Surface level (+76.2 m) +250 ft
Water struck at +54.7 m
152-mm percussion
June 1975

Overburden 1.4 m
Mineral 20.7 m
Bedrock 3.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.4	0.4
Boulder Clay	Clay, mottled yellow and brown with pebbles of chalk and flint	1.0	1.4
Barham Sands and Gravels	**a** 'Clayey' Pebbly Sand, with a seam of pebbly clay between 3.9 m and 4.1 m Gravel: coarse and fine, angular with well rounded flint, quartz and quartzite Sand: fine and medium with coarse, orange–yellow	7.7	9.1
Kesgrave Sands and Gravels	**b** Sand, with a trace of flint, quartz and quartzite pebbles Sand: medium and fine with a trace of coarse, yellow–grey	10.1	19.2
Red Crag	**c** Pebbly Sand Gravel: fine with coarse, well rounded flint with some quartz Sand: medium with fine and coarse, iron-stained	2.9	22.1
London Clay	Silt, sandy, olive–grey, top weathered to yellow–orange	3.5+	25.6

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	18	71	11	1.4–2.4	14	14	23	7	11	31	
				2.4–3.3	26	31	25	4	9	5	
				3.3–3.9	13	29	46	4	7	1	
				3.9–4.1	Clay						
				4.1–5.1	21	34	34	3	5	3	
				5.1–6.1	24	39	33	2	1	1	
				6.1–7.1	16	3	69	3	5	4	
				7.1–8.1	15	75	7	1	2	0	
				8.1–9.1	13	76	8	0	2	1	
				Mean	18	38	30	3	5	6	
b	8	92	0	9.1–10.1	12	8	79	1	0	0	
				10.1–11.1	6	31	63	0	0	0	
				11.1–12.2	14	66	20	0	0	0	
				12.2–13.2	4	35	61	0	0	0	
				13.2–14.2	3	16	81	0	0	0	
				14.2–15.2	8	48	44	0	0	0	
				15.2–16.2	6	67	27	0	0	0	
				16.2–17.2	8	50	42	0	0	0	
				17.2–18.2	8	38	54	0	0	0	
				18.2–19.2	12	34	49	2	3	0	
				Mean	8	40	52	0	0	0	
c	9	85	6	19.2–20.2	5	30	57	7	1	0	
				20.2–21.2	7	12	52	20	6	3	
				21.2–22.1	15	12	51	14	8	0	
				Mean	9	18	53	14	5	1	

TL 83 NE 8 **8648 3874** **Rye's Hall** **Block B**

Surface level (+74.4 m) +244 ft
Water struck at +56.9 m
152-mm percussion
August 1975

Overburden 1.3 m
Mineral 11.1 m
Waste 1.6 m
Mineral 5.3 m
Bedrock 0.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown with pebbles of chalk, flint and quartz	0.8	1.1
Barham Sands and Gravels	Clay, sandy, orange–brown with pebbles of chalk and flint	0.2	1.3
	a 'Clayey' Pebbly Sand Gravel: fine and coarse, angular and well rounded flint with some rounded quartz Sand: medium and fine with coarse, orange–brown	6.0	7.3
Kesgrave Sands and Gravels	**b** 'Very Clayey' Sand with a trace of fine gravel and silt seams from 8.3 m Sand: fine with medium and a trace of coarse, orange–brown becoming yellow–grey	5.1	12.4
	Clay laminae with seams of sandy clay and sand	1.6	14.0
	c Sand with clay laminae Sand: medium and fine with a trace of coarse, yellow–orange	3.1	17.1
Red Crag	**d** Pebbly Sand Gravel: fine and coarse, rounded and well rounded flint Sand: medium with fine and coarse, red–brown	2.2	19.3
London Clay	Silt, clayey, micaceous, olive–grey, top weathered to brown	0.8+	20.1

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	12	83	5	1.3–2.3	19	34	32	3	6	6	
				2.3–3.3	15	10	68	1	3	3	
				3.3–4.3	11	12	76	1	0	0	
				4.3–5.3	9	21	61	2	5	2	
				5.3–7.3	9	27	57	4	2	1	
				Mean	12	22	58	3	3	2	
b	30	70	0	7.3–8.3	9	57	32	1	1	0	
				8.3–12.4	35	59	6	0	0	0	
				Mean	30	59	11	0	0	0	
c	7	93	0	14.0–16.0	7	49	44	0	0	0	
				16.0–17.1	6	35	58	1	0	0	
				Mean	7	44	49	0	0	0	
d	5	82	13	17.1–18.1	8	16	66	6	3	1	
				18.1–19.3	3	15	55	7	11	9	
				Mean	5	16	60	6	8	5	

TL 83 NE 9 **8695 3739** **Great Henny** **Block B**

Surface level (+68.3 m) +224 ft
Water struck at +53.3 m
152-mm percussion
June 1975

Overburden 0.8 m
Mineral 6.0 m
Waste 1.9 m
Mineral 10.0 mm
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.8	0.8
Barham Sands and Gravels	**a** 'Clayey' Pebbly Sand Gravel: fine and coarse, subangular and well rounded flint with quartz Sand: medium and fine with coarse, orange–brown	6.0	6.8
Kesgrave Sands and Gravels	Silt, laminated, micaceous, yellow–grey	1.9	8.7
	b Sand Gravel: some fine well rounded flint and quartz Sand: medium and fine with some coarse, micaceous, yellow–grey	10.0	18.7
London Clay	Clay, silty, olive–grey, top weathered to brown	0.6+	19.3

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	14	81	5	0.8–1.8	9	5	45	14	15	12
				1.8–2.8	19	4	74	1	2	0
				2.8–3.8	17	13	64	4	1	1
				3.8–4.8	13	25	56	5	1	0
				4.8–5.8	8	48	44	0	0	0
				5.8–6.8	16	55	28	1	0	0
				Mean	14	25	52	4	3	2
b	9	89	2	8.7–9.7	29	34	36	1	0	0
				9.7–10.7	18	20	61	1	0	0
				10.7–11.7	11	23	64	2	0	0
				11.7–12.7	8	10	82	0	0	0
				12.7–13.7	2	11	56	1	0	0
				13.7–14.7	3	11	77	8	1	0
				14.7–15.7	8	42	46	3	1	0
				15.7–16.7	2	16	71	9	2	0
				16.7–17.7	5	34	58	3	0	0
				17.7–18.7	6	44	40	2	1	7
				Mean	9	24	62	3	1	1

TL 83 NE 10 8667 3620 Newhouse Cottages **Block E**

Surface level (+67.1 m) +220 ft
Water struck at +53.9 m
152-mm percussion
June 1975

Overburden 4.2 m
Mineral 15.8 m
Bedrock 0.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, light brown with pebbles of chalk and flint	4.0	4.2
Barham Sands and Gravels	**a** 'Clayey' Pebbly Sand, with clay laminae Gravel: fine and coarse, subrounded and well rounded flint with quartz and quartzite Sand: medium with fine and some coarse, yellow and orange	4.0	8.2
Kesgrave Sands and Gravels	**b** Sand, with a trace of gravel Sand: medium and fine with some coarse, yellow–orange	8.0	16.2
Red Crag	**c** Sand Gravel: fine well rounded flint Sand: medium with fine and coarse, yellow–orange	3.8	20.0
London Clay	Clay, silty, dark green–grey, top weathered to brown	0.8+	20.8

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	15	75	10	4.2–5.2	9	11	69	6	4	1
				5.2–6.2	24	16	51	5	4	0
				6.2–7.2	15	8	44	6	16	11
				7.2–8.2	13	6	69	7	5	0
				Mean	15	10	59	6	7	3
b	5	95	0	8.2–9.2	5	14	79	1	0	1
				9.2–10.2	16	31	51	2	0	0
				10.2–11.2	6	34	58	2	0	0
				11.2–12.2	3	33	62	1	1	0
				12.2–13.2	2	11	80	6	1	0
				13.2–14.2	4	34	59	3	0	0
				14.2–15.2	5	54	39	2	0	0
				15.2–16.2	2	47	49	2	0	0
				Mean	5	32	60	3	0	0
c	3	96	1	16.2–17.2	5	58	24	12	1	0
				17.2–18.2	2	40	39	18	1	0
				18.2–19.2	3	49	33	14	1	0
				19.2–20.0	3	24	56	16	1	0
				Mean						

TL 83 NE 11 8613 3548 Lorkin's Farm **Block C**

Surface level (+71.0 m) +233 ft
Water struck at +59.0 m
152-mm percussion
July 1975

Overburden 6.3 m
Mineral 15.9 m
Bedrock 0.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.4	0.4
Boulder Clay	Clay, brown with pebbles of chalk, flint and quartzite	4.9	5.3
Barham Sands and Gravels	Clay, sandy, with pebbles of flint and quartzite; interbedded with seams of sand	1.0	6.3
	a 'Very Clayey' Pebbly Sand Gravel: fine and coarse, angular and rounded flint with some quartz and quartzite Sand: medium and fine with coarse, micaceous, yellow–light grey	4.5	10.8
Kesgrave Sands and Gravels	**b** Sand, with clay laminae Gravel: fine and coarse, angular and rounded flint with subangular quartz and quartzite Sand: medium and fine with coarse, yellow–light grey	11.4	22.2
London Clay	Silt, clayey, micaceous, dark grey, top weathered to brown	0.8+	23.0

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	23	67	10	6.3–7.3	33	30	24	4	7	2	
				7.3–8.3	30	42	20	3	3	2	
				8.3–9.3	22	38	38	0	2	0	
				9.3–10.3	18	40	30	4	6	2	
				10.3–10.8	6	12	27	11	26	18	
				Mean	23	35	28	4	7	3	
b	4	94	2	10.8–11.8	8	27	62	1	1	1	
				11.8–12.8	4	20	71	4	1	0	
				12.8–13.8	2	15	71	10	1	1	
				13.8–14.8	3	35	55	5	2	0	
				14.8–15.8	5	56	29	6	2	2	
				15.8–16.8	5	45	41	6	3	0	
				16.8–17.8	4	38	40	15	3	0	
				17.8–18.8	3	26	50	17	2	2	
				18.8–19.8	3	25	65	4	1	2	
				19.8–20.8	3	37	58	2	0	0	
				20.8–22.2	3	39	56	2	0	0	
				Mean	4	33	55	6	1	1	

TL 83 NE 12 8794 3960 Near Middleton **Block H**

Surface level (+21.0 m) +69 ft
Water struck at +19.2 m
152-mm percussion
June 1975

Overburden 0.5 m
Mineral 4.8 m
Bedrock 1.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
First Terrace	Silt, clayey, orange–brown, pebbly	0.2	0.5
	Gravel Gravel: fine and coarse with some cobbles, subangular with well rounded flint, quartz, sandstone, quartzite. Abundant chalk from 4.5 m Sand: medium and coarse with fine, light orange–brown	4.8	5.3
Upper Chalk	Chalk, soft	1.2+	6.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	$+64$
3	32	65	0.5–1.5	6	9	13	7	33	32	0
			1.5–2.5	3	2	12	10	30	35	8
			2.5–3.5	3	1	16	12	30	38	0
			3.5–4.5	0	0	3	22	46	29	0
			4.5–5.3	1	2	26	21	27	13	0
			Mean	3	3	15	14	33	31	1

TL 83 NE 13 8790 3793 Greathouse Farm **Block H**

Surface level (+26.8 m) +88 ft
Water not struck
152-mm percussion
August 1975

Waste 3.5 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Second Terrace	Silt, clayey, brown with pebbles of flint and quartz	3.3	3.5
Upper Chalk	Chalk, soft	0.5+	4.0

TL 83 NE 14 **8786 3726** **Great Hickbush** **Block E**

Surface level (+61.9 m) +203 ft
Water not struck
152-mm percussion
June 1975

Overburden 0.1 m
Mineral 13.0 m
Bedrock 2.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.1	0.1
Glacial Sand and Gravel, upper	**a** Sandy Gravel, with a seam of pebbly clay between 1.6 and 1.8 m Gravel: fine and coarse, angular with some well rounded flint and quartzite Sand: medium with coarse, and some fine, orange–brown	2.3	2.4
Kesgrave Sands and Gravels	**b** 'Clayey' Pebbly Sand, with a seam of pebbly clay between 3.2 and 3.4 m Gravel: fine and coarse, angular with well rounded flint, quartz and quartzite Sand: medium with fine and coarse, yellow–grey	10.7	13.1
London Clay	Clay, silty, brown with pebbles of ironstone and a calcareous argillacious concretion	2.8+	15.9

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
a	5	69	26	0.1–1.1	6	2	45	13	22	12
				1.1–2.4	5	2	63	11	13	6
				Mean	5	2	55	12	17	9
b	12	73	15	2.4–3.2	11	31	52	2	3	1
				3.2–3.4	Pebbly Clay					
				3.4–4.4	5	7	66	4	12	6
				4.4–5.4	12	12	68	2	5	1
				5.4–6.4	9	5	57	6	12	11
				6.4–7.4	6	5	44	10	22	13
				7.4–8.4	5	3	44	9	14	25
				8.4–9.5	11	8	52	6	11	12
				9.5–10.5	8	26	65	1	0	0
				10.5–11.5	20	9	62	4	4	1
				11.5–12.5	23	73	3	0	0	1
				12.5–13.1	20	46	19	10	2	3
				Mean	12	19	49	5	8	7

TL 83 NE 15 8833 3980 Near Moor's Farm **Block H**

Surface level (+23.8 m) +78 ft
Water struck at +21.8 m
152-mm percussion
July 1975

