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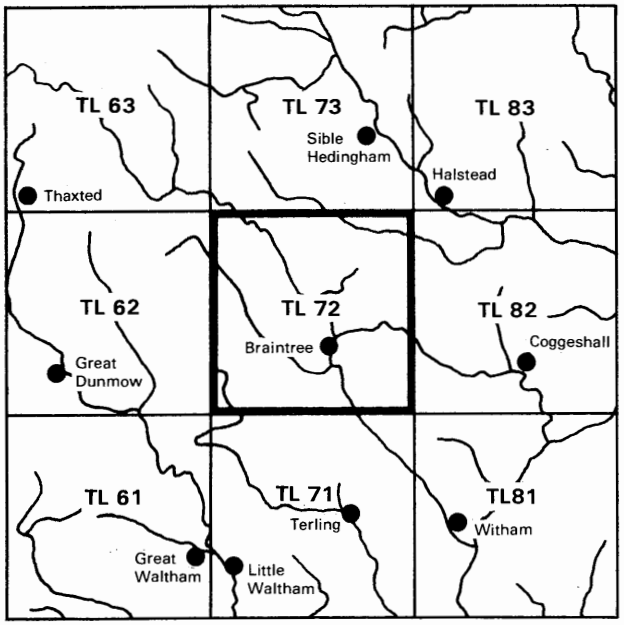

The sand and gravel resources of the country around Braintree, Essex

Description of 1:25 000 resource sheet TL 72

M. R. Clarke, BSc and

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The Institute of Geological Sciences was formed by the incorporation of the Geological Survey of Great Britain and the Museum of Practical Geology with Overseas Geological Surveys and is a constituent body of the Natural Environment Research Council.

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PREFACE

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

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

This Report describes the resources of sand and gravel of 100 km^2 of country around Braintree, Essex, shown on the accompanying 1:25 000 resource map TL 72. The survey was conducted by the late J.D. Ambrose assisted by Mr N.E. Bradbury in 1969-70; additional work was carried out by Mr M.R. Clarke in 1972. The work is based on a geological survey at 1:10 560 carried out by Dr C.R. Bristow and Dr F.C. Cox in 1971 (East Anglia and South-East England Field Unit) and by Dr R. Allender and Mr Ambrose in 1971-72.

Mr. J.W. Gardner, CBE (Land Agent) has been responsible for negotiating access to land for drilling. The ready cooperation of land owners and tenants in this work is gratefully acknowledged.

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The geological maps of the Institute of Geological Sciences, pre-existing borehole information and 95 boreholes drilled for the Mineral Assessment Unit form the basis of the assessment of sand and gravel resources in the Braintree area, Essex.

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 confidence level.

The 1:25 000 map is divided into four resource blocks containing between 10.4 and 13.1 km^2 of sand and gravel. For each block the mineral-bearing area, the mean thickness of overburden and mineral, and the mean grading are given, and the geomorphology and geology of the deposits described.

The position of the boreholes and exposures, the geology and topography and the outlines of the blocks are shown on the accompanying map TL 72. Detailed borehole data are given.

Sommaire

Les cartes géologiques de l'Institute of Geological Sciences, les renseignements sur des trous de sonde qui existaient déjà, et 95 trous de sonde forés pour le Mineral Assessment Unit constituent la base de l'évaluation des ressources en sable et en gravier dans la région de Braintree, Essex.

Tous les dépôts dans la région, qui presentent la possibilité d'exploitation pour le sable et le gravier (mineral), ont été étudies de point de vue géologique, et on s'est servi d'une methode statistique simple pour en évaluer le volume. Les évaluations de volume sont tenues d'être à 95 pour cent exactes.

La carte 1:25 000 est divisée en quatre blocs de ressources, contenants entre 10.4 à 13.1 km^2 de sable et de gravier. On donne pour chaque bloc l'étendue mineralisée, l'epaisseur moyenne de recouvrement et de mineral, et la gradation moyenne. On décrit aussi la géomorphologie et la géologie des dépôts.

La situation des trous de sonde et des affleurements, la géologie et la topographie, et la configuration des blocs sont montrées sur la carte TL 72. Des données detaillées des trous de sonde sont presentées.

Zusammenfassung

Die geologischen Karten von dem Institute of Geological Sciences, die vorher existierende Information im Bezug auf Bohrlöchern, auch 95 Bohrlöcher, die für das Mineral Assessment Unit, bilden den Grund für die Einschätzung der Sand- und Schottermittel im Braintree Gebiet, Essex.

Man hat im gebiet alle Ablagerungen, die möglich bearbeitbar für Sand und Schotter (Mineral) sind, geologisch untersucht, und man hat eine einfache statistische Methode benutzt, um das Volumen zu schätzen. Man gibt die Zuverlässigkeit der Volumenschätzungen mit symmetrischen 95 Prozent Vertrauens grenzwerten.

Man teilt die 1:25 000 Karte in Mittelsblöcke, wovon jeder von 10.4 bis zu 13.1 km^2 von Sand und Schotter einschliesst. Für jeden Block gibt man das mineralhaltige Gebiet, die Durchschnittsdicke von Überlastung und Mineral, und die Durchschnittsklassifizierung, und beschreibt die Geomorphologie und Geologie der Ablagerungen.

Man zeigt die Lage von Bohrlöchern und Aufschlüssen die Geologie und Topographie, und auch die Skizzen von den Blöcken auf der Begleitkarte TL 72. Man gibt auch ausführliche Bohrlöcherdaten.

The sand and gravel resources of the country around Braintree, Essex

Description of 1:25 000 resource sheet TL 72

M. R. CLARKE[1], BSc and J. D. AMBROSE[1], BSc

Introduction

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

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 geological evidence. The sites available for inspection, measurement, and sampling are too widely spaced to permit the mineral bodies to be outlined completely or the grade established throughout" (Anon., 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 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.

If a deposit of sand and gravel broadly meets these criteria, it 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 1/16 mm, 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 grade material, are placed at 1/16 mm and 4 mm respectively (see Appendix C).

The volume and other characteristics are assessed within resource blocks, each of which, ideally, contains 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 sand and gravel being exploited, although towns are excluded. The estimated total volume therefore bears no simple relationship to the amount that could be extracted in practice.

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

[1]M. R. Clarke and the late J. D. Ambrose carried out the work described in this report at the Institute of Geological Sciences, 199 Knightsbridge, London SW7 1DZ.

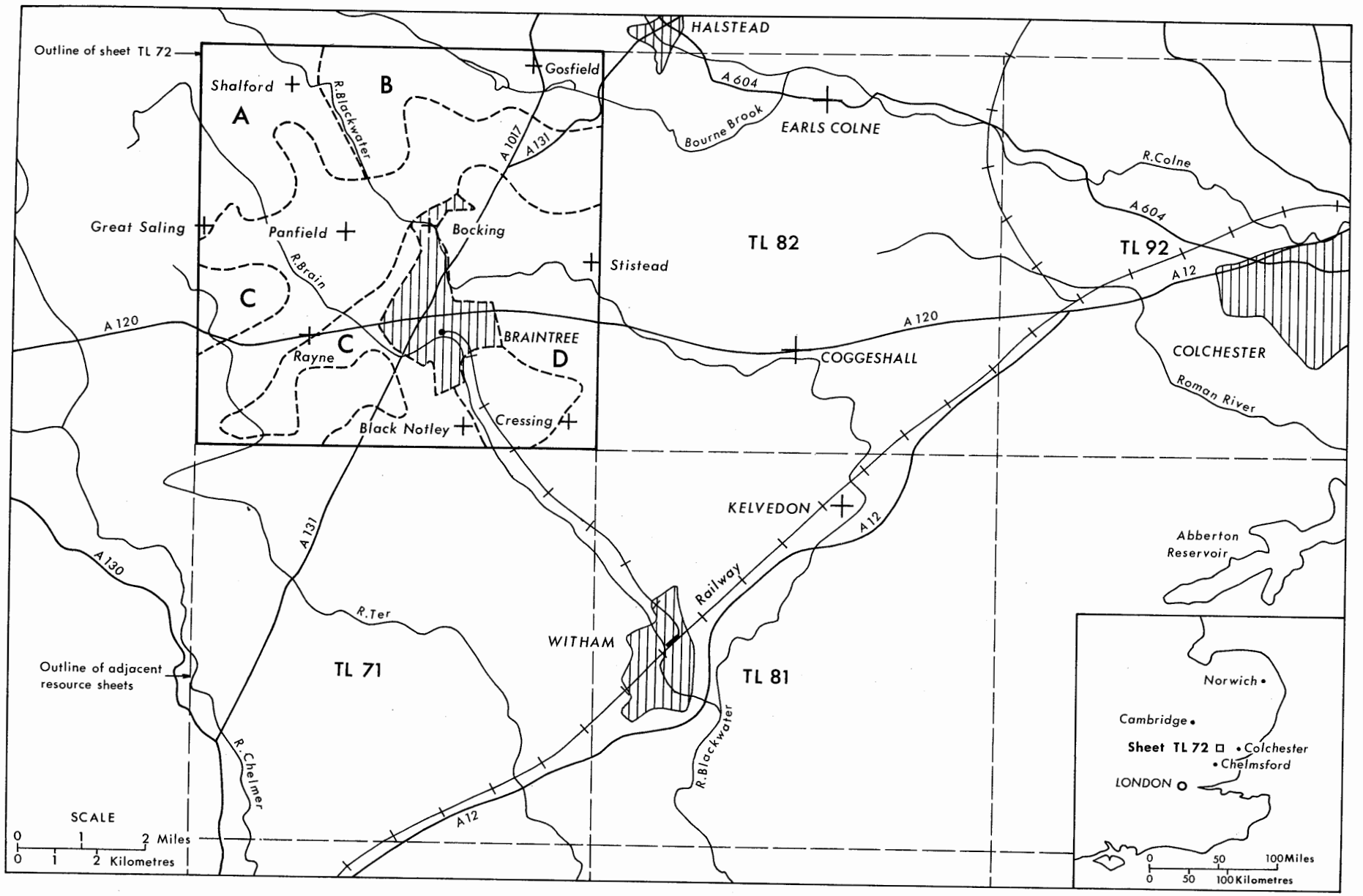


Fig. 1. Sketch map showing the position of the resource block boundaries and the location of sheet TL 72

Description of Sheet TL 72

GENERAL

The 1:25 000 resource sheet covers 100 km^2 of mainly farming country around the small market town of Braintree, Essex. Apart from the built-up area of the town (6.5 km^2) which was excluded, the assessment reveals that some 46.0 km^2 of potentially workable sand and gravel (mineral) is present in the four resource blocks (Table 3). In the remaining (uncoloured) areas of the sheet, which total 47.5 km^2 (including 9.5 km^2 within the resource blocks), sand and gravel is either absent or is not considered to be potentially workable on the basis of the criteria adopted for this survey (p. 1).

TOPOGRAPHY

The area consists of a plateau lying generally at between 200 ft (61.0 m) and 250 ft (76.2 m) above OD rising to more than 300 ft (91.4 m) near Beazley End (Fig. 2). It is dissected by four rivers, the Ter in the south-west, the Brain and the Blackwater in the centre, and Bourne Brook in the north-east of the area. The river valleys, especially those of the Brain and Blackwater, are often asymmetric, the north-eastern valley sides being considerably steeper than the south-western.

GEOLOGY

The geology and topography are related to some extent in that glacial deposits (Chalky Boulder Clay and Glacial Sand and Gravel) form the plateau areas, while in the river valleys erosion has exposed the London Clay bedrock. Younger drift deposits, for example alluvium and head, may conceal both bedrock and glacial deposits in some of the valleys (see Fig. 3).

It is very difficult to establish a reliable drift sequence within the area since the glacial deposits are particularly variable, both laterally and vertically. A list of the deposits in approximate order of succession is given in Table 1.

London Clay

Throughout the area London Clay forms the bedrock upon which the drift deposits rest. Deep boreholes show that it normally thins northwards: for example, it is shown to be 203.5 ft (61.9 m) thick in Hydrogeological Dept record 223/44 in the south [768 201][1], but at borehole 223/10 [706 289] in the north it reaches only 71 ft (21.6 m). When fresh the London Clay is bluish grey, but commonly the top has been weathered to brown or greyish brown clay, in which the assessment boreholes were commonly terminated.

The surface of the London Clay (see Fig. 4) falls from a maximum height of over 250 ft (76.2 m) in the north-west, near Shalford Green, to about 150 ft (45.7 m) in the south-east. This broad trend is modified by local variations which tend to mirror the present-day topography; channels in the London Clay surface coincide approximately with the present-day valleys. The most distinct of these channels is beneath the Blackwater Valley where the London Clay surface is in places more than 50 ft (15.2 m) lower than it is beneath the adjacent plateau.

Red Crag

Red Crag was proved only in borehole NW 1 [7051 2974], where 1.8 m (6.0 ft) of shelly sand was overlain by 21.0 m (69 ft) of fine sands (Chillesford Beds). The shelly sands have yielded a typical Red Crag microfauna and macrofauna (C. J. Wood and R. Dixon, personal communications). Crag has not been proved elsewhere on TL 72 but it may be present beneath drift, to the north and west of the sheet. The samples below 12.1 m (39.5 ft) were collected by a bailing technique and it was not possible therefore to identify precisely the lithological boundary between the Red Crag and the overlying sands.

Glacial Deposits

The glacial deposits are of two main kinds, namely Glacial Sand and Gravel, which outcrops mainly in the valleys, and Chalky Boulder Clay, which generally covers the plateau areas. However, the relationship between them is sometimes difficult to establish in the field because there is rapid lateral and vertical variation in composition, often with no clearly defined junctions between lithological types. Thus although the sequence proved is typically Chalky Boulder Clay overlying Glacial Sand and Gravel, occasionally the Glacial Sand and Gravel may be overlain and underlain by Chalky Boulder Clay, as seen in boreholes NW 15 [7208 2634] and SE 1 [7537 2471]. It may also occur in mounds which seem to be almost totally surrounded by boulder clay, for example, north of Bovingdon Hall [745 275]. Borehole and field evidence support the view (Bristow and Cox, 1973) that these complex inter-relationships are the product of a single glacial episode.