Overburden 2.0 m
Mineral 2.5 m
Waste 0.4 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	1.3	1.3
First Terrace	Clay, orange–brown with pebbles	0.7	2.0
	Gravel Gravel: fine and coarse, angular with some well rounded flint and quartz Sand: medium and fine with coarse	2.5	4.5
	Chalk and flint pebbles	0.4	4.9
Upper Chalk	Chalk, soft	0.5+	5.4

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	$+64$
8	36	56	2.0–3.0	5	7	12	9	34	33	
			3.0–4.5	10	15	19	8	25	23	
			Mean	8	12	16	8	29	27	

TL 83 NE 16 8822 3865 Shalford Meadow **Block H**

Surface level (+21.9 m) +72 ft
Water struck at +16.1 m
152-mm percussion
July 1975

Waste 9.2 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Alluvium	Silt, clayey, olive–grey	0.7	0.7
	Silt, clayey, grey and brown with shell debris and peat	1.3	2.0
	Silt, green–blue with wood fragments	5.0	7.0
	Silt, sandy, blue–grey with some pebbles	2.2	9.2
Upper Chalk	Chalk, soft	1.0+	10.2

TL 83 NE 17 8857 3775 Lower Farm **Block H**

Surface level (+20.4 m) +67 ft
Water struck at +15.0 m
152-mm percussion
July 1975

Overburden 5.4 m
Mineral 4.3 m
Waste 0.9 m
Bedrock 0.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Alluvium	Silt, clayey, mottled brown and blue–grey with shell debris, peat and fragments of wood	5.2	5.4
	Gravel Gravel: coarse and fine with some cobbles, angular flint with some well rounded quartz and quartzite Sand: medium and coarse with fine	4.3	9.7
	Chalk and flint pebbles	0.9	10.6
Upper Chalk	Chalk, soft	0.4+	11.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	$+64$
1	36	63	5.4–6.4	2	2	19	15	33	29	0
			6.4–7.4	1	6	27	11	26	29	0
			7.4–8.4	1	4	25	12	27	31	0
			8.4–9.7	1	3	15	7	19	53	2
			Mean	1	4	21	11	26	36	1

TL 83 NE 18 8827 3647 Hill Farm **Block E**

Surface level (+70.4 m) +231 ft
Water struck at +48.4 m
152-mm percussion
June 1975

Overburden 0.4 m
Mineral 2.5 m
Waste 6.9 m
Mineral 14.1 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.4	0.4
Glacial Sand and Gravel, upper	**a** Sandy Gravel Gravel: fine and coarse, subangular with well rounded flint and quartz Sand: medium and coarse with fine, yellow–orange	2.5	2.9
Boulder Clay	Clay, dark grey, with pebbles of chalk and flint	6.9	9.8
Kesgrave Sands and Gravels	**b** Sandy Gravel Gravel: fine and coarse, subrounded and well rounded flint with quartz and quartzite Sand: medium and fine with coarse, yellow, becoming iron-stained below 14.8 m	10.9	20.7
Red Crag	**c** Sand Gravel: fine subrounded and well rounded flint with quartz Sand: medium and coarse with fine, micaceous, yellow–grey, becoming iron-stained from 21.7 m	3.2	23.9
London Clay	Clay, silty, green–black, top weathered to brown	0.6+	24.5

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	
a	5	56	39	0.4–1.4	5	3	40	15	22	15	
				1.4–2.4	3	3	29	20	28	17	
				2.4–2.9	8	3	40	18	19	12	
				Mean	5	3	36	17	24	15	
b	6	68	26	9.8–10.8	11	2	49	6	18	14	
				10.8–11.8	8	7	66	2	5	12	
				11.8–12.8	3	5	30	8	21	33	
				12.8–13.8	4	7	24	8	39	18	
				13.8–14.8	3	5	40	6	17	29	
				14.8–15.8	6	2	43	11	26	12	
				15.8–16.7	6	5	33	12	27	17	
				16.7–17.7	6	19	67	8	0	0	
				17.7–18.7	6	34	52	7	1	0	
				18.7–19.7	6	36	56	2	0	0	
				19.7–20.7	8	25	56	9	2	0	
				Mean	6	14	47	7	14	12	
c	9	88	3	20.7–21.7	5	16	64	13	2	0	
				21.7–22.7	8	16	50	24	2	0	
				22.7–23.9	13	12	46	24	5	0	
				Mean	9	14	53	21	3	0	

TL 83 NE 19 8906 3936 Moor's Farm **Block H**

Surface level (+23.8 m) +78 ft
Water struck at +19.0 m
152-mm percussion
July 1975

Overburden 1.9 m
Mineral 5.1 m
Waste 0.8 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	1.9	1.9
First Terrace	Gravel	5.1	7.0
	Gravel: fine and medium with some cobbles, angular with some well rounded flint and quartz Sand: medium, coarse and fine, yellow–orange		
	Chalk with flint pebbles	0.8	7.8
Upper Chalk	Chalk, soft	0.5+	8.3

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	+64
7	45	48	1.9–2.9	15	26	36	8	11	4	0
			2.9–3.9	6	8	23	15	30	18	0
			3.9–4.9	7	2	14	12	36	29	0
			4.9–5.9	5	8	20	11	34	22	0
			5.9–7.0	3	5	25	14	26	19	8
			Mean	7	10	23	12	28	18	2

TL 83 NE 20 8965 3895 Holly Lodge **Block A**

Surface level (+44.2 m) +145 ft
Water struck at +38.4 m
152-mm percussion
July 1975

Waste 5.7 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.5	0.5
Boulder Clay	Clay, brown with flint pebbles, becoming dark grey with additional pebbles of chalk and quartz	5.2	5.7
Lower London Tertiaries	Clay, mottled grey and maroon with race nodules	1.0+	6.7

TL 83 NE 21 **8994 3784** **Pond Farm** **Block A**

Surface level (+57.6 m) +189 ft
Water struck at +49.0 m
152-mm percussion
July 1975

Overburden 4.8 m
Mineral 4.3 m
Bedrock 0.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, brown with pebbles of chalk, flint and some quartz	4.6	4.8
Red Crag	Pebbly Sand Gravel: fine and coarse, well rounded flint with some quartz and iron-pan Sand: fine and medium with coarse, orange–yellow becoming iron-stained from 6.2 m	4.3	9.1
London Clay	Clay, silty, orange–brown	0.9+	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
6	80	14	4.8–5.8	6	60	26	5	2	1
			5.8–6.8	7	30	49	6	6	2
			6.8–7.8	5	54	27	6	6	2
			7.8–9.1	7	29	18	13	18	15
			Mean	6	43	29	8	8	6

TL 83 NE 22 8922 3733 Burnthouse Farm **Block H**

Surface level (+21.9 m) +72 ft
Water struck at +19.1 m
152-mm percussion
August 1975

Overburden 1.3 m
Mineral 5.6 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.4	0.4
First Terrace	Silt, clayey, brown with some flint pebbles	0.9	1.3
	Sandy Gravel, with silt seams Gravel: fine and coarse, subangular flint with rounded quartz Sand: medium and fine with coarse	5.6	6.9
Upper Chalk	Chalk, soft	0.6+	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
4	49	47	1.3–2.3	4	30	26	7	20	13
			2.3–3.3	1	6	18	12	38	25
			3.3–4.3	1	6	25	12	32	24
			4.3–5.3	15	19	42	7	13	4
			5.3–6.9	3	6	24	9	35	23
			Mean	4	13	27	9	28	19

TL 83 NE 23 8942 3677 Near Burnthouse Farm **Block H**

Surface level (+19.5 m) +64 ft
Water struck at +13.0 m
152-mm percussion
September 1975

Overburden 6.5 m
Mineral 2.6 m
Bedrock 0.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Alluvium	Silt, clayey, mottled brown and grey with peat and shell debris	6.2	6.5
	Sandy Gravel Gravel: fine and coarse, angular flint Sand: medium, coarse and fine, brown–grey	2.6	9.1
Upper Chalk	Chalk, soft	0.3+	9.4

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
3	56	41	6.5–7.5	4	23	27	14	31	1
			7.5–9.1	2	11	23	17	24	23
			Mean	3	15	25	16	27	14

TL 83 NE 24 8931 3594 Lamarsh **Block H**

Surface level (+20.7 m) +68 ft
Water struck at +18.9 m
152-mm percussion
June 1975

Overburden 1.0 m
Mineral 5.3 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.7	0.7
First Terrace	Clay, sandy, orange–brown with pebbles	0.3	1.0
	Gravel	5.3	6.3
	Gravel: coarse and fine, angular with well rounded flint, quartz and quartzite Sand: medium and coarse with fine, yellow–orange		
Upper Chalk	Chalk, soft	1.0+	7.3

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
2	28	70	1.0–2.0	5	9	19	10	29	28
			2.0–3.0	1	3	19	12	28	37
			3.0–4.0	1	5	15	10	37	32
			4.0–5.0	2	1	6	8	36	47
			5.0–6.3	2	1	12	11	31	43
			Mean	2	4	14	10	32	38

TL 83 NE 25 8899 3863 Kedington Hill **Block A**

Surface level (+43.6 m) +143 ft
Water level not recorded
152-mm percussion
May 1975

Overburden 4.7 m
Mineral 5.8 m
Bedrock 10.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
London Clay	Silt, sandy, laminated, grey–brown	2.5	2.5
	Clay, silty, interlaminated with fine micaceous sand	2.2	4.7
Lower London Tertiaries	'Clayey' Sand, with a trace of gravel Sand: medium and fine with some coarse, grey–brown	5.8	10.5
	Clay, silty, laminated, mottled grey–brown and green	1.2	11.7
	Silt, clayey, with fine sand, red–brown to green–grey	6.2	19.3
	Clay, sandy, dark green	1.1	20.4
Upper Chalk	Chalk, soft	0.6+	21.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
12	88	0	4.7–5.7	7	86	7	0	0	0
			5.7–6.7	10	43	47	0	0	0
			6.7–7.7	8	19	65	5	3	0
			7.7–8.7	12	78	8	2	0	0
			8.7–10.5	19	11	70	0	0	0
			Mean	12	42	44	2	0	0

TL 83 NE E1 **8700 3588** **Ansell's Farm** **Block E**

Surface level (+69.8 m) +229 ft
Water not struck
Sampled by hand from exposure
June 1975

Overburden 8.0 m
Mineral 8.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown with pebbles of flint and chalk	6.9	7.2
Barham Sands and Gravels	Clay, sandy, blue–grey to yellow with pebbles	0.8	8.0
	a 'Clayey' Pebbly Sand Gravel: fine and coarse, angular with well rounded flint and quartz Sand: medium and fine with coarse, yellow–orange	3.0	11.0
Kesgrave Sands and Gravels	**b** Pebbly Sand Gravel: fine with some coarse, subangular with well rounded flint, quartz and quartzite. Gravel rare below 14.0 m Sand: medium with fine and coarse, grey to white	5.0+	16.0

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	
a	15	78	7	8.0–9.0	29	34	29	3	2	3	
				9.0–10.0	14	42	38	2	1	3	
				10.0–11.0	3	17	62	6	9	3	
				Mean	15	31	43	4	4	3	
b	2	92	6	11.0–12.0	1	12	77	5	4	1	
				12.0–13.0	2	18	72	4	4	0	
				13.0–14.0	3	11	68	4	9	5	
				14.0–16.0	*3*	*12*	*76*	*5*	*4*	*0*	
				Mean	2	13	74	5	5	1	

TL 83 SW 1 **8067 3470** **Great Maplestead** **Block D**

Surface level (+68.6 m) +225 ft
Water struck at +59.7 m
152-mm percussion
August 1975

Overburden 0.9 m
Mineral 10.5 m
Bedrock 1.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.4	0.4
Kesgrave Sands and Gravels	Clay, sandy, orange–brown with flint pebbles	0.5	0.9
	a Sand Gravel: fine angular with well rounded flints Sand: fine and medium with a trace of coarse, light grey and orange	5.4	6.3
Red Crag	**b** Sand, with silt laminae from 6.3 to 7.3 m Sand: medium and fine with some coarse, orange–brown becoming iron-stained from 10.2 m	5.1	11.4
London Clay	Silt, clayey, micaceous, olive–grey, top weathered to brown	1.1+	12.5

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	5	94	1	0.9–1.3	14	37	32	4	10	3	
				1.3–2.3	8	91	1	0	0	0	
				2.3–6.3	3	39	58	0	0	0	
				Mean	5	48	46	0	1	0	
b	7	93	0	6.3–10.3	7	22	67	4	0	0	
				10.3–11.4	5	29	63	3	0	0	
				Mean	7	24	66	3	0	0	

TL 83 SW 2 8028 3344 Kilowen Cottages **Block D**

Surface level (+75.6 m) +248 ft
Water struck at +58.6 m
152-mm percussion
July 1975

Overburden 4.9 m
Mineral 16.5 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, orange–brown with pebbles of chalk and flint	4.6	4.9
Kesgrave Sands and Gravels	Sand, with seams of silt and clay laminae Gravel: fine, subangular with well rounded flint, quartz and quartzite Sand: fine and medium with some coarse, yellow to orange	16.5	21.4
London Clay	Clay, dark grey, top weathered to yellow–brown	0.5+	21.9