Glacial Sand and Gravel

This deposit normally is gravel and sandy gravel (Appendix C) composed mainly of flint, vein quartz and quartzite. The most significant lithological variation occurs in the north-west of the sheet where the two quite distinct horizons seen in a pit at Shalford [722 286] (Plate 1) are recognised in many of the assessment boreholes.

The uppermost 1.5 m to 2.0 m at Shalford consists of poorly sorted fine to coarse, subangular

[1] National grid references in this publication all lie within the 100 km grid square TL (52)

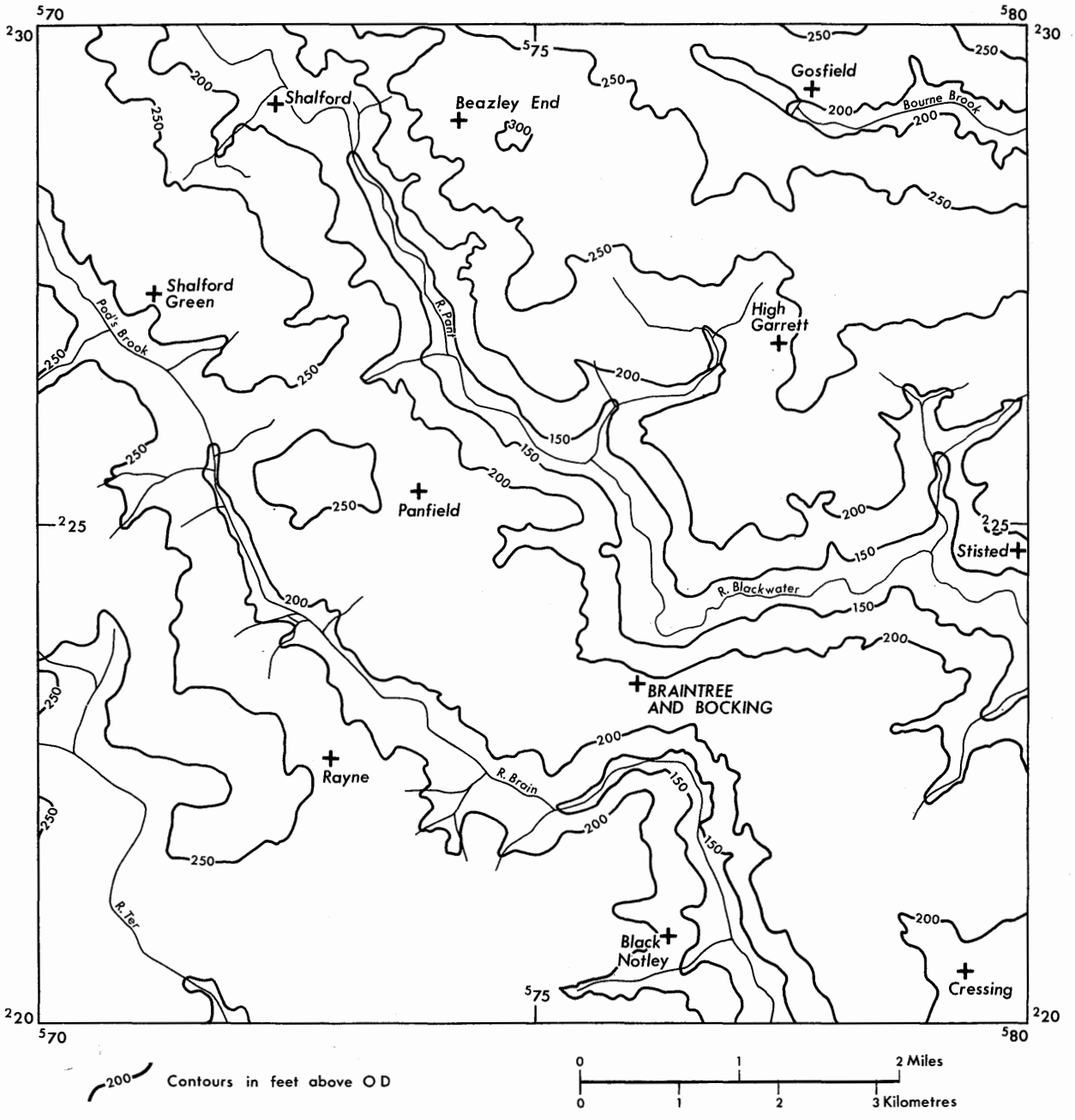


Fig. 2. Sketch diagram showing the topography of sheet TL 72

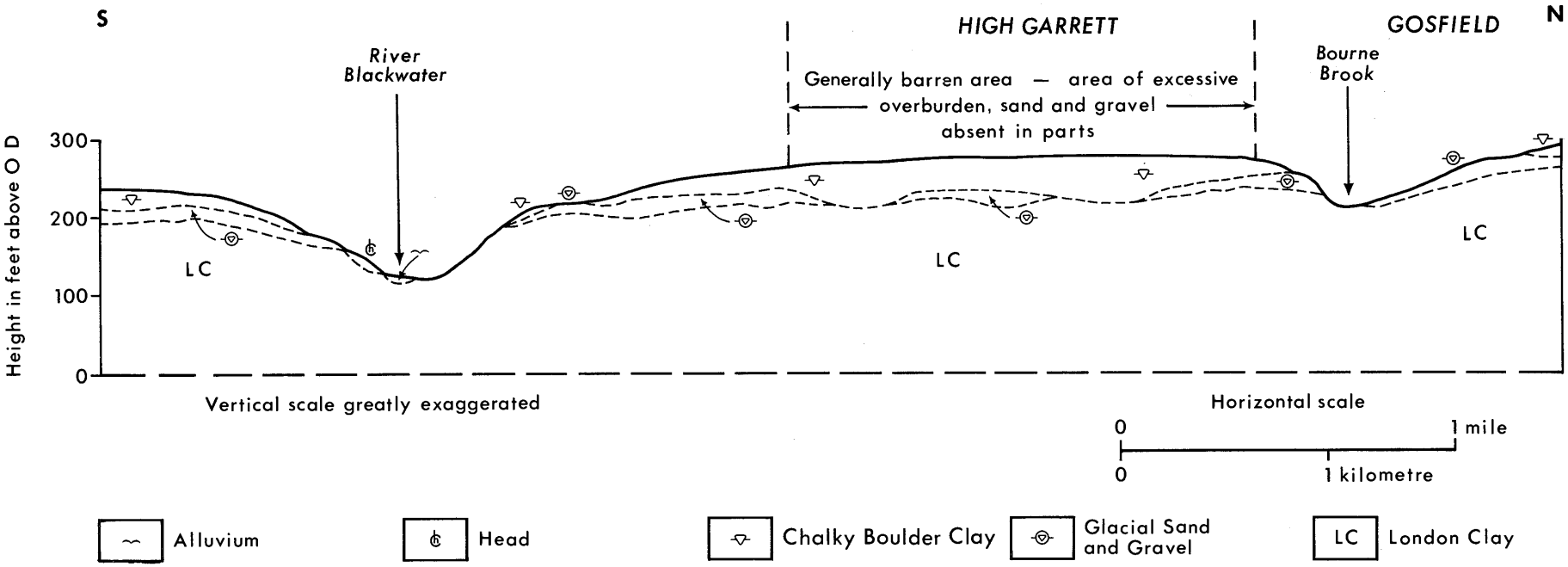


Fig. 3. Sketch section showing the geology along grid line east 78, on sheet TL 72

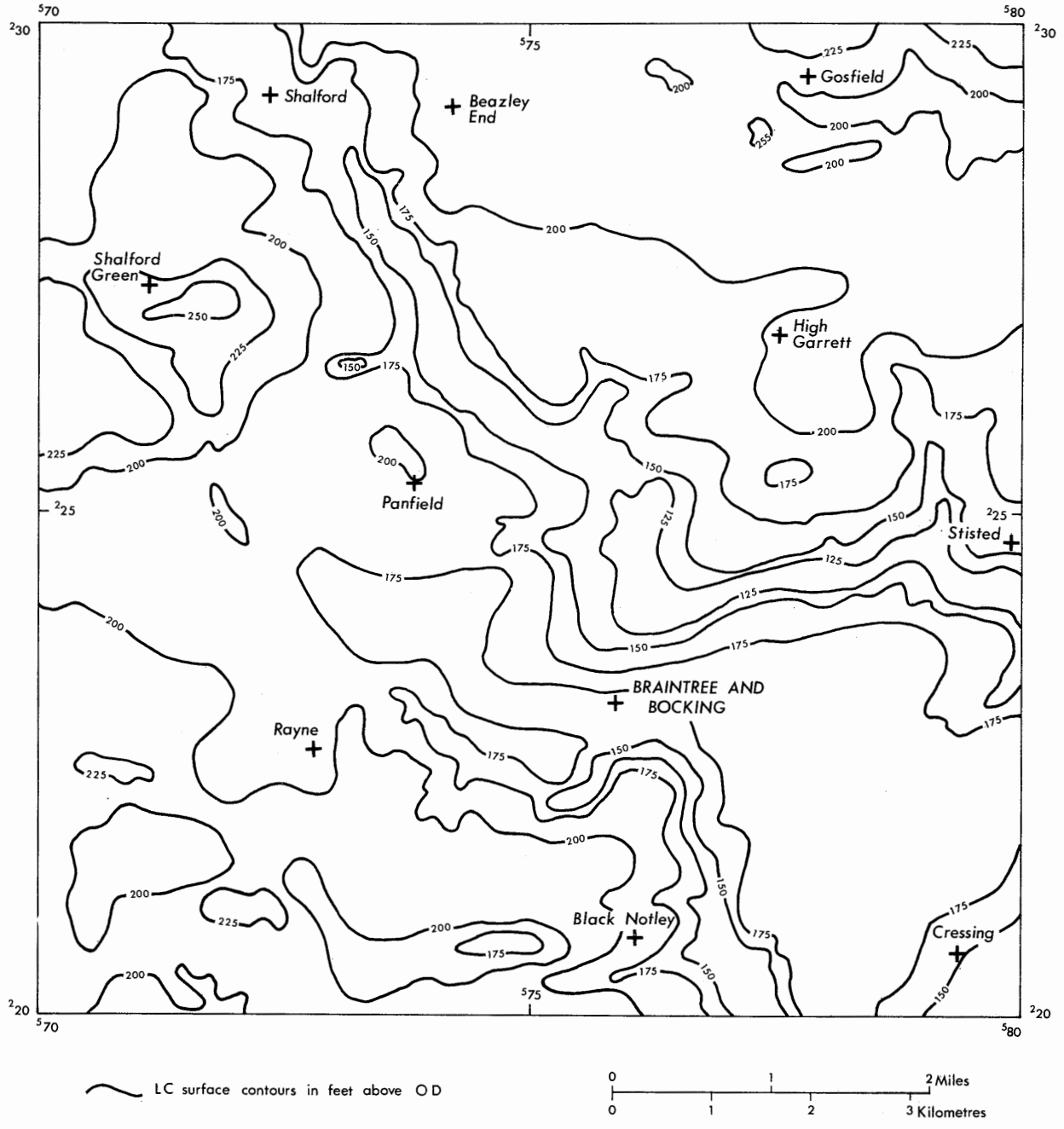


Fig. 4. Sketch diagram showing contours on the London Clay

Table 1. Geological classification of deposits.

		Description
RECENT AND PLEISTOCENE	DRIFT	
	Alluvium	Clays and silty clays with occasional pebbles
	Undifferentiated Terrace Deposits	Silty clays and clayey sand and gravel deposits of the Rivers Pant and Blackwater
	Calcareous Tufa	Soft pale grey calcareous deposits formed by the solution and redeposition of calcium carbonate
	Peat	Soft black deposits of partially decomposed organic matter
	Older River Deposits	Sandy clays and silts with coarse gravel
	Head	Clayey, pebbly silts and sands derived by solifluction from adjacent deposits
	Glacial Lake Deposits	Soft silty clays with gravel (proved in borehole NE 8 only)
	Chalky Boulder Clay	Brown and grey silty clay with pebbles of chalk, flint and quartzite
	Glacial Sand and Gravel	Clean, poorly sorted sands and gravels comprising flint, vein quartz and quartzite. (The clean well sorted sands (?Chillesford Beds) proved in assessment boreholes to underlie the Glacial Sand and Gravel in the north-west part of the sheet area are included here)
	SOLID	
	Red Crag	Orange-brown fine to coarse sands with shell debris (proved in borehole NW 1 only)
EOCENE		
	London Clay	Bluish grey silty clay weathered brown at the surface. Cementstone nodules at some horizons

to a subrounded flint and quartz gravel in a matrix of varying proportions of sand, silt and clay. Underlying these gravelly deposits are at least 3.0 m of yellow and pale grey sands which contain thin, greenish-grey clay bands and occasional lenses and seams of fine, pale grey to white quartz gravel. The sands are almost exclusively fine to medium grade, in part micaceous and strongly laminated and cross-bedded; they also exhibit microfolding and faulting. The uneven junction between the gravelly and sandy horizons is sharp, and the gravelly deposits often channel into the underlying sands, suggesting that the two deposits were laid down in markedly different depositional environments. Although the gravelly material is locally more pebbly and clayey where solifluxion has occurred, it is generally very similar to the outwash Glacial Sand and Gravel found commonly in neighbouring parts of Essex.