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
8	91	1	4.9–5.9	9	80	9	1	0	1
			5.9–6.9	8	77	15	0	0	0
			6.9–7.9	24	62	14	0	0	0
			7.9–8.9	10	31	58	1	0	0
			8.9–9.9	6	40	54	0	0	0
			9.9–10.9	7	48	45	0	0	0
			10.9–11.9	3	32	65	0	0	0
			11.9–12.9	10	86	4	0	0	0
			12.9–13.9	5	92	3	0	0	0
			13.9–14.9	8	39	49	3	1	0
			14.9–15.9	8	49	41	2	0	0
			15.9–16.9	5	48	46	1	0	0
			16.9–17.9	5	63	31	2	0	0
			17.9–18.9	6	73	20	1	0	0
			18.9–19.9	6	87	5	2	0	0
			19.9–21.4	4	53	25	5	8	0
			Mean	8	60	30	1	1	0

TL 83 SW 3 8029 3270 Dog House Grove **Block D**

Surface level (+55.2 m) +181 ft
Water struck at +49.0 m and 37.4 m
152-mm percussion
September 1975

Waste 17.3 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, mottled orange–brown and light grey with flint pebbles	3.3	3.6
	Clay, orange–brown interbedded with sandy clay and sand	4.6	8.2
	Clay, olive–grey with pebbles of chalk and flint; additional pebbles of shale from 9.9 m	9.1	17.3
London Clay	Silt, clayey, olive–grey, top weathered to brown	1.0+	18.3

TL 83 SW 4 **8013 3123** **Sloe House** **Block D**

Surface level (+73.2 m) +240 ft
Water struck at +60.4 m
152-mm percussion
July 1975

Overburden 1.5 m
Mineral 14.6 m
Bedrock 0.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.7	0.7
Barham Sands and Gravels	Clay, sandy, mottled orange and brown with pebbles	0.8	1.5
	a 'Clayey' Sandy Gravel Gravel: coarse with fine, angular and well rounded flint with quartz and quartzite Sand: medium with fine and coarse, orange to grey	2.5	4.0
Kesgrave Sands and Gravels	**b** Sand, with clay laminae Sand: medium and fine with some coarse, orange to yellow–grey	9.0	13.0
Red Crag	**c** Pebbly Sand Gravel: fine and coarse, well rounded flint with some quartz Sand: fine and medium with coarse, iron-stained	3.1	16.1
London Clay	Clay, silty, blue–grey, top weathered to orange–brown	0.7+	16.8

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	11	61	28	1.5–3.0	14	19	59	0	1	7
				3.0–4.0	6	5	25	6	14	44
				Mean	11	13	45	3	6	22
b	7	93	0	4.0–5.0	5	31	64	0	0	0
				5.0–6.0	17	20	63	0	0	0
				6.0–7.0	8	33	59	0	0	0
				7.0–8.0	8	35	57	0	0	0
				8.0–9.0	9	52	39	0	0	0
				9.0–10.0	5	72	23	0	0	0
				10.0–11.0	5	39	56	0	0	0
				11.0–12.0	5	17	78	0	0	0
				12.0–13.0	4	23	69	3	1	0
				Mean	7	36	56	1	0	0
c	3	90	7	13.0–14.0	2	18	64	11	3	2
				14.0–15.0	6	90	4	0	0	0
				15.0–16.1	2	22	41	20	11	4
				Mean	3	43	37	10	5	2

TL 83 SW 5 8019 3013 Blamster's Farm **Block D**

Surface level (+71.3 m) +234 ft
Water struck at +65.3 m
152-mm percussion
July 1975

Overburden 0.9 m
Mineral 6.1 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.9	0.9
Barham Sands and Gravels	**a** 'Clayey' Pebbly Sand Gravel: fine and coarse, subangular with well rounded flint and some quartz Sand: medium and fine with coarse	2.9	3.8
Kesgrave Sands and Gravels	**b** 'Clayey' Sand:, fine with medium and some coarse, yellow to orange	2.0	5.8
Red Crag	**c** Pebbly Sand Gravel: fine and coarse, subangular and well rounded flint with quartz Sand: medium and fine with coarse, orange	1.2	7.0
London Clay	Clay, silty, yellow–brown	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	
a	16	73	11	0.9–1.9	23	24	25	7	12	9	
				1.9–2.9	12	16	50	13	7	2	
				2.9–3.8	13	58	24	3	2	0	
				Mean	16	32	33	8	7	4	
b	11	89	0	3.8–4.8	10	78	12	0	0	0	
				4.8–5.8	11	67	20	2	0	0	
				Mean	11	72	16	1	0	0	
c	6	88	6	5.8–7.0	6	34	42	12	4	2	

TL 83 SW 6 8148 3397 Little Lodge Farm **Block D**

Surface level (+74.7 m) +245 ft
Water struck at +589 m
152-mm percussion
August 1975

Overburden 1.1 m
Mineral 2.9 m
Waste 0.6 m
Mineral 17.6 m
Bedrock 1.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.7	0.7
Boulder Clay	Clay, mottled orange and grey with pebbles	0.4	1.1
Barham Sands and Gravels	**a** 'Very Clayey' Pebbly Sand Gravel: fine and coarse, subangular flint with quartz and quartzite Sand: medium with fine and coarse	2.9	4.0
	Clay, sandy, orange–brown and grey	0.6	4.6
Kesgrave Sands and Gravels	**b** Sand, medium and fine with some coarse, yellow to orange	12.0	16.6
Red Crag	**c** Sand Gravel: fine and coarse, ironstone, quartz, quartzite and shell debris Sand: medium and fine with coarse, iron-stained	5.6	22.2
London Clay	Clay, silty, blue–grey, top weathered to brown	1.1+	23.3

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	20	72	8	1.1–2.3	20	21	54	1	2	2
				2.3–3.3	20	4	53	10	10	3
				3.3–4.0	17	10	60	4	5	4
				Mean	20	12	55	5	5	3
b	4	96	0	4.6–5.6	5	76	19	0	0	0
				5.6–6.6	5	43	52	0	0	0
				6.6–7.6	4	10	86	0	0	0
				7.6–8.6	8	22	70	0	0	0
				8.6–9.6	5	37	58	0	0	0
				9.6–10.6	3	30	66	1	0	0
				10.6–11.6	4	41	55	0	0	0
				11.6–12.6	3	57	40	0	0	0
				12.6–13.6	5	68	27	0	0	0
				13.6–14.6	5	40	52	3	0	0
				14.6–15.6	4	21	74	1	0	0
				15.6–16.6	1	23	69	5	2	0
				Mean	4	39	56	1	0	0
c	3	94	3	16.6–17.6	3	42	50	5	0	0
				17.6–18.6	6	37	55	2	0	0
				18.6–19.6	4	31	61	4	0	0
				19.6–20.6	2	39	51	4	3	1
				20.6–21.6	3	43	39	9	5	1
				21.6–22.2	4	56	36	4	0	0
				Mean	3	40	49	5	2	1

TL 83 SW 7 **8150 3322** **Chestnut Grove** **Block D**

Surface level (+68.6 m) +225 ft
Water struck at +54.6 m
152-mm percussion
July 1975

Overburden 0.3 m
Mineral 16.1 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Kesgrave Sands and Gravels	**a** Sand: medium and fine with some coarse, yellow–grey	9.0	9.3
Red Crag	**b** Pebbly Sand Gravel: fine and coarse subrounded and well rounded flint with quartz Sand: fine and medium with coarse, orange	7.1	16.4
London Clay	Clay, silty, blue–grey with pyrite nodules and selenite crystals	0.5+	16.9

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
a	4	96	0	0.3–1.3	4	46	50	0	0	0
				1.3–2.3	3	28	69	0	0	0
				2.3–3.3	5	45	50	0	0	0
				3.3–4.3	4	53	43	0	0	0
				4.3–5.3	6	24	70	0	0	0
				5.3–6.3	3	23	74	0	0	0
				6.3–7.3	3	29	69	0	0	0
				7.3–8.3	5	44	50	1	0	0
				8.3–9.3	4	24	67	5	0	0
				Mean	4	35	60	1	0	0
b	8	86	6	9.3–10.3	7	31	49	11	2	0
				10.3–11.3	12	41	36	9	2	0
				11.3–12.3	8	50	34	8	1	0
				12.3–13.3	8	49	36	7	0	0
				13.3–14.3	10	54	27	8	1	0
				14.3–15.3	5	35	42	15	3	0
				15.3–16.4	1	24	37	8	13	17
				Mean	8	40	37	9	3	3

TL 83 SW 8 **8147 3247** **Fitz John's Grove** **Block D**

Surface level (+78.6 m) +258 ft
Water struck at +59.0 m
152-mm percussion
July 1975

Overburden 6.4 m
Mineral 17.5 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, mottled light grey and orange–brown with pebbles of chalk and flint, becoming olive–grey with additional pebbles of shale from 3.0 m	5.7	5.9
Barham Sands and Gravels	Clay, sandy, orange brown with pebbles of flint quartz and quartzite	0.5	6.4
	a Pebbly Sand Gravel: coarse and fine, subangular flint with rounded quartz and subangular quartzite Sand: medium and fine with coarse, orange to light grey	3.0	9.4
Kesgrave Sands and Gravels	**b** Sand, with clayey seams and clay laminae Sand: fine and medium with some coarse, orange to light grey	7.0	16.4
Red Crag	**c** Sand Gravel: fine with a trace of coarse, angular and rounded flint Sand: fine and medium with coarse, red–brown	7.5	23.9
London Clay	Clay, silty, micaceous, olive–grey	0.5+	24.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	9	73	18	6.4–7.2	13	15	50	6	4	12
				7.2–8.4	8	22	48	5	8	9
				8.4–9.4	6	35	33	4	10	12
				Mean	9	24	44	5	7	11
b	6	94	0	9.4–10.4	5	47	46	1	1	0
				10.4–11.4	5	42	51	2	0	0
				11.4–12.4	6	36	56	2	0	0
				12.4–13.4	8	80	10	2	0	0
				13.4–14.4	7	82	11	0	0	0
				14.4–15.4	4	71	25	0	0	0
				15.4–16.4	5	58	36	1	0	0
				Mean	6	59	34	1	0	0
c	9	89	2	16.4–17.4	10	55	32	3	0	0
				17.4–18.4	18	56	22	2	1	1
				18.4–19.4	19	54	23	3	1	0
				19.4–20.4	4	32	48	11	5	0
				20.4–21.4	4	21	61	11	3	0
				21.4–22.4	8	84	7	1	0	0
				22.4–23.9	3	42	43	10	1	1
				Mean	9	49	34	6	2	0

TL 83 SW 9 **8110 3182** **The Howe** **Block D**

Surface level (+61.3 m) +201 ft
Water struck at +53.8 m
152-mm percussion
July 1975

Overburden 0.5 m
Mineral 9.9 m
Bedrock 0.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.5	0.5
Barham Sands and Gravels	**a** 'Clayey' Sandy Gravel Gravel: fine and coarse, subrounded with well rounded flint, quartz and quartzite Sand: medium and coarse with fine, grey becoming orange–brown	3.1	3.6
Kesgrave Sands and Gravels	**b** 'Clayey' Sand: medium and fine with some coarse, yellow–grey	4.9	8.5
Red Crag	**c** Pebbly Sand Gravel: fine with coarse, well rounded flint and quartz Sand: medium with fine and coarse, iron-stained	1.9	10.4
London Clay	Clay, silty, olive–grey top weathered to brown	0.9+	11.3

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	10	52	38	0.5–1.6	5	7	39	22	24	3
				1.6–2.6	20	4	28	12	21	15
				2.6–3.6	6	6	30	8	20	30
				Mean	10	6	32	14	22	16
b	11	89	0	3.6–4.6	6	32	61	1	0	0
				4.6–5.6	33	17	50	0	0	0
				5.6–6.6	5	19	75	1	0	0
				6.6–8.5	5	32	63	0	0	0
				Mean	11	26	62	1	0	0
c	3	82	15	8.5–9.5	2	16	53	13	14	2
				9.5–10.4	3	18	52	14	9	4
				Mean	3	17	52	13	12	3

TL 83 SW 10 **8251 3450** **The Red House** **Block C**

Surface level (+84.4 m) +277 ft
Water not struck
152-mm percussion
May 1975

Overburden 11.6 m
Mineral 3.9 m
Waste 1.5 m
Mineral 7.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.4	0.4
Boulder Clay	Clay, mottled brown and grey–orange with pebbles of chalk and flint, becoming dark grey with additional pebbles of shale from 7.5 m	11.2	11.6
Barham Sands and Gravels	**a** 'Clayey' Sandy Gravel Gravel: coarse and fine, well rounded and angular flints with rounded quartz and quartzite Sand: medium with coarse and fine, orange–brown	3.9	15.5
Kesgrave Sands and Gravels	Clay interlaminated with fine sand, light grey and orange	1.5	17.0
	b 'Clayey' Sand, with clay laminae and sandy clay seams Sand: medium and fine, orange to light grey	7.4+	24.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	18	51	31	11.6–12.2	32	5	55	3	5	0
				12.2–13.2	14	4	27	10	27	18
				13.2–14.5	8	7	22	8	19	36
				14.5–15.5	27	3	68	1	0	0
				Mean	18	5	40	6	14	17
b	11	89	0	17.0–18.0	21	31	48	0	0	0
				18.0–19.0	20	60	20	0	0	0
				19.0–20.0	9	41	50	0	0	0
				20.0–21.0	3	26	71	0	0	0
				21.0–22.0	5	29	66	0	0	0
				22.0–23.1	15	18	67	0	0	0
				23.1–24.4	4	36	60	0	0	0
				Mean	11	34	55	0	0	0