The finely laminated and well sorted nature of the underlying sands suggests deposition in a much quieter sedimentary environment which possibly existed immediately prior to the main glacial episode in this area. They are similar to deposits encountered during the assessment of the area around Woodbridge, Suffolk (see Allender and Hollyer, 1972). In borehole NW 1 [7051 2974] a thick sequence of these fine to medium sands was proved directly overlying 1.8 m (6 ft) of shelly sands which contain a Red Crag fauna. A possible correlation may therefore be made with the fine to medium sands (?Chillesford Beds) which overlie the Red Crag deposits in the

Ipswich area. Although some boreholes, for example, NW3 [7053 2755] pass directly into these sands, it was not possible at the time of the recent six-inch geological survey to distinguish them from the overlying Glacial Sand and Gravel except at isolated locations and in pit sections. They are therefore represented by the same symbol as the overlying Glacial Sand and Gravel deposits and are assessed with them.

Chalky Boulder Clay

This deposit normally consists of brown or bluish grey clay containing pebbles of chalk, flint, vein quartz and some quartzite which weathers to a mottled, buff, orange-brown and grey clay, silty in places, sometimes containing little or no chalk. Seams of gravel or sand are recorded in places and the deposit becomes very sandy towards the base where it often merges imperceptibly with the underlying Glacial Sand and Gravel. The Chalky Boulder Clay covers the plateau areas and extends into many of the valleys.

Head

This is a solifluxion deposit derived from adjacent material; its composition therefore varies from clayey, when derived from boulder clay or London Clay, to gravelly when derived from Glacial Sand and Gravel. It occurs only in relatively minor patches, mainly on the valley sides and floors. It is usually between 1.0 m and 2.0 m in thickness, but occasionally exceeds 3.0 m, and consists typically of soft, brown clay or silt with infrequent sandy or gravelly lenses.

Older River Deposits

This term has been adopted to describe deposits occurring in the floor of the Pant Valley and one of its tributaries in the north-west of the area near Shalford and north-east of Great Priory Farm [736 258]. They are of variable thickness and comprise brown sandy clays with occasional flint pebbles and lenses of gravel or sandy gravel and are not regarded as mineral. Although similar in lithology to River Terrace Deposits elsewhere on the sheet, they do not have a terrace form and are unlikely to have been deposited by the existing rivers. Site investigation boreholes proved deposits similar to these beneath the boulder clay mapped in the Pant Valley to the north of Iron Bridge Farm [731 286].

River Terrace Deposits

These also are of limited extent and are mapped only in the Blackwater Valley. They are most prominent in the vicinity of Bocking but less extensive spreads also occur downstream, south of Stisted [794 241]. Their correlation with the terrace sequence in the lower reaches of the Blackwater Valley around Witham (Haggard, 1972) has not been established. Borehole NE 24 [7605 2527] which was drilled to investigate the terrace deposits at Bocking, proved 1.3 m (4.5 ft) of silty and sandy clay, overlying 1.0 m (3.5 ft) of clayey gravel. Subsequent augering of these deposits showed them to consist of silty and sandy clays overlying clayey gravel. As they can be regarded as mineral only exceptionally, for example, in borehole NE 24, and generally are of limited thickness, the River Terrace Deposits are treated as non-mineral.

Peat

Small patches of Peat have developed at the spring-line at the base of the Glacial Sand and Gravel in the Blackwater Valley [710 295] and [733 291] and in the Brain Valley [715 263], [753 204] and [758 204]. Hand augering indicates that the Peat is usually more than 4 ft (1.2 m) thick.

Alluvium

This floors most of the major valleys and consists of soft, brown or dark brown silts and clayey silts, sometimes sandy and occasionally pebbly. Though no assessment boreholes have penetrated this deposit, field evidence suggests that it is unlikely to be more than 1.0 m or 2.0 m thick or to contain potentially workable sand and gravel.

Calcareous Tufa

A small area of Calcareous Tufa is mapped at the springline at the base of the Glacial Sand and Gravel near Redferns Farm [714 296]. The tufa is a soft pale grey silty deposit formed of re-deposited calcium carbonate which has been held in solution by water percolating through the sand and gravel deposits. The source of the calcium carbonate may be the chalk in the spreads of Chalky Boulder Clay, or it may be derived from shelly material proved, for example, at the base of the Glacial Sand and Gravel deposits in borehole NW 1 [7051 2974].

COMPOSITION OF THE SAND AND GRAVEL

The potentially workable sand and gravel deposits are all found in the glacial deposits. The small mapped areas of terrace deposits may locally be of mineral quality (see borehole NE 24 7605 2527) but they have not been assessed (see p. 15).

Glacial Sand and Gravel

In the southern part of the area, the composition of the Glacial Sand and Gravel deposits is generally consistent (see Fig. 5) and they have very similar mean grading results in block C and D:

	per cent		
Block	fines	sand	gravel
C	8	63	29
D	6	68	26

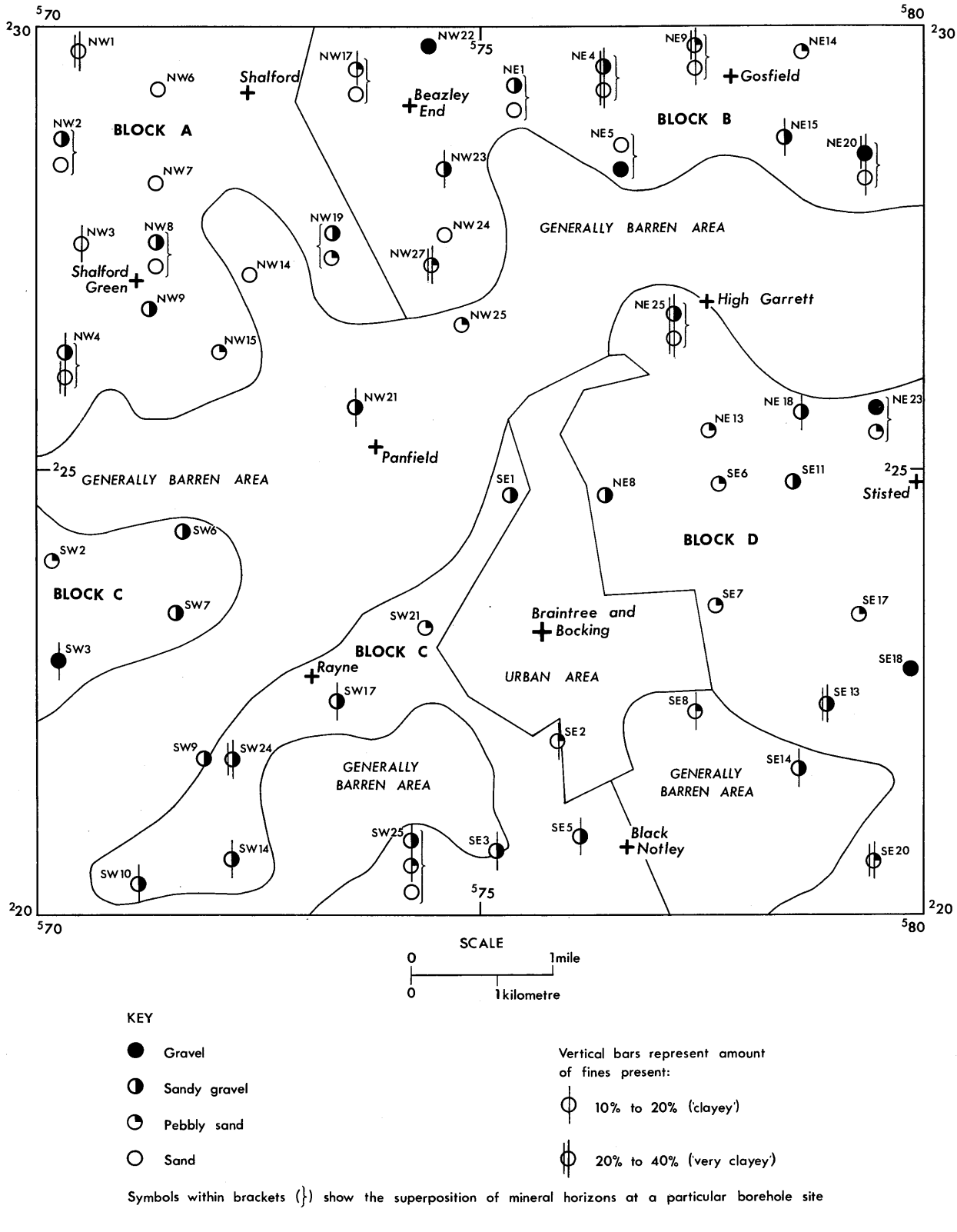


Fig. 5. Diagram showing the mean grading characteristics of the sand and gravel deposits proved in the assessment boreholes

These deposits comprise subangular to subrounded flint, vein quartz and quartzite gravels and subangular to subrounded quartz-rich sands. Fine and medium sand make up approximately 48 per cent of the mineral (Fig. 6).

In the northern part of the area (blocks A and B) both sandy (?Chillesford Beds) and gravelly (Glacial Sand and Gravel) horizons can be recognised. In some boreholes both horizons are present for example, NW 2 [7031 2871], in others only one for example, NW 23 [7460 2837]

The Glacial Sand and Gravel (found overlying the sandy beds), consisting of fine to coarse subangular to subrounded flint, vein quartz and quartzite gravels and medium to coarse subangular to subrounded quartz sands, is very similar in composition and thickness to the Glacial Sand and Gravel in blocks C and D and has a mean grading of fines 10 per cent, sand 57 per cent, gravel 33 per cent. Fine and medium sand make up 42 per cent (Fig. 6).

The lower, sandy beds (?Chillesford Beds) comprise fine to medium subangular to subrounded quartz sands, micaceous in part, usually pale grey or yellow, but they occasionally are reddish-brown. They have a mean grading of fines 12 per cent, sand 85 per cent, gravel 3 per cent; fine and medium sand account for 75 per cent (Fig. 6). A thin gravelly layer composed of subangular to subrounded flints and quartzites often forms the base of these deposits and thin clay seams are developed irregularly throughout the sandy horizons.

Table 2. Results of specific gravity and 10 per cent fines tests. Composite sample taken from borehole SW 25.

Test 1: specific gravities etc. of 10 to 14 mm size material			
Weight of material for test oven dry (g)	1355	1341	Mean
Specific gravity - apparent	2.630	2.629	2.630
- *saturated surface dry	2.553	2.552	2.553
- oven dry	2.505	2.505	2.505
Absorption (per cent)	1.89	1.89	1.89

Test 2: 10 per cent fines value			
Weight of material for test (g)	2765	2765	Mean
Per cent of 'natural' material for test	63	34*	
Per cent of 'crushed' material for test	37	66	
(x) Applied load (tons)	25.6	25.6	
(y) per cent passing No. 7 sieve	10.44	8.47	9.46
10 per cent fine value $= \frac{14x}{y+4}$ tons	24.8		26.6

*Small sample material used in first test sieved to make up test quantity.

In borehole NE 5 [7659 2862] sand overlies gravel which may represent an expanded basal deposit.

Similar sandy deposits were proved only in two boreholes (SW 21 and SW 25) in the southern part of the area. They may be contemporaneous with the ?Chillesford Beds in blocks A and B or may have been derived from them.

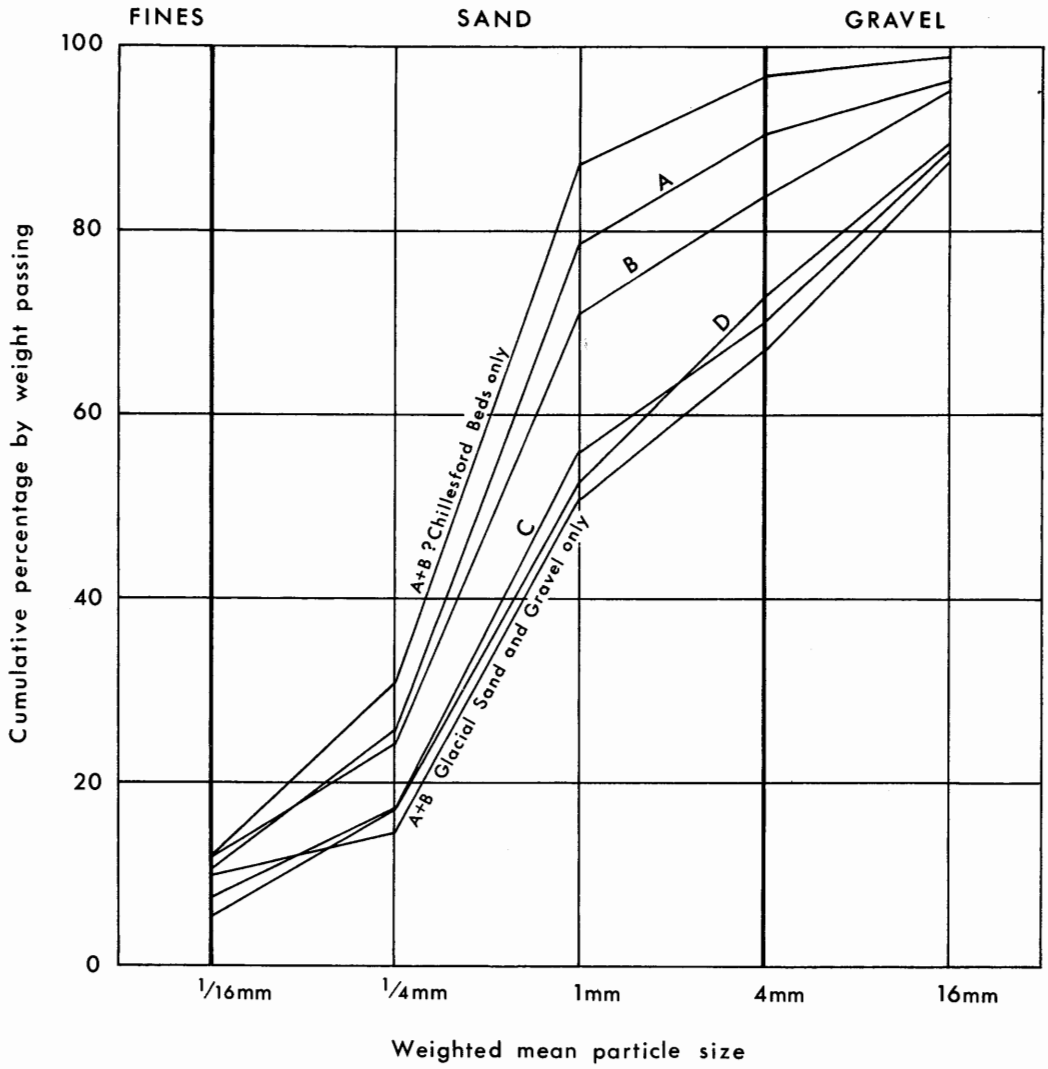
The specific gravity and 10 per cent fines value of a composite sample of Glacial Sand and Gravel of the 10 to 14 mm size material from borehole SW 25 [7422 2068] were determined in accordance with B.S. 812 (Anon., 1967). The results are shown in Table 2. Although the material was taken from a randomly selected sampling point, it may not be representative of the gravelly glacial sand and gravel deposits throughout the area.

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.

Plate 1. Glacial Sand and Gravel at Shalford Pit, Shalford, near Braintree, Essex

This pit section shows the sharp junction between the dark, orange coloured clayey Glacial Sand and Gravel (locally solifluxed), and the underlying yellow sands (?Chillesford Beds) with associated darker coloured thin clay seams. The gravels, only thinly developed at this locality, comprise fine to coarse subangular to subrounded flint, vein quartz and quartzite sands and gravels. The underlying sands are well sorted fine to medium subangular to subrounded quartz sands, typical of those proved extensively in assessment boreholes in the Shalford area.



BLOCK	Cumulative percentage by weight passing				
	1/16mm	1/4mm	1mm	4mm	16mm
A	11	25	79	90	96
B	12	24	71	83	94
A + B ?Chillesford Beds only	12	30	87	97	99
A + B Glacial Sand and Gravel only	10	15	52	67	87
C	8	17	56	71	88
D	6	17	54	74	90
A to D	9	21	66	80	92

Fig. 6. Particle size distribution for the assessed thicknesses of mineral in the resource blocks A to D on sheet TL 72

Geological Data

The geological boundary lines, symbols, etc., shown are taken from the geological map of this area, which was surveyed recently at the scale of 1 : 10 560. This information was obtained by detailed application of field mapping techniques by the field staff in the Institute's East Anglia and South-East England Unit. Borehole data, which include the stratigraphic relations and mean particle size distribution of the sand and gravel samples collected during the assessment survey, are also shown.

The geological boundaries show the best available interpretation of the information available at the time of survey. However, it is inevitable, particularly with glacial deposits such as those included in this area, which change rapidly vertically and laterally, that local irregularities or discrepancies will be revealed by some boreholes (for example, at borehole NE 19 [7934 2966]). These are taken into account in the assessment of resources (see below and Appendix B).

Mineral Resource Information

The mineral-bearing ground is subdivided into resource blocks (see Appendix A). Within a resource block the mineral is subdivided into areas where it is 'exposed' and areas where it is present in continuous (or almost continuous) spreads beneath overburden. The mineral is identified as 'exposed' where the overburden, commonly consisting only of soil and subsoil, averages less than 1.0 m (3.5 ft) 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 outcrops, where boreholes indicate absence of sand and gravel beneath cover and where sand and gravel beneath cover is interpreted to be not potentially workable are uncoloured on the Map; where appropriate the relevant criterion is noted. In such 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, for example, built-up areas, 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 used.

RESULTS

A simple statistical procedure, explained in Appendix B, has been used to calculate the resources in the four blocks; the results are shown in Table 3.

The particle size distribution for the assessed thickness of mineral in blocks A to D shown in Fig. 6, is based upon the weighted mean grading results for each assessment borehole.

Accuracy of Results

For each of the four blocks, the accuracy of the results at the two-sided 95 per cent confidence level (that is, the probability that 19 times out of 20, the true volume of mineral present lies within the stated limits) varies between 27 per cent and 43 per cent. However, the true volumes are more likely to be nearer the figure estimated than either of the limits. Moreover, it is probable that roughly the same percentage limits would apply for the statistical estimate of mineral volume within a very much smaller parcel of ground (say 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 quotation of reserves, data from more sample points would be required, even if the area were quite small. This point can be illustrated by considering the whole of the potentially workable sand and gravel on sheet TL 72. The total volume (375 million m^3) can be estimated to limits of $\pm$ 17 per cent at the 95 per cent confidence level by a calculation based on the data from the 60 sample points spread across the four resource blocks. However, it must again be emphasised that the quoted volume of mineral has no simple relationship with the amount that could be extracted in practice, because apart from the exclusion of the Braintree urban area 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.

Table 3. The sand and gravel resources of sheet TL 72 .

Resource block	Area		Mean thickness				Volume of mineral				Mean grading percentag		
	Block km^2	Mineral km^2	Overburden m	Overburden ft	Mineral m	Mineral ft	Million m^3	Million yd^3	Limits at 95% confidence level ±%	Limits at 95% confidence level ± million m^3	Fines -1/16 mm	Sand +1/16-4 mm	Grave +4-64 mm
A (14)*	12.6	10.7	2.6	8.5	9.9	32.5	106	139	43	46	11	79	10
B (14)	13.9	11.8	4.7	15.5	8.4	27.5	99	130	38	38	12	71	17
C (14)	13.2	10.4	3.5	11.5	8.2	27.0	85	111	27	23	8	63	29
D (18)	15.8	13.1	5.5	18.0	6.5	21.5	85	111	38	32	6	68	26
AtoD(60)	55.5	46.0	4.2	14.0	8.2	27.0	375	491	17	64	9	71	20

*The figures in brackets show the number of sample points used for the statistical assessment of resources in each block

NOTES ON RESOURCE BLOCKS

Block A

An almost continuous spread of Glacial Sand and Gravel overlies the London Clay bedrock except in the Pods Brook and River Pant valleys, which cross this block from north-west to south-east. The mineral is overlain by extensive spreads of overburden, mainly Chalky Boulder Clay, which ranges in thickness from 0.1 m (0.5 ft) to 4.9 m (16.0 ft) with an average of 2.6 m (8.5 ft), in the assessment boreholes. The overburden is thickest on the relatively level interfluves and thins towards the valleys, where the sand and gravel outcrops.

Because of the lack of detailed information about the vertical and lateral variation of the Glacial Sand and Gravel and the ? Chillesford Beds, they have been assessed together: the thickness of mineral ranges from 4.3 m (14.0 ft) to 22.8 m (75.0 ft) with an average of 9.9 m (32.5 ft), based on 14 sample points. In those boreholes in which only one of the deposits is present (for example, NW 7 [7137 2822] proved only the sandy deposit and NW 9 [7130 2680] proved only the gravelly deposit), the thickness of the gravelly deposit ranges from 2.1 m (7.0 ft) to 9.1 m (30.0 ft), and that of the sandy deposit from 2.7 m (9.0 ft) to 22.8 m (75.0 ft).

It is thought that the 22.8 m (75.0 ft) and 21.0 m (69.0 ft) of mineral proved in boreholes NW 1 [7051 2974] and NW 2 [7031 2871] respectively, may have accumulated in channel-like features in the London Clay surface. The volume of mineral present in this block is 106 million m^3 (139 million yd^3), ± 43 per cent. Its mean grading is fines 11 per cent, sand 79 per cent and gravel 10 per cent.

Field evidence shows that sand and gravel does not occur beneath the boulder clay which outcrops lower in the Pant Valley [728 288] than the Glacial Sand and Gravel, although boreholes drilled by the Colchester and District Water Board show that Older River Deposits and possibly some reworked Glacial Sand and Gravel, all of non-mineral quality, occur locally in the valley bottoms for example, near Iron Bridge Farm [731 286]. Glacial Lake Deposits, comprising grey silty clays, have been proved below a thin cover of Alluvium and boulder clay in Water Board boreholes drilled in the Pant Valley below Iron Bridge Farm.

Older River Deposits are mapped in the upper parts of the Pant Valley around Shalford [722 292]. Although they are gravelly in parts, field evidence shows them to be generally too clayey to be assessed as mineral. Small outcrops of Peat and Calcareous Tufa occur at the springline at the base of the Glacial Sand and Gravel near Redferns Farm [714 296] and peat occurs in the Pods Brook Valley near Pudney Farm [711 262].

Block B

As in block A, almost continuous spreads of mineral (Glacial Sand and Gravel) rest upon the London Clay which is exposed in the valleys of the River Pant and Bourne Brook. The mineral is generally overlain by an extensive cover of Chalky Boulder Clay which is thickest on the plateau area.

Overburden, comprising soil and boulder clay, ranges in thickness from 1.7 m (5.5 ft) to 8.5 m (28.0 ft) with an average of 4.7 m (15.5 ft)

Boulder Clay in the Pant Valley outcrops [740 276] at a lower level than the Glacial Sand and Gravel, and rests on the London Clay bedrock. There are no known mineral deposits beneath this Boulder Clay, although, as in block A, some superficial patches of reworked Glacial Sand and Gravel and Older River Deposits may occur locally. As in block A, the mineral deposits in this block can often be subdivided into an upper gravelly deposit and a lower sandy deposit (see borehole NE 1 [7539 2936]). The gravelly deposit ranges in thickness from 2.2 m (7.0 ft) to 11.0 m (36.0 ft) and the sandy deposit ranges from 1.9 m (6.0 ft) to 13.4 m (44.0 ft). Again, however, they are assessed together as one unit. Thus, mineral in this block ranges in thickness from 2.7 m (9.0 ft) to 21.0 m (69.0 ft) with an average of 8.4 m (27.5 ft), calculated from 14 sample points, and the volume estimated to limits of ± 38 per cent is 99 million m^3 (130 million yd^3). The grading is fines 12 per cent, sand 71 per cent, gravel 17 per cent.

To the south-east of Rotten End Farm [731 294] deposits of Peat occur at the springline associated with the base of the Glacial Sand and Gravel.

Block C

This resource block is made up of two mineral-bearing areas, one, of very irregular shape. Spreads of continuous or almost continuous Glacial Sand and Gravel are overlain largely by Chalky Boulder Clay. The overburden ranges in thickness from 0.5 m to (1.5 ft) to 10.4 m (34.0 ft) with an average of 3.5 m (11.5 ft). London Clay is exposed in the sides and bottoms of the valleys of the River Ter and Pods Brook. The composition of the Glacial Sand and Gravel in this block appears to correspond with that of the upper gravelly deposit proved in blocks A and B. In all but two of the thirteen assessment boreholes drilled, the mineral contains at least 20 per cent gravel. The exceptions are boreholes SW 21 [7436 2321] which proved a sandy deposit with a mean grading of fines 1 per cent, sand 94 per cent, gravel 5 per cent and SW 25 [7422 2068] which encountered a similar sandy deposit between beds of sand and gravel, typical of the deposits found elsewhere in this block. These two boreholes also proved the greatest thicknesses of mineral within the block.

The mineral thickness proved by the 14 sample points ranges from 3.7 m (12.0 ft) to 15.8 m (52.0 ft), the average for the block as a whole being 8.2 m (27.0 ft), and the volume is 85 million m^3 (111 million yd^3) ± 27 per cent. The mean grading for the block is fines 8 per cent, sand 63 per cent, gravel 29 per cent.

Block D

The mineral deposits in this block are similar in thickness and composition to that in block C and are overlain by almost continuous spreads of Chalky Boulder Clay. The River Blackwater flows eastwards across the central part of the block and the Glacial Sand and Gravel outcrops on the sides of the valley, where the London Clay bedrock is also exposed in the lower slopes.

Overburden comprises boulder clay and Head, ranging in thickness from 0.3 m (1.0 ft) to 5.8 m (19.0 ft) with a mean of 5.5 m (18.0 ft); it is thickest on the plateau and thins rapidly towards the Blackwater Valley. Borehole NE 8 [7627 2535] proved a succession of Glacial Lake Deposits (soft silty clays with gravelly seams), below the boulder clay which outcrops on the valley sides at a lower level than the Glacial Sand and Gravel in that area [763 253].

The mineral in this block ranges in thickness from 3.7 m (12.0 ft) to 13.7 m (45.0 ft) with an average of 6.5 m (21.5 ft), calculated from 18 sample points. Boreholes SE 16 [7980 2482] and SE 18 [7985 2275] each proved 1.8 m (6.0 ft) of sand and gravel below a thick cover of boulder clay and in borehole NE 12 [7742 2658] boulder clay concealed thin seams of clayey gravel.

The mineral deposits seen in this block have a similar composition to those seen in block C and again there is some variation in the gravel content, some boreholes proving a markedly sandy deposit (borehole SE 17 [7924 2335]) and others a more gravelly deposit (borehole SE 4 [7639 2474]).

The estimated volume of mineral in this block is 85 million m^3 (111 million yd^3) ± 38 per cent; the mean grading is fines 6 per cent, sand 68 per cent, gravel 26 per cent.

Although borehole NE 24, drilled in the river terrace deposits at Bocking [7605 2527], proved 1.0 m of mineral, hand augering in this area and downstream [794 241] showed the deposits to be of limited thickness and extent, and to be composed principally of silty clays. Consequently, no assessment is offered for the terrace deposits.