TL 83 SW 11 8236 3344 Hamper's Farm **Block D**

Surface level (+82.3 m) +270 ft
Water not struck
152-mm percussion
April 1975

Waste 18.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, grey–orange with pebbles of chalk and flint, becoming grey with additional pebbles of shale from 7.3 m	17.9+	18.1

TL 83 SW 12 8252 3232 Ashford Lodge **Block D**

Surface level (+78.6 m) +258 ft
Water struck at +59.7 m
152-mm percussion
September 1975

Overburden 8.4 m
Mineral 16.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.6	0.6
Boulder Clay	Clay, brown with pebbles of chalk and flint, becoming olive–grey with additional pebbles of shale from 3.5 m	6.8	7.4
Kesgrave Sands and Gravels	Clay with sandy seams, orange–brown with flint pebbles	1.0	8.4
	a 'Clayey' Sand, with clay laminae Gravel: fine and coarse, subangular flint with quartz and some quartzite. Present above 8.8 m Sand: fine and medium with some coarse, orange–brown to light grey	12.4	20.8
Red Crag	**b** Sand Gravel: fine flint, quartz and sandstone Sand: medium with fine and coarse, iron-stained	3.6+	24.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	10	88	2	8.4–8.8	6	7	19	7	24	37
				8.8–10.8	22	51	24	2	1	0
				10.8–12.8	12	38	49	1	0	0
				12.8–17.8	7	51	41	1	0	0
				17.8–20.8	5	49	45	1	0	0
				Mean	10	47	40	1	1	1
b	4	95	1	20.8–22.8	4	22	54	19	1	0
				22.8–24.4	*4*	*22*	*54*	*19*	*1*	*0*
				Mean	4	22	54	19	1	0

TL 83 SW 13 8204 3155 Constantine's Cottages **Block D**

Surface level (+74.1 m) +243 ft
Water struck at +61.8 m
152-mm percussion
August 1975

Overburden 4.1 m
Mineral 14.0 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, brown with pebbles of chalk, flint and quartz	3.9	4.1
Barham Sands and Gravels	**a** 'Clayey' Pebbly Sand Gravel: fine and coarse, angular and well rounded flints with some rounded quartz Sand: medium with coarse and fine, mid-brown to light grey	3.0	7.1
Kesgrave Sands and Gravels	**b** Sand, with clay laminae Sand: medium and fine, orange to light grey	8.0	15.1
Red Crag	**c** Pebbly Sand Gravel: fine and coarse, subangular and well rounded flint Sand: medium and fine with coarse, red–brown	3.0	18.1
London Clay	Clay, silty, olive–grey, top weathered to light brown	0.6+	18.7

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	13	74	13	4.1–5.1	15	3	32	23	19	8
				5.1–6.1	12	5	61	13	5	4
				6.1–7.1	13	28	53	2	3	1
				Mean	13	12	49	13	9	4
b	6	94	0	7.1–8.1	8	42	50	0	0	0
				8.1–11.1	6	29	65	0	0	0
				11.1–15.1	5	30	65	0	0	0
				Mean	6	31	63	0	0	0
c	3	89	8	15.1–17.1	3	45	38	9	3	2
				17.1–18.1	2	23	49	10	11	5
				Mean	3	38	42	9	5	3

TL 83 SW 14 **8279 3098** **Abbotts Shrubs** **Block G**

Surface level (+73.5 m) +241 ft
Water struck at +58.3 m
152-mm percussion
July 1975

Overburden 12.5 m
Mineral 4.9 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.9	0.9
Boulder Clay	Clay, orange–brown with pebbles of chalk and flint, becoming dark grey with additional pebbles of shale from 6.5 m	11.6	12.5
Kesgrave Sands and Gravels	**a** Gravel Gravel: fine and coarse, subangular flint with well rounded quartz and quartzite Sand: medium with coarse and fine, yellow–grey	3.0	15.5
Red Crag	**b** Gravel Gravel: coarse and fine with cobbles, well rounded quartz and subrounded flint Sand: medium and coarse with fine, iron-stained	1.9	17.4
London Clay	Clay, silty, blue–grey, top weathered to orange–brown	0.6+	18.0

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	3	46	51	12.5–13.5	3	8	36	10	28	15	0
				13.5–14.5	4	4	31	9	26	26	0
				14.5–15.5	2	3	25	11	30	29	0
				Mean	3	5	31	10	28	23	0
b	1	41	58	15.5–16.5	0	1	9	13	37	37	3
				16.5–16.8	0	2	8	7	30	53	0
				16.8–17.4	3	13	50	21	10	3	0
				Mean	1	5	22	14	27	29	2

TL 83 SW 15 **8369 3379** **Seven Acre Wood** **Block C**

Surface level (+79.2 m) +260 ft
Water struck at +60.2 m
152-mm percussion
August 1975

Overburden 14.6 m
Mineral 9.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.4	0.4
Boulder Clay	Clay, yellow–brown with pebbles of chalk and flint, becoming dark grey with additional pebbles of shale	14.2	14.6
Kesgrave Sands and Gravels	**a** Sand, with clay laminae Gravel: fine and coarse, flint and quartz Sand: medium and fine with some coarse, yellow–grey	8.5	23.1
Red Crag	**b** Sand Gravel: fine flint and quartz Sand: fine and medium with coarse	1.3+	24.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	
a	5	92	3	14.6–15.1	11	14	22	9	20	24	
				15.1–16.1	14	23	60	1	2	0	
				16.1–17.1	4	24	71	1	0	0	
				17.1–18.1	2	20	78	0	0	0	
				18.1–19.1	5	25	68	2	0	0	
				19.1–20.1	3	44	50	3	0	0	
				20.1–21.1	2	39	56	3	0	0	
				21.1–22.1	3	53	42	0	0	0	
				22.1–23.1	4	68	20	6	2	0	
				Mean	5	36	54	2	2	1	
b	2	95	3	23.1–24.4	2	52	28	15	3	0	

TL 83 SW 16 **8320 3323** **Gage's** **Block G**

Surface level (+76.5 m) +251 ft
Water struck at +60.5 m
152-mm percussion
August 1975

Overburden 12.6 m
Mineral 10.3 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown with pebbles of chalk and flint, becoming olive–grey with additional pebbles of shale and cobbles of limestone from 7.3 m	12.3	12.6
Barham Sands and Gravels	**a** 'Clayey' Sandy Gravel, with seams of silt laminae Gravel: fine and coarse, subangular and well rounded flints with some rounded quartz Sand: medium and fine with coarse, orange–brown	2.0	14.6
Kesgrave Sands and Gravels	**b** Pebbly Sand Gravel: coarse and fine, angular and well rounded flints, rounded quartzite and quartz Sand: medium and fine with coarse, grey–orange	3.0	17.6
Red Crag	**c** Sand, with clay laminae to 18.6 m Gravel: fine, sandstone and well rounded flints Sand: medium and fine with coarse, red–brown	5.3	22.9
London Clay	Clay, silty, olive–grey with pyritised burrows	0.5+	23.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	10	61	29	12.6–13.6	10	12	41	8	16	13	
				13.6–14.6	10	21	32	7	19	11	
				Mean	10	17	37	7	17	12	
b	4	85	11	14.6–15.6	5	37	53	3	1	1	
				15.6–16.6	2	21	43	3	12	19	
				16.6–17.6	5	36	52	5	1	1	
				Mean	4	32	49	4	4	7	
c	7	91	2	17.6–20.6	7	31	48	12	2	0	
				20.6–22.9	6	47	31	14	2	0	
				Mean	7	38	40	13	2	0	

TL 83 SW 17 **8332 3248** **Birch Wood** **Block G**

Surface level (+80.2 m) +263 ft
Water struck at +73.5 m
152-mm percussion
September 1975

Waste 18.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown with pebbles of chalk and flint, becoming olive–grey with additional pebbles of shale	18.1	18.4
Barham Sands and Gravels	Sandy Gravel Gravel: coarse and fine, subangular flints with some rounded quartz Sand: medium with coarse and fine, orange–brown	0.3+	18.7

TL 83 SW 18 **8368 3180** **Rooktree Plantation** **Block G**

Surface level (+72.5 m) +238 ft
Water struck at +67.5 m and +59.0 m
152-mm percussion
July 1975

Overburden 10.7 m
Mineral 4.6 m
Bedrock 0.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, mottled grey–orange and light grey with pebbles of chalk and flint, becoming olive–grey with additional pebbles of shale from 6.0 m	10.4	10.7
Kesgrave Sands and Gravels	Gravel Gravel: fine and coarse, angular and well rounded flint with rounded quartz and quartzite Sand: medium and coarse with fine, rounded quartz, grey–orange	4.6	15.3
London Clay	Clay, silty, olive–grey, top weathered to brown	0.4+	15.7

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
1	38	61	10.7–11.5	2	5	42	18	26	7
			11.5–12.0	4	14	62	6	10	4
			12.0–13.0	1	2	16	12	39	30
			13.0–14.0	1	1	9	5	33	51
			14.0–15.3	1	1	11	14	37	36
			Mean	1	4	22	12	32	29

TL 83 SW 19 **8366 3080** **Knight's Farm** **Block G**

Surface level (+72.8 m) +239 ft
Water struck at +59.0 m
152-mm percussion
July 1975

Overburden 6.7 m
Mineral 2.0 m
Waste 0.7 m
Mineral 6.5 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown with pebbles of chalk and flint, becoming dark brown with additional pebbles of shale from 5.5 m	6.1	6.4
Barham Sands and Gravels	Clay, sandy, orange–brown with flint pebbles	0.3	6.7
	a Pebbly Sand Gravel: fine and coarse, angular and rounded flint with some rounded quartz Sand: medium and fine with coarse, grey–orange	2.0	8.7
	Clay, sandy, mottled light grey and brown–red with pebbles of flint and quartz	0.7	9.4
Kesgrave Sands and Gravels	**b** Sandy Gravel Gravel: fine and coarse, rounded and angular flint with some rounded quartz and rounded quartzite Sand: medium with coarse and fine, orange–brown	4.9	14.3
Red Crag	**c** Sand Gravel: fine, rounded flint with some rounded quartz Sand: medium with fine and coarse, red–brown	1.6	15.9
London Clay	Clay, micaceous, olive–grey	0.6+	16.5

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	7	76	17	6.7–7.7	7	26	52	4	7	4	
				7.7–8.7	8	26	39	5	11	11	
				Mean	7	26	45	5	9	8	
b	6	54	40	9.4–10.4	13	17	33	6	24	7	
				10.4–11.4	7	8	40	9	25	11	
				11.4–12.4	2	10	34	10	22	22	
				12.4–13.4	6	5	26	15	31	17	
				13.4–14.3	1	14	29	13	22	21	
				Mean	6	11	32	11	25	15	
c	1	95	4	14.3–15.3	1	21	67	8	3	0	
				15.3–15.9	1	23	60	10	6	0	
				Mean	1	22	64	9	4	0	

TL 83 SW 20 **8414 3431** **Collin's Farm** **Block C**

Surface level (+78.6 m) +258 ft
Water struck at +61.0 m
152-mm percussion
August 1975

Overburden 11.1 m
Mineral 13.3 m
Bedrock 0.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, yellow–brown with pebbles of chalk and flint, becoming blue–grey with additional pebbles of quartz, quartzite and chert	10.8	11.1
Barham Sands and Gravels	**a** 'Clayey' Pebbly Sand, with seams of laminated sandy clay Gravel: coarse and fine, flint, quartz and quartzite Sand: medium and fine with coarse, orange–brown	2.0	13.1
Kesgrave Sands and Gravels	**b** Sand, with clay laminae Sand: medium and fine with some coarse, yellow–grey	7.0	20.1
Red Crag	**c** Sand Gravel: fine and coarse, subrounded and well rounded flint with quartz and iron-pan Sand: medium with fine and coarse, iron-stained	4.3	24.4
London Clay	Clay, silty, blue–grey	0.1+	24.5

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	
a	14	70	16	11.1–12.1	12	24	26	7	13	18	
				12.1–13.1	15	39	45	0	0	1	
				Mean	14	31	35	4	7	9	
b	7	93	0	13.1–14.1	6	36	58	0	0	0	
				14.1–15.1	11	55	34	0	0	0	
				15.1–16.1	8	55	37	0	0	0	
				16.1–17.1	5	20	75	0	0	0	
				17.1–18.1	6	17	77	0	0	0	
				18.1–19.1	4	19	75	2	0	0	
				19.1–20.1	8	21	65	5	1	0	
				Mean	7	32	60	1	0	0	
c	6	90	4	20.1–21.1	14	13	58	13	2	0	
				21.1–22.1	2	9	73	14	1	0	
				22.1–23.0	3	19	60	13	3	2	
				23.0–24.4	*5*	*19*	*58*	*13*	*5*	*2*	
				Mean	6	15	62	13	3	1	

TL 83 SW 21 **8482 3377** **Oak Farm** **Block G**

Surface level (+69.8 m) +229 ft
Water struck at +56.8 m
152-mm percussion
July 1975