NOTES ON THE REMAINING AREAS

Areas are left uncoloured on the resource map where boreholes show that the sand and gravel has an overburden ratio greater than 3 : 1, or is likely to be generally absent, apart from scattered minor occurrences. This ground is divided for descriptive purposes into five areas, three of which form a continuous belt to the north, northwest and west of Braintree.

East of the River Pant

In this area, five boreholes (NE 2, NE 3, NE 6, NE 16 and NE 21) were abandoned at 16.5 m (60 ft) without proving the base of the boulder clay. Borehole NW 25 proved 2.1 m (7.0 ft) of sand and gravel overlain by thick burden. Field evidence suggests that the Glacial Sand and Gravel which outcrops on the side of the Pant Valley [746 264] is thin and patchy and in parts very clayey, and therefore not potentially workable. Boreholes NE 17 and NE 22 proved no Glacial Sand and Gravel although small patches outcrop near-by [790 263]; these are likely to be very thin and impersistent and are therefore thought to be not potentially workable. Boreholes NE 7 and NE 10 proved 1.2 m (4.0 ft) and 0.3 m (1.0 ft) respectively of a very clayey gravel beneath boulder clay.

Between the River Pant and Pods Brook

Boreholes NW 13, NW 16, NW 20 and SW 15 did not penetrate the thick boulder clay in this area and the sand and gravel proved in boreholes NW 14 and NW 21 is not classified as mineral because the overburden exceeds three times its thickness. Locally the sand and gravel is thin or absent, as shown by boreholes SW 11, SW 16, SW 20 and NW 26. The small areas of exposed sand and gravel near Lightwaters Farm [722 247], near borehole SW 16 [736 235], near Panfield Hall [743 249] and near borehole NW 26 [748 259] are regarded as not potentially workable in terms of the criteria adopted for this survey. Field evidence shows that the Older River Deposits mapped in the Pant Valley [740 265] consist mainly of gravelly clays and silts which are not regarded as potentially workable.

South-west of Pods Brook

In this area, three boreholes (NW 5, SW 1 and SW 12) were terminated at 18.3 m (60.0 ft) in boulder clay and one, SW 9, proved 3.0 m (10.0 ft) of sand and gravel below thick overburden. Boulder clay lay directly on bedrock in NW 10 and SW 5 and 0.6 m (2.0 ft) of clayey gravel was proved at the base of the boulder clay in SW 4. Augering has shown that the small area of sand and gravel [710 221] exposed in the sides of the Ter Valley, to the north-east of this borehole is thin and patchy and is therefore regarded as non-mineral.

South-west of Braintree

This is an extension of a generally barren area proved on the adjoining sheet TL 71 (Eaton, 1973). Although quite extensive areas of sand and gravel are exposed near Beddalls End [745 216], the three boreholes (SW 22, SW 23 and SW 26) in that area proved boulder clay directly on London Clay. This lends support to the view that these deposits may consist of thinly spread soliflucted material which is unlikely to be potentially workable.

Boreholes SW 13 and SW 19 also failed to prove mineral, although the bottom 0.9 m of the boulder clay in the latter was gravelly. Glacial Sand and Gravel was proved in borehole SE 3 [7518 2075] but, being overlain by more than three times its thickness of overburden, it is regarded as non-mineral.

South-east of Braintree

The sand and gravel deposits here are locally shown to be very clayey and particularly thin and impersistant in distribution:

Boreholes SE 8, SE 10, SE 14, SE 19 and SE 15 proved respectively 1.8 m (6.0 ft), 1.5 m (5.0 ft), 1.8 m (6.0 ft), 2.1 m (7.0 ft) and 0.6 m + (2.0 ft+) of sand and gravel below thick overburden, the overburden ratio far exceeding 3 : 1 in every case. Borehole SE 9 proved boulder clay directly overlying London Clay.

The exposed areas of sand and gravel mapped along the sides of the Brain Valley are not of mineral quality; field evidence shows them to be thin and patchy and similar in nature to the clayey gravels proved at the base of the boulder clay in borehole SE 10. This generally barren area also continues southwards into the adjoining sheet area TL 71 (Eaton, 1973).

Appendix A: Field Procedure

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

The mineral shown on each 1:25 000 sheet is divided into resource blocks. The arbitrary size selected, 10 km^2, is a compromise to meet the aims of the survey by providing sufficient sample points in each block. As far as possible the block boundaries are determined by geological boundaries so that, for example, glacial and river terrace gravels are separated. Otherwise division is by arbitrary lines, which may bear no relationship to the geology. The blocks are drawn provisionally before drilling begins.

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

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

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

A continuous series of bulk samples is taken throughout the sand and gravel. Ideally samples are composed exclusively of the whole of the material encountered in the borehole between stated depths. However, care is taken to discard, as far as possible, material which has caved or has been pumped from the bottom of the hole. A new sample is commenced whenever there is an appreciable lithological change within the sand and gravel, or at every 1 m (3.3 ft) depth. The samples each weighing between 25 and 45 kg (55 and 100 lb), are despatched in heavy duty polythene bags to a laboratory for grading. The grading procedure is based on British Standard 1377 (Anon., 1967). Random checks on the accuracy of the grading are made in the laboratories of the Institute's Geochemical Division.

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

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

Appendix B: Statistical Procedure

STATISTICAL ASSESSMENT

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

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

4. The above relationship may be transposed such that

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

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

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

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

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

$$S_{\bar{l}} = \frac{1}{\bar{l}_m} \sqrt{\frac{(l_m - \bar{l}_m)^2}{(n - 1)}}$$

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

6. The sampled area in each resource block is coloured pink on the map. Wherever possible, calculations relate to the mineral within mapped geological boundaries (which may not necessarily correspond to the limits of a deposit). Where the area is not defined by a mapped boundary, that is, where the boundary is inferred, a distinctive symbol is used. Experience suggests that the errors in determining area are small relative to those in thickness.
The relationship

$\frac{S_A}{S_{\bar{l}_m}} \leqslant 1/3$ is assumed in all cases

It follows from equation (2) that

$$S_{\bar{l}_m} \leqslant S_V \leqslant 1.05\ S_{\bar{l}_m} \quad \ldots\ldots(3)$$

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

$\pm \frac{t}{\sqrt{n}} \times S_{\bar{l}_m}$

or as a percentage

$\pm \frac{t}{\sqrt{n}} \times S_{\bar{l}_m} \times \frac{100}{\bar{l}_m}$ 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	∞	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 Ed. 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:

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

Block Calculation — 1:25 000 Block — Fictitious

Area
- Block: 11.08 km^2
- Mineral: 8.32 km^2

Volume
- Overburden: 21 million m^3
- Mineral: 54 million m^3

Mean Thickness
- Overburden: 2.5 m
- Mineral: 6.5 m

Confidence limits of the estimate of mineral volume at the 95 per cent probability level: ± 20 per cent
That is, the volume of mineral (with 95 per cent probability): 54 ± 11 million m^3

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

Sample point	Weighting w	Overburden l_o	Overburden wl_o	Mineral l_m	Mineral wl_m	Remarks
SE 14	1	1.5	1.5	9.4	9.4	MAU boreholes
SE 18	1	3.3	3.3	5.8	5.8	
SE 20	1	nil	-	6.9	6.9	
SE 22	1	0.7	0.7	6.4	6.4	
SE 23	1	6.2	6.2	4.1	4.1	
SE 24	1	4.3	4.3	6.4	6.4	
SE 17	½	1.2	1.6	9.8	7.2	Hydrogeological Dept record
123/45	½	2.0		4.6		
1	¼	2.7	2.5	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	$\Sigma w = 8$	$\Sigma wl_o = 20.1$		$\Sigma wl_m = 52.0$		
Means		$\bar{l}_o = 2.5$		$\bar{l}_m = 6.5$		

Calculation of confidence limits

l_m	$(l_m - \bar{l}_m)$	$(l_m - \bar{l}_m)^2$
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

$\Sigma(l_m - \bar{l}_m)^2 = 15.82$

$n = 8$

$t = 2.365$

L_V is calculated as

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

$$= 1.05 \times \frac{2.365}{6.5} \sqrt{\frac{15.82}{8 \times 7}} \times 100$$

$$= 20.3$$

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

Fig. 7. Example of resource block assessment: calculation and results

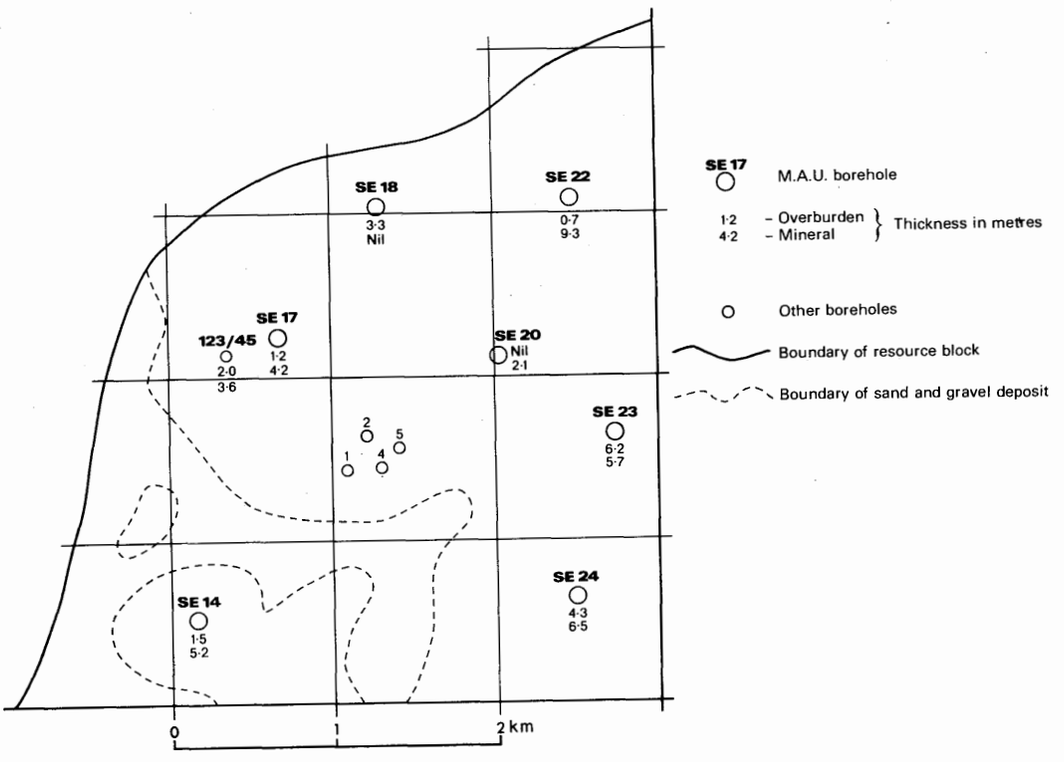
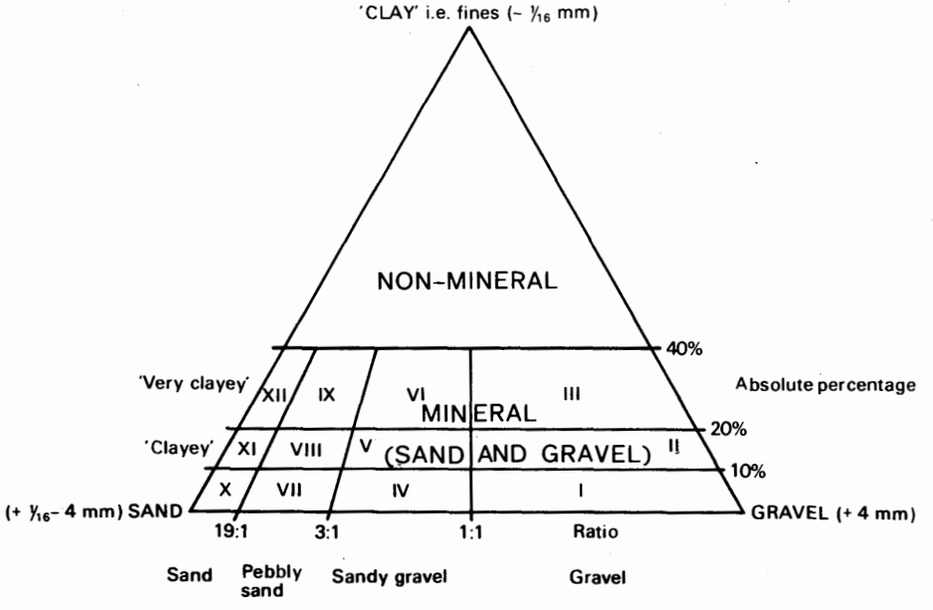


Fig. 8. Example of resource block assessment: map of fictitious block



I	Gravel	IV	Sandy gravel	VII	Pebbly sand	X	Sand
II	'Clayey' gravel	V	'Clayey' sandy gravel	VIII	'Clayey' pebbly sand	XI	'Clayey' sand
III	'Very clayey' gravel	VI	'Very clayey' sandy gravel	IX	'Very clayey' pebbly sand	XII	'Very clayey' sand

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

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

$$\frac{1.05 \times t}{\bar{l}_m} \times \sqrt{\frac{\sum(l_m - \bar{l}_m)^2}{n(n-1)}} \times 100 \text{ per cent}$$

and when n is greater than 20, as

$$\frac{1.05 \times 1.96}{\bar{l}_m} \times \sqrt{\frac{\sum(l_m - \bar{l}_m)^2}{n(n-1)}} \times 100 \text{ per cent}$$

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

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 1/16 mm) and coarser than pebbles (more than 64 mm 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 1/16 mm. Thus it has no mineralogical significance and includes particles falling within the size range of silt. The normal meaning applies to the term clay where it does not appear in single quotation marks.