Overburden 7.6 m
Mineral 13.2 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, yellow–brown with pebbles of chalk and flint, becoming dark grey with additional pebbles of shale from 3.7 m	7.4	7.6
Kesgrave Sands and Gravels	**a** Pebbly Sand Gravel: fine and coarse, angular with well rounded flint, rounded quartz and quartzite Sand: medium and fine with coarse, yellow–orange	11.9	19.5
Red Crag	**b** 'Clayey' Sand Gravel: fine and coarse, sandstone Sand: medium and fine with coarse, iron-stained	1.3	20.8
London Clay	Clay, silty, dark grey with mica and selenite crystals	0.6+	21.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	5	81	14	7.6–8.6	6	20	45	6	13	10	
				8.6–9.6	6	6	34	11	27	16	
				9.6–10.6	6	4	39	15	23	13	
				10.6–11.6	3	3	52	12	17	13	
				11.6–12.5	3	5	53	12	11	16	
				12.5–13.5	4	49	45	2	0	0	
				13.5–14.5	11	26	53	8	2	0	
				14.5–15.5	5	33	50	11	1	0	
				15.5–16.5	5	33	50	11	1	0	
				16.5–17.5	4	32	49	13	2	0	
				17.5–18.5	4	32	50	13	1	0	
				18.5–19.5	1	28	44	19	7	1	
				Mean	5	23	47	11	9	5	
b	10	87	3	19.5–20.8	10	27	55	5	2	1	

TL 83 SW 22 **8447 3308** **Spoon's Halls** **Block G**

Surface level (+64.6 m) +212 ft
Water struck at +55.6 m
152-mm percussion
April 1975

Overburden 2.6 m
Mineral 10.7 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, grey–orange with pebbles of chalk and flint	2.4	2.6
Kesgrave Sands and Gravels	Sandy Gravel Gravel: fine and coarse, angular with well rounded flint, rounded quartz and subrounded quartzite Sand: medium with fine and coarse	10.7	13.3
London Clay	Clay, silty, olive–grey, top weathered to brown	0.5+	13.8

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
5	70	25	2.6–3.6	9	11	17	6	40	17
			3.6–4.0	9	10	26	12	25	18
			4.0–5.0	5	7	40	13	21	14
			5.0–6.0	5	8	27	11	34	15
			6.0–7.3	5	6	27	10	29	23
			7.3–8.3	5	25	64	5	1	0
			8.3–9.3	4	31	55	9	1	0
			9.3–10.3	3	29	47	12	7	2
			10.3–11.3	3	16	54	17	8	2
			11.3–12.3	2	18	53	18	8	1
			12.3–13.3	3	15	38	31	10	3
			Mean	5	16	41	13	17	8

TL 83 SW 23 8423 3246 Hunt's Hall **Block G**

Surface level (+72.3 m) +237 ft
Water struck at +58.2 m
152-mm percussion
April 1975

Overburden 8.6 m
Mineral 10.1 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.1	0.1
Boulder Clay	Clay, yellow–brown with pebbles of chalk and flint, becoming dark grey from 5.7 m	8.5	8.6
Kesgrave Sands and Gravels	Pebbly Sand, with clay seams Gravel: fine and coarse, subangular with well rounded flint, subrounded quartz and quartzite Sand: medium and fine with coarse, yellow to orange	10.1	18.7
London Clay	Clay, silty, blue–grey, top weathered to orange–brown	0.6+	19.3

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	
6	82	12	8.6–9.6	10	21	42	7	14	6	
			9.6–10.6	13	14	61	4	5	3	
			10.6–11.6	6	8	57	11	15	3	
			11.6–12.6	2	18	41	8	19	12	
			12.6–13.6	7	26	53	8	5	1	
			13.6–14.6	4	46	27	12	10	1	
			14.6–15.6	2	79	11	5	3	0	
			15.6–16.6	4	37	48	5	4	2	
			16.6–17.6	5	41	34	14	5	1	
			17.6–18.7	4	43	29	16	5	3	
			Mean	6	33	40	9	9	3	

TL 83 SW 24 **8444 3156** **Elm Tree Farm** **Block G**

Surface level (+69.8 m) +229 ft
Water struck at +58.8 m
152-mm percussion
July 1975

Overburden 5.3 m
Mineral 7.7 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, yellow–brown with pebbles of chalk and flint	5.1	5.3
Kesgrave Sands and Gravels	Sandy Gravel Gravel: coarse and fine, subangular with some well rounded flint, subrounded quartz and quartzite Sand: medium and fine with coarse, yellow–brown	7.7	13.0
London Clay	Clay, olive–grey	1.0+	14.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
5	63	32	5.3–6.3	3	11	43	8	19	16
			6.3–7.3	8	18	41	8	18	7
			7.3–8.5	8	8	51	8	17	8
			8.5–9.5	8	65	27	0	0	0
			9.5–10.5	6	77	17	0	0	0
			10.5–11.5	1	10	33	10	25	21
			11.5–12.5	1	2	17	8	30	42
			12.5–13.0	2	2	14	9	19	54
			Mean	5	25	32	6	16	16

TL 83 SW 25 8477 3084 Boose's Green **Block G**

Surface level (+64.9 m) +213 ft
Water struck at +53.8 m
152-mm percussion
September 1975

Overburden 3.9 m
Mineral 8.7 m
Bedrock 0.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, yellow–brown with pebbles of chalk and flint	3.7	3.9
Barham Sands and Gravel	**a** 'Clayey' Pebbly Sand Gravel: fine and coarse, subangular with some well rounded flint and quartz Sand: medium with coarse and fine, orange–brown	3.2	7.1
Kesgrave Sands and Gravels	**b** Sand, with clay laminae Gravel: fine with a trace of coarse, rounded flint with quartz Sand: medium and fine with coarse, yellow–grey	4.0	11.1
Red Crag	**c** Pebbly Sand Gravel: fine with some coarse, rounded flint, quartz and some quartzite Sand: medium and fine with coarse, iron-stained	1.5	12.6
London Clay	Clay, silty, blue–grey, top weathered to orange–brown	0.4+	13.0

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	
a	12	68	20	3.9–4.9	14	8	41	8	19	10	
				4.9–5.9	13	10	52	8	13	4	
				5.9–7.1	9	4	61	11	13	2	
				Mean	12	7	52	9	15	5	
b	4	95	1	7.1–8.1	6	54	38	1	1	0	
				8.1–9.1	3	26	70	1	0	0	
				9.1–10.1	3	25	70	1	1	0	
				10.1–11.1	3	19	64	10	3	1	
				Mean	4	31	60	4	1	0	
c	3	87	10	11.1–12.6	3	32	42	13	9	1	

TL 83 SE 1 8556 3462 Hawkin's Farm **Block E**

Surface level (+64.6 m) +212 ft
Water struck at +57.3 m
152-mm percussion
October 1975

Overburden 3.0 m
Mineral 9.1 m
Bedrock 0.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, yellow–brown with pebbles of flint, quartz and chalk	2.7	3.0
Kesgrave Sands and Gravels	**a** Pebbly Sand Gravel: coarse and fine, well rounded with subangular flint, rounded quartz and quartzite Sand: fine and medium with some coarse, orange	5.0	8.0
Red Crag	**b** Sand Gravel: fine and coarse, subangular with well rounded flint and some quartz Sand: medium and fine with coarse, orange	4.1	12.1
London Clay	Clay, silty, blue–grey	0.9+	13.0

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	7	86	7	3.0–4.0	5	36	41	5	5	8
				4.0–5.0	8	47	37	4	2	2
				5.0–6.0	13	59	26	1	1	0
				6.0–7.0	5	17	55	8	7	8
				7.0–8.0	6	46	43	3	2	0
				Mean	7	41	41	4	3	4
b	4	94	2	8.0–9.0	2	27	56	12	2	1
				9.0–10.0	2	24	63	9	2	0
				10.0–12.1	5	38	40	14	1	2
				Mean	4	32	50	12	1	1

TL 83 SE 2 8510 3275 Marvel's Garden **Block G**

Surface level (+57.3 m) +188 ft
Water not struck
152-mm percussion
October 1975

Waste 12.0 m
Bedrock 0.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, brown with chalk and flint pebbles, becoming olive–grey from 4.8 m. Passing down into sandy clay from 10.8 m	11.8	12.0
London Clay	Clay, olive–grey	0.9+	12.9

TL 83 SE 3 8518 3200 Nr. Nightingale's Farm **Block G**

Surface level (+58.2 m) +191 ft
Water struck at +53.9 m
152-mm percussion
July 1975

Waste 4.6 m
Bedrock 1.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, brown with pebbles of chalk and flint	4.1	4.3
Kesgrave Sands and Gravels	'Clayey' Sandy Gravel Gravel: fine with coarse Sand: fine, medium and coarse, brown	0.3	4.6
London Clay	Clay, silty, blue, top weathered to brown	1.2+	5.8

TL 83 SE 4 **8576 3077** **Black Bats** **Block G**

Surface level (+50.9 m) +167 ft
Water not struck
152-mm percussion
July 1975

Overburden 3.0 m
Mineral 2.4 m
Bedrock 1.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.7	0.7
Boulder Clay	Clay, sandy with pebbles, becoming increasingly sandy with depth	2.3	3.0
Kesgrave Sands and Gravels	Sandy Gravel Gravel: fine and coarse, subrounded with well rounded flint, quartz and quartzite Sand: medium with fine and coarse, orange–brown	2.4	5.4
London Clay	Clay, silty, olive–grey, top weathered to orange–brown	1.2+	6.6

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
5	62	33	3.0–4.0	5	7	39	11	21	17
			4.0–5.4	6	15	42	7	15	15
			Mean	5	12	41	9	17	16

TL 83 SE 5 **8671 3468** **Ivy Cottage** **Block E**

Surface level (+70.7 m) +232 ft
Water struck at +57.7 m
152-mm percussion
September 1975

Overburden 8.2 m
Mineral 11.8 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, orange–brown with pebbles of chalk and flint, becoming dark grey from 6.4 m	7.9	8.2
Kesgrave Sands and Gravels	**a** Pebbly Sand Gravel: fine and coarse with a trace of cobbles, subangular with well rounded flint, quartz and quartzite Sand: medium and fine with coarse, yellow–grey	8.2	16.4
Red Crag	**b** Pebbly Sand Gravel: fine with a trace of coarse, well rounded flints with shell debris from 19.2 m Sand: medium and fine with coarse, iron-stained becoming shelly and green–grey from 19.2 m	3.6	20.0
London Clay	Clay, silty, olive–grey	0.5+	20.5

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	$+64$
a	6	80	14	8.2–9.2	11	21	29	4	11	11	13
				9.2–10.2	8	10	39	10	19	14	0
				10.2–11.4	4	12	41	9	26	8	0
				11.4–12.4	7	40	50	1	1	1	0
				12.4–13.4	6	49	45	0	0	0	0
				13.4–14.4	4	55	41	0	0	0	0
				14.4–15.4	3	42	45	8	2	0	0
				15.4–16.4	2	41	36	18	3	0	0
				Mean	6	33	41	6	10	4	0
b	4	91	5	16.4–17.4	4	37	34	20	4	1	0
				17.4–18.4	5	24	42	26	3	0	0
				18.4–19.4	2	32	40	19	6	1	0
				19.4–20.0	5	42	37	10	5	1	0
				Mean	4	33	38	20	5	0	0

TL 83 SE 6 **8605 3399** **Le Mote** **Block F**

Surface level (+71.9 m) +236 ft
Water struck at +55.2 m
152-mm percussion
October 1975

Overburden 11.0 m
Mineral 11.0 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, orange–brown with pebbles of chalk and flint, becoming blue–grey with additional pebbles of shale from 7.3 m	10.7	11.0
Kesgrave Sands and Gravels	**a** Sandy Gravel Gravel: fine and coarse with some cobbles, subangular with well rounded flint, rounded quartz and quartzite Sand: medium with coarse and fine, grey becoming orange–brown	7.0	18.0
Red Crag	**b** Sand Gravel: fine with coarse, well rounded with subangular flint and fossiliferous sandstone Sand: medium and fine with coarse, red–brown becoming green–grey	4.0	22.0
London Clay	Clay, silty, dark grey with selenite crystals	0.5+	22.5

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	+64
a	4	64	32	11.0–12.0	5	16	47	8	18	6	0
				12.0–13.0	5	14	53	10	14	4	0
				13.0–14.0	8	7	24	11	34	16	0
				14.0–15.0	5	6	33	19	28	9	0
				15.0–16.0	1	4	50	13	18	8	6
				16.0–17.0	1	4	47	20	19	10	0
				17.0–18.0	1	9	43	15	20	12	0
				Mean	4	9	42	13	22	9	1
b	5	91	4	18.0–19.0	4	46	41	7	2	0	0
				19.0–20.0	5	28	48	13	5	1	0
				20.0–21.0	5	31	53	9	2	0	0
				21.0–22.0	6	26	53	9	3	3	0
				Mean	5	33	49	9	3	1	0

TL 83 SE 7 **8675 3362** **Stapleford's Farm** **Block F**

Surface level (+66.8 m) +219 ft
Water struck at +57.5 m
152-mm percussion
August 1975

Overburden 1.8 m
Mineral 12.5 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Head	Silt, mottled light grey and orange	1.1	1.4
Boulder Clay	Clay, brown, with pebbles of chalk and flint	0.4	1.8
Barham Sands and Gravels	**a** 'Clayey' Pebbly Sand Gravel: fine and coarse, subangular flint with rounded quartz and quartzite Sand: medium with fine and coarse, red–brown to light grey	3.0	4.8
Kesgrave Sands and Gravels	**b** Pebbly Sand, with clay seams Gravel: coarse and fine, well rounded flint with quartz and quartzite Sand: medium and fine with some coarse, light grey	4.0	8.8
Red Crag	**c** Pebbly Sand Gravel: fine with coarse, well rounded flint with quartz and ironstone Sand: medium and fine with coarse, red–brown	5.5	14.3
London Clay	Clay, silty, micaceous olive–grey	0.5+	14.8

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	18	75	7	1.8–2.8	25	33	39	1	2	0
				2.8–3.8	17	10	59	10	2	2
				3.8–4.8	13	10	57	6	10	4
				Mean	18	17	52	6	5	2
b	8	81	11	4.8–5.8	8	5	47	8	15	17
				5.8–6.8	9	30	48	2	4	7
				6.8–8.8	6	30	63	1	0	0
				Mean	8	23	55	3	5	6
c	5	86	9	8.8–9.8	4	15	65	12	4	0
				9.8–10.8	2	27	53	9	7	2
				10.8–11.8	7	25	44	9	10	5
				11.8–12.8	3	35	38	9	9	6
				12.8–14.3	6	51	27	11	5	0
				Mean	5	32	44	10	7	2

TL 83 SE 8 **8610 3268** **Crick's Farm** **Block F**

Surface level (+70.7 m) +232 ft
Water struck at +57.7 m
152-mm percussion
June 1975

Overburden 9.5 m
Mineral 8.0 m
Bedrock 0.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, brown with pebbles of chalk and flint, becoming blue–grey with additional pebbles of shale from 7.4 m	9.3	9.5
Kesgrave Sands and Gravels	**a** Sandy Gravel Gravel: fine and coarse, subangular flint with well rounded quartz and quartzite Sand: medium and fine with coarse, yellow–orange	3.0	12.5
Red Crag	**b** Pebbly Sand Gravel: fine and coarse, subangular with well rounded flint and quartz Sand: medium and fine with coarse, iron-stained	5.0	17.5
London Clay	Clay, silty, micaceous, olive–black with pyritised burrows	0.7+	18.2

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	9	62	29	9.5–10.5	7	16	30	7	22	18
				10.5–11.5	9	9	37	12	23	10
				11.5–12.5	10	28	42	4	4	12
				Mean	9	18	36	8	16	13
b	3	82	15	12.5–13.5	3	11	49	11	12	14
				13.5–14.5	3	21	53	16	6	1
				14.5–15.5	3	31	40	15	9	2
				15.5–16.5	3	34	49	10	3	1
				16.5–17.5	3	23	35	11	20	8
				Mean	3	24	45	13	10	5

TL 83 SE 9 8626 3177 Peverel's Farm **Block F**

Surface level (+69.2 m) +227 ft
Water struck at +53.8 m
152-mm percussion
June 1975

Overburden 8.4 m
Mineral 10.5 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, yellow–brown with pebbles of chalk and flint	7.4	7.6
Kesgrave Sands and Gravels	Clay, sandy, yellow–orange with pebbles	0.8	8.4
	a Sandy Gravel Gravel: fine and coarse with a trace of cobbles, subrounded with well rounded flint, well rounded quartz and quartzite Sand: medium and fine with coarse, yellow–grey	3.7	12.1
Red Crag	**b** Pebbly Sand Gravel: fine with coarse, well rounded flint with well rounded quartz Sand: medium and fine with coarse, iron-stained	6.8	18.9
London Clay	Clay, silty, olive–grey, top weathered to brown	0.6+	19.5

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	+64
a	8	59	33	8.4–9.0	10	7	17	4	23	39	0
				9.0–10.0	13	17	39	5	13	12	1
				10.0–11.0	6	17	48	4	13	12	0
				11.0–12.1	3	5	39	20	20	12	1
				Mean	8	12	38	9	17	16	0
b	5	89	6	12.1–13.1	6	36	50	6	2	0	0
				13.1–14.1	6	57	25	11	1	0	0
				14.1–15.1	4	15	61	13	6	1	0
				15.1–16.1	4	14	65	12	4	1	0
				16.1–17.1	5	16	58	13	5	3	0
				17.1–18.1	5	13	61	13	7	1	0
				18.1–18.9	3	15	57	13	10	2	0
				Mean	5	24	54	11	5	1	0

TL 83 SE 10 8665 3073 Countesscross Farm **Block F**

Surface level (+62.2 m) +204 ft
Water struck at +50.2 m
152-mm percussion
September 1975

Overburden 0.2 m
Mineral 14.8 m
Bedrock 0.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Kesgrave Sands and Gravels	**a** Sandy Gravel Gravel: fine and coarse, subangular with well rounded flint, rounded quartz and quartzite Sand: medium with coarse and fine, orange–brown	13.0	13.2
Red Crag	**b** Pebbly Sand Gravel: fine with coarse, well rounded flints Sand: medium with fine and coarse, orange–brown	1.8	15.0
London Clay	Clay, silty, olive–grey	0.4+	15.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	7	55	38	0.2–1.2	13	9	37	12	25	4	
				1.2–2.2	4	5	25	12	36	18	
				2.2–3.2	4	6	20	8	29	33	
				3.2–4.2	16	14	24	8	18	20	
				4.2–5.2	7	35	35	4	14	5	
				5.2–6.2	16	11	38	8	16	11	
				6.2–7.2	9	3	32	17	28	11	
				7.2–8.2	2	2	40	19	22	15	
				8.2–9.2	9	2	28	17	25	19	
				9.2–10.2	0	3	45	18	20	14	
				10.2–11.2	0	1	33	22	27	17	
				11.2–12.2	3	8	52	16	15	6	
				12.2–13.2	1	19	30	6	10	34	
				Mean	7	9	33	13	22	16	
b	4	91	5	13.2–14.2	4	21	48	23	3	1	
				14.2–15.0	3	26	48	16	6	1	
				Mean	4	23	48	20	4	1	

TL 83 SE 11 **8764 3494** **Sycamores Farm** **Block E**

Surface level (+64.0 m) +210 ft
Water struck at +56.0 m
152-mm percussion
October 1975

Overburden 1.8 m
Mineral 9.5 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Boulder Clay	Clay, brown with pebbles of chalk and flint	1.8	1.8
Kesgrave Sands and Gravels	**a** Pebbly Sand, with clay seams Gravel: fine with coarse, subrounded flint with quartz Sand: medium and fine with coarse, brown	5.0	6.8
Red Crag	**b** Sand Gravel: fine with coarse, well rounded flint and ironstone Sand: medium and fine with coarse, red–brown	4.5	11.3
London Clay	Clay, silty, olive–grey, micaceous, with burrows	0.5+	11.8

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	5	86	9	1.8–2.8	7	14	54	8	15	2	
				2.8–3.8	4	23	63	3	6	1	
				3.8–4.8	9	56	32	2	1	0	
				4.8–5.8	2	11	66	5	10	6	
				5.8–6.8	4	23	65	4	3	1	
				Mean	5	26	56	4	7	2	
b	5	91	4	6.8–7.8	5	28	63	3	1	0	
				7.8–8.8	6	45	35	10	3	1	
				8.8–11.3	5	30	43	17	5	0	
				Mean	5	33	45	13	3	1	

TL 83 SE 12 8786 3388 Cleeshall Great Wood **Block E**

Surface level (+71.3 m) +234 ft
Water struck at +56.3 m
152-mm percussion
June 1975

Overburden 12.0 m
Mineral 10.0 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.4	0.4
Boulder Clay	Clay, grey–orange with pebbles of chalk and flint, becoming blue–grey with additional pebbles of shale from 7.6 m	8.6	9.0
Kesgrave Sands and Gravels	Clay, sandy, brown with pebbles of flint, quartz and chalk	3.0	12.0
	a 'Clayey' Pebbly Sand with clayey seams Gravel: fine and coarse, angular with well rounded flint, rounded quartz and quartzite Sand: fine and medium with coarse, yellow–brown	3.5	15.5
Red Crag	**b** Pebbly Sand Gravel: fine and coarse, well rounded flint with sandstone and siltstone Sand: medium and fine with coarse, red–brown becoming green–grey	6.5	22.0
London Clay	Clay, silty, olive–grey with marcasite nodules	0.5+	22.5

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	+64
a	12	72	16	12.0–13.0	18	34	27	5	8	8	
				13.0–14.0	15	17	36	8	15	9	
				14.0–14.5	5	21	40	7	15	12	
				14.5–15.5	6	68	18	5	3	0	
				Mean	12	37	29	6	9	7	
b	4	87	9	15.5–16.5	2	23	56	14	3	2	
				16.5–17.5	3	22	70	5	0	0	
				17.5–18.5	3	28	61	5	3	0	
				18.5–19.5	14	20	36	6	14	10	
				19.5–20.5	3	25	54	10	6	2	
				20.5–22.0	3	24	46	16	9	2	
				Mean	4	24	53	10	6	3	

TL 83 SE 13 8723 3283 Lamarsh Park **Block F**

Surface level (+73.2 m) +240 ft
Water struck at +57.2 m
152-mm percussion
July 1975

Overburden 12.1 m
Mineral 11.3 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, yellow–grey with pebbles of chalk and flint	11.9	12.1
Kesgrave Sands and Gravels	**a** Pebbly Sand Gravel: coarse and fine with a trace of cobbles subrounded with well rounded flint, well rounded quartz and quartzite Sand: medium and fine with coarse, yellow–orange	6.0	18.1
Red Crag	**b** Sand Gravel: fine with coarse, well rounded flint with sandstone and fine shell debris Sand: medium and fine with coarse, iron-stained becoming green–grey and shelly from 19.8 m	5.3	23.4
London Clay	Clay, silty, dark grey with selenite and mica crystals	0.6+	24.0

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	+64
a	5	76	19	12.1–13.1	10	33	49	5	2	1	0
				13.1–14.1	7	10	50	10	6	17	0
				14.1–15.1	5	10	33	11	23	17	1
				15.1–16.1	4	18	29	7	21	21	0
				16.1–17.1	3	53	39	3	1	1	0
				17.1–18.1	3	52	40	3	1	1	0
				Mean	5	29	40	7	9	10	0
b	3	93	4	18.1–19.1	2	28	57	11	2	0	0
				19.1–20.1	3	27	56	11	1	2	0
				20.1–21.1	3	25	57	12	1	2	0
				21.1–22.1	3	29	49	13	4	2	0
				22.1–23.4	3	36	44	13	4	0	0
				Mean	3	29	52	12	3	1	0

TL 83 SE 14 **8739 3164** **Mannings Farm** **Block F**

Surface level (+69.2 m) +227 ft
Water struck at +64.1 m
152-mm percussion
June 1975

Overburden 6.1 m
Mineral 11.6 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown with pebbles of chalk and flint. Seam of sand and gravel, composed largely of flint between 4.9 and 5.1 m	5.8	6.1
Barham Sands and Gravels	**a** 'Very Clayey' Sandy Gravel Gravel: fine and coarse, well rounded with some angular flints and quartz Sand: fine and medium with coarse, orange–brown to light grey	4.0	10.1
Kesgrave Sands and Gravels	**b** Sandy Gravel Gravel: fine and coarse, subangular with well rounded flint, well rounded quartz and rounded quartzite Sand: medium with fine and coarse, yellow–orange becoming orange–brown	5.2	15.3
Red Crag	**c** Pebbly Sand Gravel: fine with coarse, subrounded flint and quartz Sand: medium and fine with coarse, orange–brown	2.4	17.7
London Clay	Clay, silty, olive–grey, micaceous	0.6+	18.3

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	22	58	20	6.1–7.1	28	41	22	3	4	2	
				7.1–8.1	32	43	21	1	1	2	
				8.1–9.1	16	17	28	6	16	17	
				9.1–10.1	12	6	28	13	23	18	
				Mean	22	27	25	6	11	9	
b	5	49	46	10.1–11.1	7	5	30	12	24	22	
				11.1–12.3	6	8	27	11	26	22	
				12.3–13.3	6	24	34	7	14	15	
				13.3–14.3	2	5	20	12	33	28	
				14.3–15.3	1	20	30	4	20	25	
				Mean	5	12	28	9	24	22	
c	2	93	5	15.3–16.3	3	54	33	6	2	2	
				16.3–17.7	2	33	53	6	5	1	
				Mean	2	42	45	6	4	1	

TL 83 SE 15 8785 3095 Little Catley's Farm **Block F**

Surface level (+68.6 m) +225 ft
Water struck at +53.9 m
152-mm percussion
July 1975

Overburden 8.0 m
Mineral 11.2 m
Bedrock 0.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, brown with pebbles of chalk and flint, becoming olive–grey with additional pebbles of shale from 6.0 m	7.3	7.5
Barham Sands and Gravels	Clay, sandy mottled red, orange and light grey with flint pebbles	0.5	8.0
	a 'Clayey' Pebbly Sand, with a seam of sandy clay between 9.3 and 9.5 m Gravel: fine and coarse, rounded and angular flint with rounded quartz and quartzite Sand: medium with fine and coarse, orange–brown to light grey	2.0	10.0
Kesgrave Sands and Gravels	**b** Sandy Gravel Gravel: fine and coarse with a trace of cobbles, well rounded flints, rounded quartz and quartzite Sand: medium with fine and coarse, yellow–orange	9.2	19.2
London Clay	Clay, silty, olive–grey	0.4+	19.6

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	$+64$
a	10	76	14	8.0–9.0	18	9	45	9	13	6	0
				9.0–10.0	3	22	61	6	5	3	0
				Mean	10	15	53	8	9	5	0
b	4	70	26	10.0–11.0	10	8	45	7	18	12	0
				11.0–12.0	8	6	53	8	14	11	0
				12.0–13.0	4	6	38	16	20	16	0
				13.0–14.0	4	6	55	10	16	9	0
				14.0–15.0	3	6	47	14	18	12	0
				15.0–16.0	0	3	46	18	19	14	0
				16.0–17.0	1	3	49	19	25	3	0
				17.0–18.0	2	34	39	7	9	7	2
				18.0–19.2	1	29	54	6	5	4	1
				Mean	4	12	47	11	16	10	0