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

Thus it is possible to classify the mineral into one of twelve descriptive categories (see Fig. 8). 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 11, p. 25).

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 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 4), 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 ($-\frac{1}{4}$ +1/16 mm), medium (-1 $+\frac{1}{4}$ mm) and coarse (-4 +1 mm). The boundary at 16 mm distinguishes a range of finer gravel (-16 +4 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 (Anon., 1967)). In this report the grading is tabulated on the borehole record sheets (Appendix F), the intercepts corresponding with the simple geometric scale 1/16 mm, $\frac{1}{4}$ mm, 1 mm, 4 mm, 16 mm and so on as required. Original sample grading curves are available for reference at the appropriate office of the Institute.

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

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

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

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

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

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

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

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

Table 4. Classification of gravel, sand and fines

Size limits	Grain size description	Qualification	Primary classification
64 mm	Cobble		Gravel
16 mm	Pebble	Coarse	
4 mm		Fine	
1 mm	Sand	Coarse	Sand
¼ mm		Medium	
1/16 mm		Fine	
	Fines (silt and clay)		Fines

Appendix D: Explanation of the Borehole Records

ANNOTATED EXAMPLE

TL 72 NE 20[1] 7933 2852[2] Near Froyz Hall, Halsted Block B[3]

Surface level (+70.1 m) +230 ft[4]
Water struck at +62.8 m (+206 ft)[5]
Shell and auger 6 in diameter[6]
December 1972[6]

Overburden[7] 5.4 m (18 ft)
Mineral 2.4 m (8 ft)
Waste 1.1 m (3.5 ft)
Mineral 3.9 m (13 ft)
Bedrock 1.0 m+ (3.5 ft)[5]

		LOG	Thickness m	(ft)	Depth[8] m	(ft)
Soil			0.1	(0.5)	0.1	(0.5)
Made Ground			0.2	(0.5)	0.3	(1.0)
Chalky Boulder Clay[10]		[11]Mottled grey/brown silty clay becoming firm orange/brown clay with flints and quartzite	3.6	(12.0)	3.9	(13.0)
?Glacial lake deposits		Soft, laminated, orange/brown silty clay with fawn bands	1.5	(5.0)	5.4	(18.0)
Glacial Sand and Gravel	(a)	'Very clayey' gravel. Gravel: fine to coarse subangular to subrounded flints and quartzite and subrounded chalk. Sand: Medium and coarse subangular to subrounded quartz and chalk, brown. 'Very clayey' (Fawn silty clay from 7.8 m to 8.9 m (25.5 ft to 29.0 ft) depth.	5.5	(18.0)	10.9	(36.0)
	(b)	'Clayey' sand Gravel: fine to coarse anglular, subangular and subrounded flints and angular chalk. Sand: Medium with fine and coarse subrounded quartz with some fine subrounded chalk. Greenish-grey, 'clayey'.	1.9	(6.0)	12.8	(42.0)
London Clay		Stiff dark grey silty clay.	1.0+	(3.5+)	13.8	(45.5)

GRADING

		%	mm		%	Depth below surface (m)[12]	Percentages[13] Fines -1/16	Sand +1/16-¼	Sand +¼-1	Sand +1-4	Gravel +4-16	Gravel +16
(a)	Gravel[15]	42	+16	:	17	5.4 - 6.4	44	2	31	9	9	5
			-16+4	:	25	6.4 - 7.8	9	2	16	14	25	34
						7.8 - 8.9	Clay Band					
			-4+1	:	12	8.9 - 9.9	20	2	16	12	38	12
	Sand	37	-1+¼	:	23	9.9 -10.9	15	4	29	14	29	9
			-¼+1/16	:	2							
	Fines	21	1/16	:	21							
(b)	Gravel	1	+16	:	0	10.9 - 11.9	17	17	59	6	1	0
			-16+4	:	1	11.9 - 12.8	11	9	59	23	1	0
			-4+1	:	14							
	Sand	85	-1+¼	:	58							
			-¼+1/16	:	13							
	Fines	14	-1/16	:	14							

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

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

1) The number of the 1:25 000 sheet on which the borehole lies, for example TL 72.

2) The quarter of the 1:25 000 sheet on which the borehole lies and its number in a series for that quarter, for example NE 20.

Thus the full Registration Number is TL 72 NE 20. Usually this is abbreviated to NE 20 in the text.

2. The National Grid Reference
All National Grid References in this publication lie within the 100 km square TG 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 shown.

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 and feet above Ordnance Datum).

6. Type of Drill and Date of Drilling
Drilling for the survey during 1969-70 was carried out by Wirths B1(or B0) machines (continuous flight power augers), and that for the additional survey in 1972 by shell and auger rigs. The type of machine, the external diameter of the casing used, and the month and year of completion of the borehole 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. Thickness and Depth
Although most measurements were made in feet, some were recorded in metres; the conversions appear in brackets. Metric conversions, the thicknesses of beds and the depth

from the surface of their bases have been rounded off to the nearest 0.1m because quotation to two places of decimals would imply a higher order of accuracy than could be justified by the original figures. Similarly conversions from metres to feet have been rounded off to the nearest 0.5 ft. Where figures have been rounded in this way there may be a discrepancy between the sum of the thicknesses and the recorded depths.

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

10. Geological Classification
The geological classification (page 8) is given whenever possible.

11. 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.

12. Sampling
A continuous series of bulk samples is taken throughout the thickness of sand and gravel. A new sample is commenced whenever there is an appreciable lithological change within the sand and gravel or at every 3 ft or 1m of depth.

13. Grading Results
The limits are as follows: gravel, +4 mm; sand; -4+1/16 mm; fines, -1/16 mm.

14. 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 brackets.

15. 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 4.

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

Appendix E: List of Boreholes Used in the Assessment of Resources

MINERAL ASSESSMENT UNIT BOREHOLES

Borehole No. (by sheet quadrant)	Grid reference (all fall within 100 km grid square TL)		Borehole No. (by sheet quadrant)	Grid reference (all fall within 100 km grid square TL)	
NW 1	7051	2974	24	7605	2527
2	7031	2871	25	7715	2671
3	7053	2755			
4	7037	2636	SW 1	7074	2468
5	7084	2576	2	7017	2396
6	7138	2929	3	7029	2284
7	7137	2822	4	7056	2193
8	7138	2753	5	7065	2094
9	7130	2680	6	7166	2428
10	7146	2515	7	7158	2338
11	7277	2957	8	7200	2251
12	7278	2832	9	7189	2175
13	7220	2794	10	7114	2035
14	7244	2717	11	7289	2444
15	7208	2634	12	7242	2315
16	7252	2567	13	7269	2147
17	7365	2948	14	7219	2060
19	7334	2765	15	7350	2487
20	7321	2654	16	7353	2377
21	7362	2571	17	7341	2239
22	7444	2982	19	7315	2045
23	7460	2837	20	7471	2441
24	7460	2763	21	7436	2321
25	7485	2665	22	7442	2219
26	7461	2564	23	7463	2147
27	7448	2732	24	7220	2177
			25	7422	2068
NE 1	7539	2936	26	7438	2183
2	7578	2851			
3	7557	2783	SE 1	7537	2471
4	7638	2951	2	7588	2200
5	7659	2862	3	7518	2075
6	7627	2762	4	7639	2474
7	7606	2667	5	7613	2086
8	7627	2535	6	7769	2486
9	7743	2988	7	7764	2347
10	7768	2850	8	7741	2228
12	7742	2658	9	7766	2154
13	7757	2545	10	7792	2030
14	7862	2973	11	7851	2485
15	7840	2873	12	7854	2402
16	7849	2753	13	7887	2235
17	7880	2630	14	7856	2166
18	7860	2561	15	7863	2050
19	7934	2966	16	7980	2482
20	7933	2852	17	7924	2335
21	7932	2748	18	7985	2275
22	7961	2652	19	7956	2148
23	7946	2562	20	7941	2056

OTHER BOREHOLES

Hydrogeological Department boreholes (Sayer and Harvey, 1965): 223/5, 223/40, 223/44d, 223/58, 223/77, 223/130, 223/173, 223/189, 223/201, 223/210, 223/210, 223/231, 223/235, 223/239. (Details of the last three boreholes are held in the National Well Record Collection of the Hydrogeological Department of the Institute, and may be inspected upon application to the Director, Institute of Geological Sciences, Exhibition Road, London, SW7 2DE.

Site investigation borehole results have been used from the site investigation report for the Braintree New Source Works (Colchester and District Water Board) and from commercial records made available by the industry and held in confidence by the Institute.

Table 5. Numbers of boreholes used in the assessment of resources for each resource block.

Resource Block	MAU Boreholes	Hydro-geological Dept Boreholes	Site Investigation Boreholes
A	11	6	19
B	13	2	-
C	13	3	-
D	15	2	213

The term 'sample point' as used in Table 3 may include a number of closely spaced site investigation boreholes which, in the calculations, have been given a collective weighting factor of 1. Therefore, the number of sample points used in the assessment of resources may be less than the total number of borehole records available for the block.

Appendix F: Mineral Assessment Unit Borehole Records

TL 72 NW 1 7051 2974 'Mandalay', Finchingfield BLOCK A

Surface level (+79.9 m) +262 ft
Water struck at +67.8 m (+22 ft)
Shell and auger 6 in diameter
November 1972

Overburden 0.1 m (0.5 ft)
Mineral 22.8 m (75.0 ft)
Bedrock 1.3 m+ (4.5 ft+)

		Thickness m	(ft)	Depth m	(ft)
Soil		0.1	(0.5)	0.1	(0.5)
Glacial Sand and Gravel	'Very clayey' sand. Sand: medium with fine and a little coarse subangular to subrounded quartz. Orange, yellow and grey, silty in parts especially from 15.1 m (49.5 ft) to 18.1 m (59.5 ft)	21.0	(69.0)	21.1	(69.0)
Red Crag	Sand: fine to coarse subangular to subrounded quartz. Orange/brown Much shell debris (Red Crag fauna identified)	1.8	(6.0)	22.9	(75.0)
London Clay	Firm grey silty clay	1.3+	(4.5+)	24.2	(79.5)

	%	mm	%
Gravel	2	+16	1
		-16+4	1
		-4+1	4
Sand	73	-1+$\frac{1}{4}$	57
		-$\frac{1}{4}$+1/16	12
Fines	25	-1/16	25

Percentages

Depth below surface (m)	Fines 1/16	+1/16-$\frac{1}{4}$	Sand +$\frac{1}{4}$-4	+1-4	Gravel +4-16	+16
0.1 - 1.1	23	6	50	8	9	4
1.1 - 2.1	24	7	63	2	3	1
2.1 - 3.1	15	7	76	2	0	0
3.1 - 4.1	19	10	69	2	0	0
4.1 - 5.1	13	8	73	5	1	0
5.1 - 6.1	11	3	83	3	0	0
6.1 - 7.1	12	4	78	6	0	0
7.1 - 8.1	18	10	70	2	0	0
8.1 - 9.1	32	8	52	8	0	0
9.1 -10.1	9	5	85	1	0	0
10.1 -11.1	21	10	65	4	0	0
11.1 -12.1	23	4	65	4	4	0
12.1 -13.1	10	6	80	2	1	0
13.1 -14.1	16	8	72	2	2	0
14.1 -15.1	29	18	52	0	1	0
15.1 -16.1	43	34	23	0	0	0
16.1 -17.1	52	30	18	0	0	0
17.1 -18.1	53	17	29	1	0	0
18.1 -19.1	32	2	40	8	7	11
19.1 -20.1	22	25	50	3	0	0
20.1 -21.1	22	21	51	5	1	0
21.1 -22.1	33	25	39	3	0	0
22.1 -22.9	39	15	22	20	4	0

TL 72 NW 2 7031 2871 West of Hunt's Farm, Shalford Block A

Surface level (+c. 82. 3 m) + c. 270 ft
Water struck at (+c. 68. 3 m)+c. 224 ft
Wirth B0 8 in diameter
June 1969

Overburden (2.1 m) 7 ft
Mineral (21. 0 m) 69 ft
Bedrock (0. 9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0. 9)	3	(0. 9)	3
Chalky Boulder Clay	Brown clay with flints and chalk	(1. 2)	4	(2. 1)	7
Glacial Sand and Gravel	(a) Sandy gravel. Very clayey between 10 ft (3. 0 m) and 13 ft (4. 0 m) Gravel: fine to coarse subangular to subrounded flints with subrounded quartzite and chalk. Sand: medium and coarse subangular to subrounded quartz with some chalk. Grey and yellow.	(9. 1)	30	(11. 3)	37
	(b) Sand Sand: medium with fine and coarse subangular to subrounded quartz. Yellow/brown becoming red/brown.	(11. 9)	39	(23. 2)	76
London Clay	Brown clay	(0. 9+)	3+	(24. 1)	79

(a)	%	mm		%
Gravel	39	+16	:	13
		-16+4	:	26
Sand	56	-4+1	:	15
		-1+¼	:	36
		-¼+1/16	:	5
Fines	5	-1/16	:	5
(b)				
Gravel	2	+16	:	0
		-16+4	:	2
Sand	97	-4+1	:	14
		-1+¼	:	67
		-¼+1/16	:	16
Fines	1	-1/16	:	1

Percentages

Depth below surface (ft)	Fines -1/16	+1/16-¼	Sand +¼-1	+1-4	Gravel +4-16	+16
7-10	2	14	69	8	5	2
10-13	32	7	41	3	10	7
13-16	0	2	25	11	43	19
16-19	7	7	63	7	13	3
19-22	0	1	17	26	37	19
22-25	1	0	2	15	45	37
25-28	1	2	25	16	33	23
28-31	No sample					
31-34	1	4	48	23	16	8
34-37	1	5	37	22	35	0
37-40	0	4	68	21	7	0
40-43	0	2	62	36	0	0
43-46	3	52	43	2	0	0
46-49	2	6	72	20	0	0
49-52	1	6	79	12	2	0
52-55	2	16	72	10	0	0
55-58	2	33	63	2	0	0
58-61	1	2	77	18	2	0
61-64	0	16	56	25	2	1
64-67	2	23	69	6	0	0
67-70	1	17	76	6	0	0
70-73	0	10	66	21	3	0
73-76	2	18	67	8	3	2