TL 83 SE 16 8729 3005 Instep's Farm **Block F**

Surface level (+60.4 m) +198 ft
Water struck at +53.1 m
152-mm percussion
July 1975

Overburden 2.8 m
Mineral 9.2 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.6	0.6
Boulder Clay	Clay, yellow–orange with pebbles of chalk, quartz and flint	1.8	2.4
Barham Sands and Gravels	Clay, sandy, orange–brown with pebbles of flint and quartz	0.4	2.8
	a 'Clayey' Pebbly Sand Gravel: coarse and fine, well rounded and angular flints with quartzite Sand: fine and medium with some coarse, orange–brown	1.0	3.8
Kesgrave Sands and Gravels	**b** Pebbly Sand, with a clayey seam at 4.9 m Gravel: fine and coarse, angular and well rounded flint with rounded quartzite and rounded quartz Sand: medium and fine with coarse, yellow–orange to brown	5.7	9.5
Red Crag	**c** Pebbly Sand Gravel: fine with coarse, rounded with some angular flints Sand: medium and fine with coarse, red–brown	2.5	12.0
London Clay	Clay, silty, olive–grey, with marcasite nodules, top weathered to light brown	0.6+	12.6

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	19	71	10	2.8–3.8	19	35	33	3	5	5
b	6	72	22	3.8–4.9	11	13	26	7	23	20
				4.9–5.9	8	7	43	10	14	18
				5.9–6.5	4	7	35	11	22	21
				6.5–7.5	6	23	61	8	2	0
				7.5–8.5	4	17	55	12	10	2
				8.5–9.5	4	55	33	5	2	1
				Mean	6	21	42	9	12	10
c	4	87	9	9.5–10.5	3	27	49	8	8	5
				10.5–12.0	4	43	37	9	5	2
				Mean	4	36	42	9	6	3

TL 83 SE 17 **8887 3488** **Speck's Farm** **Block E**

Surface level (+68.6 m) +225 ft
Water struck at +50.0 m
152-mm percussion
August 1975

Overburden 8.4 m
Mineral 10.5 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, brown with pebbles of chalk and flint, becoming dark brown with additional pebbles of shale from 6.4 m	7.9	8.2
Barham Sands and Gravels	Clay, sandy, brown with flint pebbles	0.2	8.4
	a 'Clayey' Pebbly Sand Gravel: fine and coarse, well rounded flint with some quartz Sand: medium and fine with coarse, orange–brown to light grey	2.0	10.4
Kesgrave Sands and Gravels	**b** Sandy Gravel Gravel: coarse and fine with some cobbles, well rounded and subangular flints with some rounded quartz and rounded quartzite Sand: medium and coarse with fine, yellow–orange	5.4	15.8
Red Crag	**c** Pebbly Sand Gravel: fine and coarse, subrounded flint with ironstone Sand: medium and fine with coarse, yellow–orange becoming red–brown	3.1	18.9
London Clay	Clay, olive–grey, micaceous with pyritised wood	0.5+	19.4

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	$+64$
a	17	63	20	8.4–9.4	25	26	34	4	7	4	0
				9.4–10.4	9	11	41	10	20	9	0
				Mean	17	18	38	7	13	7	0
b	5	50	45	10.4–11.4	5	4	21	6	21	36	7
				11.4–12.4	10	8	23	14	29	16	0
				12.4–13.4	3	6	39	11	23	18	0
				13.4–14.4	2	6	40	17	24	11	0
				14.4–15.8	3	7	32	15	18	25	0
				Mean	5	6	31	13	22	22	1
c	3	90	7	15.8–17.8	4	33	51	9	3	0	0
				17.8–18.9	2	39	40	6	9	4	0
				Mean	3	35	47	8	5	2	0

TL 83 SE 18 8880 3359 Horne's Green **Block E**

Surface level (+65.2 m) +214 ft
Water struck at +52.2 m
152-mm percussion
August 1975

Overburden 3.3 m
Mineral 13.2 m
Bedrock 0.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Head	Silt, brown with flint pebbles	1.7	2.0
Boulder Clay	Clay, brown with pebbles of chalk and flint	1.3	3.3
Kesgrave Sands and Gravels	**a** Pebbly Sand, with silt seams Gravel: coarse and fine, well rounded and angular flint with some rounded quartz Sand: medium and fine with coarse, yellow–light grey	8.9	12.2
Red Crag	**b** Sand Gravel: fine and coarse, well rounded flints and ironstone Sand: fine and medium with coarse, red–brown	4.3	16.5
London Clay	Clay, silty, olive–grey, micaceous with pyritised burrows	0.4+	16.9

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	5	77	18	3.3–4.4	14	10	37	9	17	13	
				4.4–5.4	7	10	69	6	7	1	
				5.4–6.4	3	10	63	9	12	3	
				6.4–7.3	3	4	42	17	21	13	
				7.3–8.3	1	43	54	1	1	0	
				8.3–9.3	4	31	50	7	5	3	
				9.3–10.2	1	4	20	9	19	47	
				10.2–11.2	6	36	51	6	1	0	
				11.2–12.2	5	66	24	4	1	0	
				Mean	5	24	46	7	9	9	
b	4	94	2	12.2–13.2	4	39	44	10	2	1	
				13.2–14.2	4	35	57	3	1	0	
				14.2–15.2	3	65	29	3	0	0	
				15.2–16.5	5	66	23	3	1	2	
				Mean	4	52	37	5	1	1	

TL 83 SE 19 **8859 3287** **Pricketts Hall** **Block E**

Surface level (+70.4 m) +231 ft
Water struck at +55.4 m
152-mm percussion
August 1975

Overburden 8.6 m
Mineral 10.0 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	'Clayey' Pebbly Sand Gravel: subangular and well rounded flints Sand: medium and coarse, orange to light grey	1.1	1.3
	Clay, yellow–grey with pebbles of chalk and flint, becoming darker with depth	7.3	8.6
Kesgrave Sands and Gravels	**a** Sandy Gravel Gravel: coarse and fine, subangular with well rounded flint, quartz and quartzite Sand: medium with coarse and fine, light grey	5.9	14.5
Red Crag	**b** Sandy Gravel Gravel: fine and coarse, rounded and angular flints with some rounded quartz and quartzite Sand: medium and fine with coarse, iron-stained	4.1	18.6
London Clay	Clay, silty, olive–grey, micaceous	0.5+	19.1

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	
a	6	61	33	8.6–9.6	3	34	42	7	10	4	
				9.6–10.6	12	14	45	9	16	4	
				10.6–11.6	7	9	34	13	26	11	
				11.6–12.6	7	6	26	16	34	11	
				12.6–13.6	2	4	40	14	27	10	
				13.6–14.5	5	4	32	15	28	16	
				Mean	6	12	37	12	23	10	
b	4	68	28	14.5–15.5	6	5	35	17	28	9	
				15.5–16.5	3	3	20	20	29	25	
				16.5–18.6	3	32	43	9	7	6	
				Mean	4	19	35	14	17	11	

TL 83 SE 20 8866 3175 Pannell's Farm **Block F**

Surface level (+65.5 m) +215 ft
Water struck at +51.5 m
152-mm percussion
July 1975

Overburden 5.0 m
Mineral 11.3 m
Bedrock 0.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.4	0.4
Boulder Clay	Clay, brown, with pebbles of chalk and flint	4.3	4.7
Barham Sands and Gravels	Clay, sandy, orange–brown with flint pebbles	0.3	5.0
	a 'Clayey' Sandy Gravel Gravel: coarse and fine, rounded and angular flints with rounded quartz Sand: fine and medium with coarse, orange–brown	1.7	6.7
Kesgrave Sands and Gravels	**b** Sandy Gravel Gravel: fine and coarse, well rounded flints with rounded quartz and rounded quartzite Sand: medium with fine and coarse, light grey	5.4	12.1
Red Crag	**c** Sand, with clayey seams Gravel: fine with a trace of coarse, rounded flint, quartz and sandstone Sand: medium and fine with coarse, red–brown	4.2	16.3
London Clay	Clay, silty, olive–grey, top weathered	0.6+	16.9

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	13	63	24	5.0–5.7	12	51	28	2	3	4	
				5.7–6.7	14	18	27	4	12	25	
				Mean	13	32	28	3	8	16	
b	5	64	31	6.7–7.7	10	6	21	17	37	9	
				7.7–8.5	5	7	26	10	37	15	
				8.5–9.5	5	38	48	2	4	3	
				9.5–10.5	3	12	48	9	11	17	
				10.5–12.1	3	10	45	13	16	13	
				Mean	5	14	39	11	20	11	
c	4	94	2	12.1–13.1	5	35	54	5	1	0	
				13.1–14.1	6	39	47	6	2	0	
				14.1–15.1	4	26	64	5	1	0	
				15.1–16.3	3	21	64	8	3	1	
				Mean	4	30	58	6	2	0	

TL 83 SE 21 **8874 3057** **Reedings** **Block F**

Surface level (+64.3 m) +211 ft
Water struck at +49.8 m
152-mm percussion
July 1975

Overburden 5.7 m
Mineral 12.1 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, yellow–brown with pebbles of chalk, flint and quartz	5.2	5.5
Kesgrave Sands and Gravels	Clay, light grey with pebbles	0.2	5.7
	a Pebbly Sand Gravel: coarse and fine, subangular and well rounded flint with well rounded quartzite and quartz Sand: medium with fine and coarse, orange–yellow	7.9	13.6
Red Crag	**b** Pebbly Sand Gravel: coarse and fine, subrounded and well rounded flint with quartz Sand: medium and fine with coarse, orange–yellow	4.2	17.8
London Clay	Clay, silty, blue–grey, top weathered to light brown	0.5+	18.3

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	7	76	17	5.7–6.7	11	9	32	6	14	28
				6.7–7.7	9	19	57	5	6	4
				7.7–8.7	9	13	61	5	5	7
				8.7–9.7	8	32	50	4	3	3
				9.7–10.7	8	33	56	1	2	0
				10.7–11.7	5	7	60	9	11	8
				11.7–12.6	5	6	68	13	6	2
				12.6–13.6	3	23	32	6	10	26
				Mean	7	18	52	6	7	10
b	3	82	15	13.6–14.6	3	14	58	12	9	4
				14.6–15.6	3	23	48	16	5	5
				15.6–16.6	4	29	37	14	6	10
				16.6–17.8	3	25	37	14	5	16
				Mean	3	23	45	14	6	9

TL 83 SE 22 **8955 3229** **Valley Green Farm** **Block E**

Surface level (+55.8 m) +183 ft
Water struck at +49.3 m
152-mm percussion
July 1975

Overburden 1.3 m
Mineral 7.5 m
Bedrock 0.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.4	0.4
Kesgrave Sands and Gravels	Silt, sandy, brown with pebbles, becoming more sandy with depth	0.9	1.3
	a Sandy Gravel, with clayey seams Gravel: coarse and fine with a trace of cobbles, well rounded and angular flints with quartz and quartzite Sand: medium and fine with coarse, grey–orange	5.0	6.3
Red Crag	**b** Sandy Gravel Gravel: fine and coarse with some cobbles, angular and well rounded flints with well rounded quartz Sand: medium with fine and coarse, iron-stained	2.5	8.8
London Clay	Clay, silty, olive–grey, top weathered to brown	0.7+	9.5

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	+64
a	5	62	33	1.3–2.3	6	12	38	6	18	19	1
				2.3–3.3	4	13	44	6	14	18	1
				3.3–4.3	4	13	23	9	25	26	0
				4.3–5.3	4	29	47	4	11	5	0
				5.3–6.3	5	29	31	6	14	15	0
				Mean	5	19	37	6	16	17	0
b	3	71	26	6.3–7.3	2	8	49	10	16	14	1
				7.3–8.8	3	13	49	12	13	9	1
				Mean	3	11	49	11	14	11	1

TL 83 SE 23 8972 3124 Great Loveney Hall **Block F**

Surface level (+71.6 m) +235 ft
Water struck at +49.6 m
152-mm percussion
July 1975

Overburden 14.2 m
Mineral 9.7 m
Bedrock 0.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, sandy, light brown with pebbles of chalk and flint, becoming olive–grey with additional pebbles of shale from 7.9 m	12.5	12.8
Kesgrave Sands and Gravels	Clay, sandy, light grey with pebbles	1.4	14.2
	a Pebbly Sand Gravel: coarse and fine, subrounded with well rounded flint, quartz and quartzite Sand: medium and fine with coarse, light grey to yellow	7.0	21.2
Red Crag	**b** Pebbly Sand Gravel: fine and coarse, subrounded and well rounded flint with quartz and ironstone Sand: medium and fine with coarse, iron-stained	2.7	23.9
London Clay	Clay, silty, olive–grey, top weathered to brown	0.3+	24.2

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
a	7	80	13	14.2–15.2	10	15	39	13	14	9
				15.2–16.2	6	15	45	9	13	12
				16.2–17.2	4	16	33	6	15	26
				17.2–18.2	5	40	53	2	0	0
				18.2–19.2	5	30	63	2	0	0
				19.2–20.2	13	43	38	2	2	2
				20.2–21.2	4	22	72	1	1	0
				Mean	7	26	49	5	6	7
b	4	85	11	21.2–22.2	4	22	53	9	7	5
				22.2–23.9	4	25	40	21	8	2
				Mean	4	24	45	16	8	3