TL 72 NW 3 7053 2755 Near Littles Farm, Shalford Block A

Surface level (+75.3 m)+ 247 ft
Water struck at +68.3 m (+224 ft)
Shell and auger 6 in diameter
November 1972

Overburden 0.3 m (1.0 ft)
Mineral 11.5 m (37.5 ft)
Bedrock 1.2 m+ (4.0 ft+)

		Thickness m	Thickness (ft)	Depth m	Depth (ft)
Soil		0.3	(1.0)	0.3	(1.0)
Glacial Sand and Gravel	'Clayey' sand Sand: medium with some fine and coarse subangular to subrounded quartz yellow and orange. Silty, clayey in parts	11.5	(37.5)	11.8	(38.5)
London Clay	Stiff dark grey silty clay	1.2+	(4.0+)	13.0	(42.5)

	%	mm		%
Gravel	2	+16	:	1
		-16+4	:	1
Sand	80	-4+1	:	4
		-1+$\frac{1}{4}$	:	67
		-$\frac{1}{4}$+1/16	:	9
Fines	18	-1/16	:	18

Percentages

Depth below surface (m)	Fines -1/16	Sand +1/16-$\frac{1}{4}$	Sand +$\frac{1}{4}$-1	Gravel +1-4	Gravel +4-16	Gravel +16
0.3- 1.3	15	2	71	5	4	3
1.3- 2.3	18	29	48	1	0	4
2.3- 3.3	23	8	68	1	0	0
3.3- 4.3	17	8	74	1	0	0
4.3- 5.3	22	15	60	2	1	0
5.3- 6.3	20	11	66	3	0	0
6.3- 7.3	14	6	74	5	1	0
7.3- 8.3	11	6	77	5	1	0
8.3- 9.3	15	4	75	6	0	0
9.3-10.3	21	12	63	3	1	0
10.3-11.3	15	6	64	13	2	0
11.3-11.8	26	4	55	13	2	0

TL 72 NW 4 7037 2636 Near Lower Hyde Houses, Great Saling Block A

Surface level (+79.9 m) +262 ft
Water struck at +74.5 m (+244 ft)
Shell and auger 6 in diameter
November 1972

Overburden 1.4 m (4.5 ft)
Mineral 8.5 m (28.0 ft)
Bedrock 1.1 m+ (3.5 ft+)

		Thickness m	Thickness (ft)	Depth m	Depth (ft)
Soil		0.2	(0.5)	0.2	(0.5)
? Chalky Boulder Clay	Soft brown silty clay with with flints	1.2	(4.0)	1.4	(4.5)
Glacial Sand and Gravel	(a) 'Clayey' sandy gravel Gravel: fine to coarse subrounded flints and quartzite Sand: medium with some fine and coarse subrounded to subangular quartz. Yellow	4.0	(13.0)	5.4	(18.0)
	(b) 'Very clayey' sand Sand: medium and fine subrounded quartz. Orange/brown, silty at top	4.5	(15.0)	9.9	(32.5)
London Clay	Firm dark grey silty clay	1.1+	(3.5+)	11.0	(36.0)

(a)	%	mm		%
Gravel	28	+16	:	11
		-16+4	:	17
Sand	56	-4+1	:	8
		-1+¼	:	44
		-¼+1/16	:	4
Fines	16	-1/16	:	16
(b)				
Gravel	0	+16	:	0
		-16+4	:	0
Sand	66	-4+1	:	2
		-1+¼	:	50
		-¼+1/16	:	14
Fines	34	-1/16	:	34

Percentages

Depth below surface (m)	Fines -1/16	Sand +1/16-¼	Sand +¼-1	Gravel +1-4	Gravel +4-16	Gravel +16
1.4 - 2.4	17	5	62	5	6	5
2.4 - 3.4	17	2	29	8	24	20
3.4 - 4.4	16	2	27	10	27	18
4.4 - 5.4	14	5	60	8	11	2
5.4 - 6.4	No sample					
6.4 - 7.4	42	21	35	2	0	0
7.4 - 8.4	52	12	35	1	0	0
8.4 - 9.4	12	17	68	2	1	0
9.4 - 9.9	29	7	62	2	0	0

TL 72 NW 5 7084 2576 Piccott's Farm, Great Saling

Surface level (+82.6 m) + 271 ft
Water not struck
Wirth B0 8 in diameter
June 1969

Waste (18.3 m+) 60 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown silty clay becoming firm brown then grey clay with pebbles of flint. quartzite and chalk.	(17.1+)	56+	(18.3)	60

TL 72 NW 6 7138 2929 Near Redfern's Farm, Shalford Block A

Surface level (+76.3 m) +252
Water struck at (+64.3 m) +211 ft
Wirth B0 8 in diameter
May 1969

Overburden (1.5 m) 5 ft
Mineral (11.9 m) 39 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Glacial Sand and Gravel	Very clayey gravel	(0.3)	1	(1.5)	5
	Sand Sand: medium with fine and coarse. Yellow/ brown becoming red and grey/brown. Some flint gravel near base	(11.9)	39	(13.4)	44
London Clay	Firm brown clay	(0.9+)	3+	(14.3)	47

	%	mm	%
Gravel	4	+16	1
		-16+4	3
		-4+1	20
Sand	94	-1+$\frac{1}{4}$	59
		-$\frac{1}{4}$+1/16	15
Fines	2	-1/16	2

Percentages

Depth below surface (ft)	Fines -1/16	+1/16-$\frac{1}{4}$	Sand +$\frac{1}{4}$-1	+1-4	Gravel +4-16	+16
5 - 8	0	0	70	28	0	0
8 - 11	0	6	41	50	2	1
11 - 14	0	16	75	2	5	2
14 - 17	3	22	72	3	0	0
17 - 20	0	7	54	36	2	1
20 - 23	0	6	58	29	7	0
23 - 26	0	1	71	28	0	0
26 - 29	0	38	43	16	3	0
29 - 32	2	43	49	6	0	0
32 - 35	0	27	57	13	3	0
35 - 38	12	15	62	5	3	3
38 - 41	0	4	42	30	19	5
41 - 44	3	19	65	13	0	0

TL 72 NW 7 7137 2822 Northwest of Hubbard's Farm, Shalford Block A

Surface level (+80. 5 m) +264 ft
Water struck at (+71. 0 m) +233 ft
Wirth B0 8 in diameter
June 1969

Overburden (4. 9 m) 16 ft
Mineral (9. 1 m) 30 ft
Bedrock (0. 9 m +) 3 ft +

		Thickness (m)	ft	Depth (m)	ft
Soil		(0. 9)	3	(0. 9)	3
Chalky Boulder Clay	Brown clay with traces of flint and chalk	(4. 0)	13	(4. 9)	16
Glacial Sand and Gravel	Sand Sand: fine and medium with a little coarse. Grey-brown to yellow-brown in colour	(9. 1)	30	(14. 0)	46
London Clay	Firm brown clay	(0. 9+)	3+	(14. 9)	49

	%	mm		%
Gravel	1	+16	:	1
		-16+4	:	0
Sand	98	-4+1	:	4
		-1+$\frac{1}{4}$	:	49
		-$\frac{1}{4}$+1/16	:	45
Fines	1	-1/16	:	1

Percentages

Depth below surface (ft)	Fines	Sand			Gravel	
	-1/16	+1/16-$\frac{1}{4}$	+$\frac{1}{4}$-1	+1-4	+4-16	+16
16 - 19	0	14	85	1	0	0
19 - 22	1	43	56	0	0	0
22 - 25	0	59	37	4	0	0
25 - 28	0	14	70	9	7	0
28 - 31	2	67	29	2	0	0
31 - 34	2	54	31	13	0	0
34 - 37	2	65	32	1	0	0
37 - 40	1	53	43	3	0	0
40 - 43	0	42	53	5	0	0
43 - 46	3	42	48	0	1	6

TL 72 NW 8 7138 2753 Dine's Farm, Shalford Block A

Surface level (+82.3 m) +270 ft
Water struck at (+74.4 m)+244 ft
Wirth B0 8 in diameter
April 1969

Overburden (4.0 m) 13 ft
Mineral (4.8 m) 16 ft
Bedrock (0.9 m +) 3 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
Soil			(1.2)	4	(1.2)	4
Chalky Boulder Clay		Brown clay with flint and chalk pebbles becoming grey silty clay with flint and chalk pebbles	(2.7)	9	(4.0)	13
Glacial Sand and Gravel	(a)	Sandy Gravel Gravel: fine to coarse subangular to subrounded flint and quartzite with some chalk Sand: medium and coarse with fine. Buff to grey/brown.	(2.1)	7	(6.1)	20
	(b)	Sand Sand: medium sand red or yellow/brown, pebbles of flint near base	(2.7)	9	(8.8)	29
London Clay		Firm brown clay	(0.9+)	3+	(9.8)	32

	%	mm		%
Gravel	36	+16	:	12
		-16+4	:	24
Sand	63	-4+1	:	21
		-1+¼	:	39
		-¼+1/16	:	3
Fines	1	-1/16	:	1
Gravel	5	+16	:	3
		-16+4	:	2
Sand	94	-4+1	:	1
		-1+¼	:	92
		-¼+1/16	:	1
Fines	1	-1/16	:	1

Percentages

Depth below surface (ft)	Fines -1/16	Sand +1/16-¼	Sand +¼-1	Gravel +1-4	Gravel +4-16	Gravel +16
13 - 14	1	1	28	34	26	10
14 - 17	2	5	50	13	19	11
17 - 20	1	3	39	15	26	16
20 - 23	0	23	75	2	0	0
23 - 26	1	7	88	2	2	0
26 - 29	2	18	67	1	3	9

TL 72 NW 9 7130 2680 Near The Mount, Shalford Green Block A

Surface level (+77.7 m) +255 ft
Water struck at (+71.9 m) + 236 ft
Wirth B0 8 in diameter
June 1969

Overburden (4.9 m) 16 ft
Mineral (4.3 m) 14 ft
Bedrock (0.9 m +) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
Soil		(1.2)	4	(1.2)	4
Glacial Sand and Gravel	Very clayey red-brown sand and gravel	(3.7)	12	(4.9)	16
	Sandy gravel Gravel: fine to coarse subangular to subrounded flints Sand: medium with coarse and some fine. Red-brown/brown, clayey near base	(4.3)	14	(9.1)	30
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(10.1)	33

	%	mm	:	%
Gravel	25	+16	:	13
		-16+4	:	12
Sand	72	-4+1	:	19
		-1+1/4	:	46
		-1/4+1/16	:	7
Fines	3	-1/16	:	3

Depth below surface (ft)	Percentages Fines	Sand	Gravel
16 - 19	2	57	41
19 - 22	1	86	13
22 - 25	0	86	14
25 - 28	8	65	27
28 - 30	8	61	31

TL 72 NW 10 7146 2515 Mount's Farm Great Saling

Surface level (+72.5 m) +238 ft
Water struck (+67.1 m) +220 ft
Wirth B0 8 in diameter
June 1969

Waste (13.7 m) 45 ft
Bedrock (0.9 m+) 3 ft +

		Thickness (m)	ft	Depth (m)	ft
Made Ground		(1.5)	5	(1.5)	5
Chalky Boulder Clay	Brown clay becoming grey silty clay both with flint and chalk pebbles	(12.2)	40	(13.7)	45
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(14.6)	48

TL 72 NW 11 7277 2957 Valley Farm, Wethersfield Block A

Surface level (+c. 67.1 m) +c. 220 ft
Water struck +c. 62.4 m (+c. 204.5 ft)
Shell and auger 6 in diameter
November 1972

Waste 4.7 m (15.5 ft)
Bedrock 1.3 m+ (4.5 ft+)

		Thickness m	(ft)	Depth m	(ft)
Soil		0.2	(0.5)	0.2	(0.5)
? Chalky Boulder Clay	Fawn clayey silt with pebbles of flint and quartzite	0.3	(1.0)	0.5	(1.5)
Glacial Sand and Gravel	Fine to medium orange sand	0.5	(1.5)	1.0	(3.5)
London Clay (reworked)	Firm brown and grey silty clay with mauve tint and iron staining	3.7	(12.0)	4.7	(15.5)
London Clay	Firm bluish-grey silty clay	1.3+	(4.5+)	6.0	(19.5)

TL 72 NW 12 7278 2832 Nichol's Farm, Shalford Block A

Surface level (+c. 65.5 m) +c. 215 ft
Water struck at (+c. 59.4 m) +c. 195 ft
Wirth B1 8 in diameter
May 1970

Waste (13.7 m) 45 ft
Bedrock (0.6 m+) 2 ft+

		Thickness (m)	ft	Depth (m)	ft
Made Ground		(0.3)	1	(0.3)	1
Chalky Boulder Clay	Firm grey clay with chalk pebbles	(9.8)	32	(10.1)	33
	Gravelly clay containing flint and quartz pebbles	(0.3)	1	(10.4)	34
	Firm brown clay with seams of sand and of gravel, especially near base	(3.4)	11	(13.7)	45
London Clay	Firm grey clay	(0.6+)	2+	(14.3)	47

TL 72 NW 13 7220 2794 Church End, Shalford

Surface level (+78.3 m) +257 ft
Water not struck
Wirth B0 8 in diameter
June 1969

Waste (18.3 m+) 60 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
Chalky Boulder Clay	Brown clay with pebbles of chalk quartzite and flint, becoming grey silty clay with pebbles.	(17.4+)	57+	(18.3)	60