TL 83 SE 24 **8980 3031** **Jupeshill Farm** **Block F**

Surface level (+61.6 m) +202 ft
Water struck at +53.0 m
152-mm percussion
July 1975

Overburden 1.8 m
Mineral 12.2 m
Bedrock 0.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	1.8	1.8
Barham Sands and Gravels	**a** 'Clayey' Pebbly Sand Gravel: coarse and fine with cobbles, subangular with well rounded flint and some rounded quartz Sand: medium and fine with coarse, yellow–orange	4.0	5.8
Kesgrave Sands and Gravels	**b** Sand, with a trace of flint and quartz gravel Sand: medium and fine with some coarse, yellow–grey	5.0	10.8
Red Crag	**c** Sand, with a trace of gravel Sand: medium and fine with coarse, iron-stained	3.2	14.0
London Clay	Clay, silty, olive–grey, top weathered to brown	0.5+	14.5

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	+64
a	11	77	12	1.8–2.8	13	28	39	6	8	6	0
				2.8–3.8	10	43	33	4	4	6	0
				3.8–4.8	11	11	54	10	7	7	0
				4.8–5.8	11	18	60	1	1	1	8
				Mean	11	25	47	5	5	5	2
b	7	93	0	5.8–6.8	9	32	59	0	0	0	0
				6.8–7.8	9	54	37	0	0	0	0
				7.8–8.8	5	40	52	2	1	0	0
				8.8–9.8	4	38	55	2	1	0	0
				9.8–10.8	5	52	42	1	0	0	0
				Mean	7	43	49	1	0	0	0
c	5	95	0	10.8–11.8	5	36	55	4	0	0	0
				11.8–12.8	5	28	53	13	1	0	0
				12.8–14.0	4	31	59	6	0	0	0
				Mean	5	32	56	7	0	0	0

TL 83 SE E1 8946 3437 Bombose Farm **Block E**

Surface level (+70.7 m) +232 ft
Water not struck
Sampled by hand from exposure
May 1975

Overburden 0.5 m
Mineral 9.1 m
Waste 0.6 m
Mineral 12.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.5	0.5
Glacial Sand and Gravel, upper	**a** Sandy Gravel Gravel: coarse and fine, subangular with well rounded flint, rounded quartzite and quartz Sand: medium with coarse and fine, red–orange to yellow–orange	9.1	9.6
	Clay, sandy, orange–brown with pebbles of flint and some quartz and chalk	0.6	10.2
Kesgrave Sands and Gravels	**b** Pebbly Sand Gravel: fine and coarse, subangular with well rounded flint, rounded quartzite and quartz Sand: medium and fine with some coarse, yellow–grey	5.0	15.2
Red Crag	**c** Sandy Gravel Gravel: coarse and fine, sandstone and ironstone with rounded flints and quartz Sand: medium with fine and coarse, iron-stained	7.0+	22.2

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64	
a	6	63	31	0.5–1.5	8	3	29	12	19	29	
				1.5–2.5	2	2	29	11	23	33	
				2.5–3.5	8	2	39	20	15	26	
				3.5–4.5	8	7	40	7	14	24	
				4.5–5.5	7	5	40	10	17	21	
				5.5–6.5	12	16	41	11	14	6	
				6.5–7.5	1	14	64	8	9	4	
				7.5–8.5	4	30	45	12	8	1	
				8.5–9.6	7	2	69	10	7	5	
				Mean	6	9	44	10	14	17	
b	5	80	15	10.2–11.2	9	10	60	8	6	7	
				11.2–12.2	1	5	42	20	16	16	
				12.2–13.2	11	51	27	0	8	3	
				13.2–14.2	4	6	76	1	9	4	
				14.2–15.2	0	78	14	3	5	0	
				Mean	5	30	44	6	9	6	
c	2	58	40	15.2–16.2	0	5	80	2	10	3	
				16.2–17.2	2	1	45	6	26	20	
				17.2–18.2	4	1	12	7	42	34	
				18.2–19.2	2	5	18	7	23	45	
				19.2–20.2	2	3	16	6	20	53	
				20.2–22.2	2	15	82	1	0	0	
				Mean	2	6	48	4	18	22	

APPENDIX G

LIST OF WORKINGS

In 1979 only one sand and gravel pit was known to be operational. All the worked-out areas are shown on the resource map accompanying the report. A list of active and disused workings is given below.

Pit location	*Grid reference*	*Deposits worked*
ACTIVE		
The Ferriers	895 342	Glacial Sand and Gravel, upper, Kesgrave Sands and Gravels and Red Crag
DISUSED		
Ansell's Farm	873 355	Barham Sands and Gravels and Kesgrave Sands and Gravels
Kilowen Cottages	801 334	Kesgrave Sands and Gravels
Great Cornard	887 395	River Deposits: First Terrace
Great Cornard	887 391	River Deposits: First Terrace
Great Cornard	885 389	River Deposits: First Terrace

APPENDIX H

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

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

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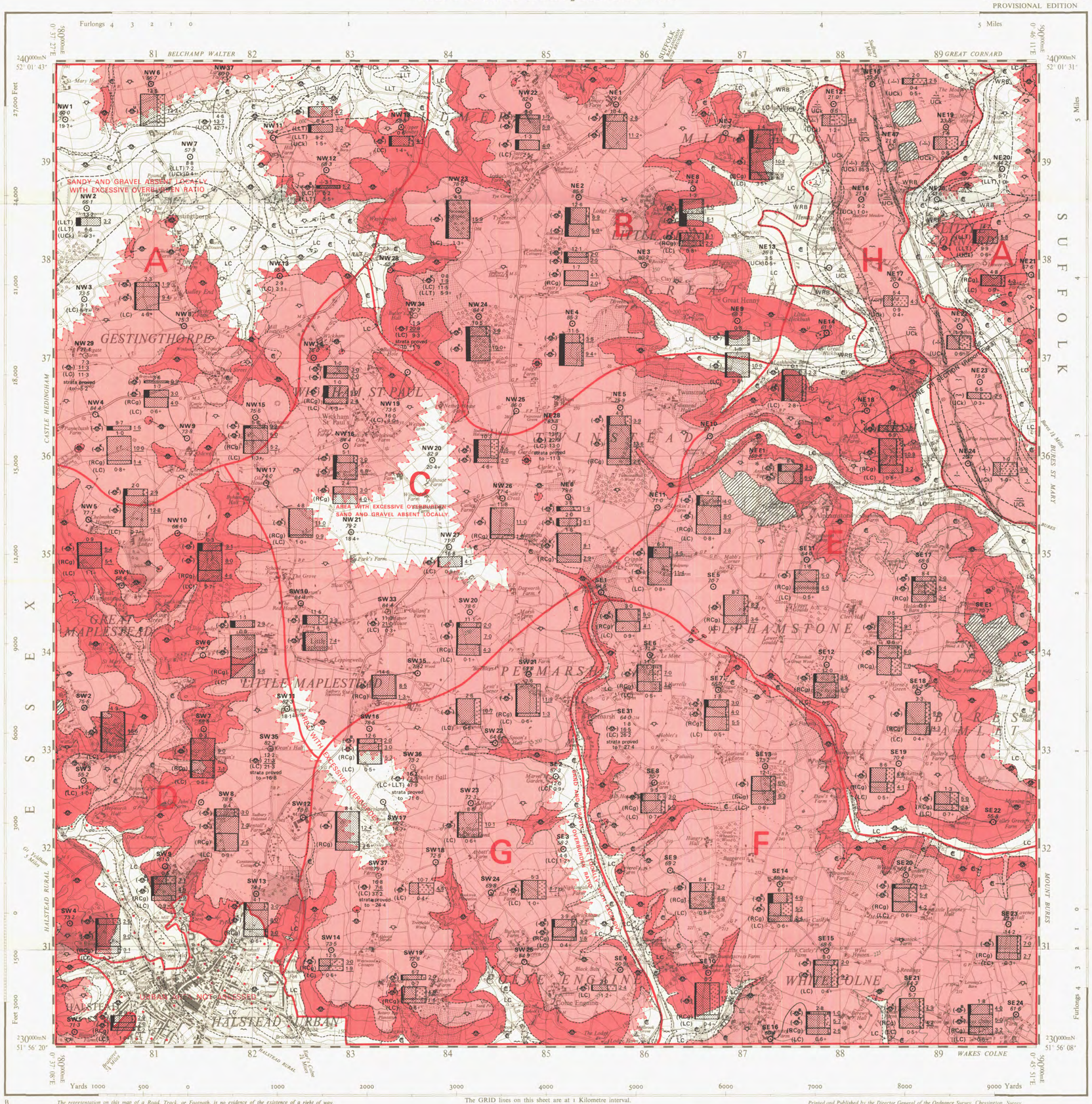
INSTITUTE OF GEOLOGICAL SCIENCES

INDUSTRIAL MINERALS ASSESSMENT UNIT

THE SAND AND GRAVEL RESOURCES OF THE COUNTRY NORTH-EAST OF HALSTEAD, ESSEX

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

ORDNANCE SURVEY
SHEET TL83
PROVISIONAL EDITION



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

Geological lines from a six-inch survey by M. J. Heath and S. R. Mills in 1974-75. W. A. Read, District Geologist. Included on One-Inch Geological Sheets 206-223.

Sand and Gravel Survey by J. W. Merritt and R. J. Marks in 1975-76. R. G. Thurrell, Head, Industrial Minerals Assessment Unit.

1:25 000 Sand and Gravel Resource Sheet, published 1981
G. M. Brown, D.Sc., F.R.S., *Director, Institute of Geological Sciences incorporating the Geological Survey of Great Britain, the Museum of Practical Geology and Overseas Geological Surveys.*
1100/81

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

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

Compiled from 6" sheets last fully revised 1919-24. Other partial systematic revision 1938-54 has been incorporated.

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TL74	206 TL84	TL94
TL73	TL83	TL93
TL72	223 TL82	TL92

Diagram showing the relationship between the National Grid 1:25 000 sheets and the One Inch Geological sheets 223 and 206.

68

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

- **Peat** –localised accumulations of partially decomposed organic matter P-7
- **Calcareous Tufa** –soft light grey earthy calcareous deposits CT-1
- **Alluvium** –silts, clays and peats with basal sand and gravel A-20
- **River Terrace Deposits** –gravel, containing pebbles of flint with some quartz and quartzite
  - 1st Terrace 1T-27
  - 2nd Terrace 2T-19
- **Head** –pebbly sandy clay H-24
- **Lacustrine Deposit** –laminated fine sand, silt and clay LA-3
- **Glacial Sand and Gravel, upper** –sandy gravel with flint, quartz and quartzite pebbles GS-47
- **Boulder Clay** –clay with pebbles of chalk and flint BC-25
- **Glacial Silt** –sandy clayey silt, often laminated, with some pebbles GSI-3
- **Barham Sands and Gravels** –clayey, pebbly sand BSG-1
- **Kesgrave Sands and Gravels** –micaceous sand or sandy gravel K-2

  Barham Sands and Gravels, Kesgrave Sands and Gravels, and Red Crag, undivided
  While the individual deposits are identified in I.M.A.U. borehole records these sub-Boulder Clay sands and gravels are mapped as a single unit due to their similar lithologies at outcrop

SOLID

- **Red Crag** –reddish brown sand with some pebbles RC-4 (if it exists on map)
- **London Clay** –olive grey silty clay
- **Woolwich and Reading Beds** –clays and sands
- **Thanet Beds** –silty fine sand

  LLT **Lower London Tertiaries, undivided**
- **Upper Chalk** – soft white limestone

RECENT AND PLEISTOCENE; PALAEOCENE: EOCENE; CRETACEOUS

- **Made ground** MG-2
- **Worked-out areas of sand and gravel** WO-9

BOUNDARY LINES

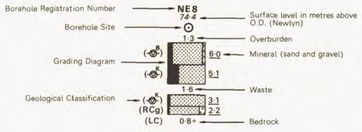
- Geological boundary, Drift.
- Geological boundary, Solid (Broken lines denote uncertainty).
- Inferred boundary between recognised categories of deposits.
- Resource Block boundary.

BOREHOLE DATA

SITE LOCATIONS

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

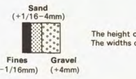
I.M.A.U. BOREHOLES



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

Borehole Registration Number
Each I.M.A.U. borehole is identified by a Registration Number, e.g. **NE8.**
The letters refer to the quarter sheet and the figures to the I.G.S. serial number for that quarter. The unique designation for borehole **NE8** is **TL83 NE8.**

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



The height of the diagram is proportional to the mineral thickness.
The widths of the divisions show the proportional of **Fines, Sand** and **Gravel.**

OTHER BOREHOLES
The layout of information is the same as for I. M. A. U. boreholes, although the data available may not be as comprehensive. They are registered in the same series.
The final depth of deep boreholes is given in metres above (+) or below (–) O.D.

EXPOSURE RECORDS
Information from the inspection of exposures is shown in the same way as for boreholes, but they are located by an asterisk, thus ✳. Reference number and details of thicknesses are shown.

CATEGORIES OF DEPOSITS

- **Exposed mineral** CAT-E6
- **Continuous or almost continuous spreads of mineral beneath overburden** CAT-C1
- **Sand and Gravel not Assessed (exposed and/or beneath cover)** CAT-N1
- **Sand and Gravel absent or not potentially workable** CAT-A2

RESOURCE BLOCKS
For the purposes of assessment the mineral bearing land is divided into Resource Blocks (see Report.) Each is designated by a letter.
A Schematic section showing the general relationships of deposits along the line A-A¹ constitute Figure 3 of the Report

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

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