TL 72 NW 14 7244 2717 Killhogs Farm, Shalford

Surface level (+c. 80.8 m) +c. 265 ft
Water struck at (+c. 70.7 m) +c. 232 ft
Wirth B0 8 in diameter
April 1969

Waste (11.9 m) 39 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
Chalky Boulder Clay	Firm brown clay becoming firm brown/grey partially silty clay with pebbles of chalk, flint and occasional quartzite	(8.2)	27	(9.1)	30
Glacial Sand and Gravel	Sand: medium with some coarse and fine. Buff becoming reddish towards base.	(2.7)	9	(11.9)	39
London Clay	Firm brown clay becoming bluish-grey clay	(0.9+)	3+	(12.8)	42

	%	mm		%
Gravel	1	+16	:	0
		-16+4	:	1
Sand	98	-4+1	:	15
		-1+$\frac{1}{4}$	:	72
		-$\frac{1}{4}$+1/16	:	11
Fines	1	-1/16	:	1

Percentages

Depth below surface (ft)	Fines	Sand			Gravel	
	-1/16	+1/16-$\frac{1}{4}$	+$\frac{1}{4}$-1	+1-4	+4-16	+16
30 - 33	0	5	72	21	2	0
33 - 36	0	12	66	22	0	0
36 - 39	2	17	77	4	0	0

TL 72 NW 15 7208 2634 Lowlands Farm, Shalford Block A

Surface level (+c. 77.1 m) +c. 253 ft
Water level not recorded
Wirth B1 8 in diameter
April 1969

Overburden	(3.4 m)	11 ft
Mineral	(6.1 m)	20 ft
Waste	(2.4 m)	8 ft
Bedrock	(0.3m+)	1 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.6)	2	(0.6)	2
Chalky Boulder Clay	Brown clay with pebbles of flint and chalk	(2.7)	9	(3.4)	11
Glacial Sand and Gravel	Pebbly sand Gravel: fine to coarse subangular to subrounded flint and quartzite and subrounded chalk Sand: medium with fine and coarse Light brown clayey in parts	(6.1)	20	(9.4)	31
Chalky Boulder Clay	Firm brown/grey clay with chalk pebbles. Gravel band from 35 ft (10.7 m) to 36.5 ft (11.1 m) depth	(2.4)	8	(11.9)	39
London Clay	Firm brown clay	(0.3+)	1+	(12.2)	40

	%	mm		%
Gravel	15	+16	:	6
		-16+4	:	9
Sand	78	-4+1	:	12
		$-1+\frac{1}{4}$	:	54
		$-\frac{1}{4}+1/16$	:	12
Fines	7	-1/16	:	7

Percentages

Depth below surface (ft)	Fines	Sand	Gravel
11 - 14	11	79	10
14 - 17	13	61	26
17 - 20	4	84	12
20 - 23	10	77	13
23 - 26	5	84	11
26 - 29	2	86	12
29 - 31	6	71	23

TL 72 NW 16 7252 2567 Goldhall Farm, Panfield

Surface level (+77.1m) +253 ft
Water struck at (+68.3 m) +224 ft
Wirth B0 8 in diameter
April 1969

Waste (18.3 m+) 60 ft +

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
Chalky Boulder Clay	Firm brown clay becoming brown then grey silty clay with pebbles of flint, chalk and occasional quartzite	(17.4+)	57+	(18.3)	60

TL 72 NW 17 7365 2948 Woolmer's Farm Wethersfield Block B

Surface level (+79.6 m) + 261 ft
Water struck at (+63.5 m) +280 ft
Wirth B0 8 in diameter
May 1969

Overburden (0.6 m) 2 ft
Mineral (20.7 m) 68 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a) 'Clayey' pebbly sand Gravel: fine to coarse subangular to subrounded flint and quartzite Sand: medium with some fine and coarse. Yellow/brown	(7.3)	24	(7.9)	26
	(b) Sand Sand: medium and fine with a little coarse, red-brown, gravelly at base	(13.4)	44	(21.3)	70
London Clay	Firm brown clay	(0.9+)	3+	(22.2)	73

	%	mm		%
(a)				
Gravel	11	+16	:	4
		-16+4	:	7
Sand	73	-4+1	:	9
		-1+¼	:	51
		-¼+1/16	:	13
Fines	16	-1/16	:	16
(b)				
Gravel	2	+16	:	0
		-16+4	:	2
Sand	97	-4+1	:	6
		-1+¼	:	52
		-¼+1/16	:	39
Fines	1	-1/16	:	1

Percentages

Depth below surface (ft)	Fines -1/16	Sand +1/16-¼	Sand +¼-1	Sand + 1-4	Gravel +4-16	Gravel +16
2 - 5	32	2	22	13	20	11
5 - 8	0	11	76	13	0	0
8 - 11	39	22	34	5	0	0
11 - 14	24	27	27	5	10	7
14 - 17	28	9	49	2	10	2
17 - 20	0	4	71	18	4	3
20 - 23	1	14	66	13	4	2
23 - 26	0	16	64	3	7	10
26 - 29	2	22	73	3	0	0
29 - 32	1	2	85	12	0	0
32 - 35	1	68	29	2	0	0
35 - 38	0	55	40	5	0	0
38 - 41	2	67	29	2	0	0
41 - 44	2	67	29	2	0	0
44 - 47	0	65	34	1	0	0
47 - 50	0	31	66	3	0	0
50 - 53	2	32	63	3	0	0
53 - 56	0	32	65	3	0	0
56 - 59	0	48	47	5	0	0
59 - 62	2	34	55	6	3	0
62 - 65	No sample					
65 - 68	0	8	43	25	22	2
68 - 70	2	20	61	9	5	3

TL 72 NW 19 7334 2765 Opposite Abbott's Hall Shalford Block A

Surface level (+61.3 m) +201 ft
Water not struck
Wirth B0 8 in diameter
May 1969

Overburden (3.7 m) 12 ft
Mineral (9.8 m) 32 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
? Chalky Boulder Clay	Very gravelly clay	(2.7)	9	(3.7)	12
Glacial Sand and Gravel (a)	Sandy gravel Gravel: fine to coarse subangular to subrounded flint with some quartzite and vein quartz Sand: medium and coarse Pale brown to brown, clayey at top	(3.7)	12	(7.3)	24
(b)	Pebbly sand. Gravelly at base. Gravel: fine to coarse flint and quartzite Sand: fine medium and coarse yellow brown becoming brown to grey brown	(6.1)	20	(13.4)	44
London Clay	Firm brown clay	(0.9+)	3+	(14.3)	47

	%	mm		%	Depth below surface (ft)	Percentages: Fines -1/16	Sand +1/16-¼	Sand +¼-1	Sand +1-4	Gravel +4-16	Gravel +16
(a)											
Gravel	30	+16	:	10	12 - 15	18	8	47	6	14	7
		-16+4	:	20	15 - 18	2	3	37	34	15	9
					18 - 21	0	0	19	37	36	8
Sand	65	-4+1	:	33	21 - 24	0	0	15	55	14	16
		-1+¼	:	29							
		-¼+1/16	:	3							
Fines	5	-1/16	:	5							
(b)											
Gravel	10	+16	:	2	24 - 27	3	64	29	4	0	0
		-16+4	:	8	27 - 30	0	18	48	32	1	1
					30 - 33	4	84	10	2	0	0
Sand	89	-4+1	:	25	33 - 36	0	17	49	32	1	1
		-1+¼	:	33	36 - 39	2	27	43	22	4	2
		-¼+1/16	:	31	39 - 42	0	3	25	40	29	3
					42 - 44	0	4	25	41	23	7
Fines	1	-1/16	:	1							

TL 72 NW 20 7321 2654 Sheering Hall Shalford

Surface level (+c. 64.0 m) +c. 210 ft
Water struck at (+c. 53.3 m) +c. 175 ft
Wirth B0 8 in diameter
April 1969

Waste (18.3 m+) 60 ft +

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
? Chalky Boulder Clay	Firm brown clay	(1.5)	5	(2.4)	8
? Glacial Sand and Gravel	Clayey gravel	(3.0)	10	(5.5)	18
Chalky Boulder Clay	Firm grey silty clay with pebbles of flint and chalk	(12.8+)	42+	(18.3)	60

TL 72 NW 21 7362 2571 Great Priory Farm, Panfield

Surface level (+c. 71.6 m) +c. 235 ft
Water struck at (+c. 64.0 m) +c. 210 ft
Wirth B0 8 in diameter
May 1969

Waste (9. 8 m) 32 ft
Bedrock (0. 9 m+) 3 ft +

		Thickness (m)	ft	Depth (m)	ft
Soil		(0. 9)	3	(0. 9)	3
Chalky Boulder Clay	Brown. becoming firm grey silty clay with flint and chalk pebbles	(6. 7)	22	(7. 6)	25
Glacial Sand and Gravel	Very clayey gravel	(1. 2)	4	(8. 8)	29
	'Clayey' sandy gravel	(0. 9)	3	(9. 8)	32
	Gravel: fine to coarse subangular to subrounded flint and quartzite some subrounded chalk Sand: mainly medium some fine and coarse, pale brown. Clayey				
London Clay	Firm brown clay	(0. 9 +)	3+	(10. 7)	35

	%	mm		%
Gravel	21	+16	:	12
		-16+4	:	9
Sand	60	-4+1	:	4
		-1+¼	:	46
		-¼+1/16	:	10
Fines	19	-1/16	:	19

Percentages

Depth below surface (ft)	Fines	Sand	Gravel
29 - 32	19	60	21

TL 72 NW 22 7444 2982 North of Beazley End, Wethersfield Block B

Surface level (+77.4 m) +254 ft
Water struck at (+67. 4 m) +221 ft
Wirth B0 8 in diameter
May 1969

Overburden (7. 3 m) 24 ft
Mineral (2. 7 m) 9 ft
Bedrock (0. 9 m+) 3 ft +

		Thickness (m)	ft	Depth (m)	ft
Soil		(1. 2)	4	(1. 2)	4
Chalky Boulder Clay	Brown, then grey silty clay with pebbles of flint and chalk	(6. 1)	20	(7. 3)	24
Glacial Sand and Gravel	Gravel Gravel: fine to coarse subangular to subrounded flints occasional angular to subangular cobbles Sand: medium and coarse Brown	(2. 7)	9	(10. 1)	33
London Clay	Firm brown clay	(0. 9+)	3+	(11. 0)	36

	%	mm		%
Gravel	62	+16	:	28
		-16+4	:	34
Sand	38	-4+1	:	19
		-1+1/4	:	16
		-$\frac{1}{4}$+1/16	:	3
Fines	0	-1/16	:	0

Depth below surface (ft)	Percentages Fines	Sand	Gravel
24 - 27	0	44	56
27 - 30	0	44	56
30 - 33	0	26	74

TL 72 NW 23 7460 2837 Little Codham Hall Farm, Wethersfield Block B

Surface level (+81.7 m) +268 ft
Water level not recorded
Wirth B0 8 in diameter
April 1969

Overburden (6.4 m) 21 ft
Mineral (11.0 m) 36 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown clay becoming brown silty clay with pebbles of flint and chalk	(5.2)	17	(6.4)	21
Glacial Sand and Gravel	'Clayey' sandy gravel; fine sand from 48 ft to 54 ft (14.6 m to 16.5 m) depth Gravel: fine subangular and course subrounded flints, with quartzite and occasional chalk Sand: medium with coarse and fine; red brown; clayey	(11.0)	36	(17.4)	57
London Clay	Firm brown clay	(0.9+)	3+	(18.3)	60

	%	mm		%
Gravel	34	+16	:	15
		-16+4	:	19
Sand	55	-4+1	:	13
		-1+$\frac{1}{4}$	:	36
		-$\frac{1}{4}$+1/16	:	6
Fines	11	-1/16	:	11

Percentages

Depth below surface (ft)	Fines	Sand	Gravel
21 - 24	0	42	58
24 - 27	17	45	38
27 - 30	2	48	50
30 - 33	13	42	45
33 - 36	8	44	48
36 - 39	22	30	48
39 - 42	3	45	52
42 - 45	17	40	43
45 - 48	11	58	31
48 - 51	0	100	0
51 - 54	1	93	6
54 - 57	10	67	23

TL 72 NW 24 7460 2763 North of Bovingdon Hall, Bocking Block B

Surface level (+71.6 m) +235 ft
Water struck at (+64.3 m) +211 ft
Wirth B0 8 in diameter
May 1969

Overburden (2.7 m) 9 ft
Mineral (12.8 m) 42 ft
Bedrock (0.9 m +) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
Glacial Sand and Gravel	Very clayey gravel; gravelly at base and between 33 ft (10.2 m) and 36 ft (11.0 m) Gravel: fine to coarse subangular to subrounded flints and quartzite Sand: medium and coarse with some fine: red/brown; clayey at base	(1.8) (12.8)	6 42	(2.7) (15.5)	9 51
London clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(16.5)	54

	%	mm		%
Gravel	6	+16	:	2
		-16+4	:	4
		-4+1	:	23
Sand	92	-1+$\frac{1}{4}$	:	59
		-$\frac{1}{4}$+1/16	:	10
Fines	2	-1/16	:	2

Percentages

Depth below surface (ft)	Fines	Sand			Gravel	
	-1/16	+1/16-$\frac{1}{4}$	+$\frac{1}{4}$-1	+1-4	+4-16	+16
9 - 12	0	5	42	49	2	2
12 - 15	0	2	75	23	0	0
15 - 18	0	4	62	33	1	0
18 - 21	0	6	50	42	2	0
21 - 24	0	16	81	2	1	0
24 - 27	0	6	66	27	1	0
27 - 30	1	22	72	5	0	0
30 - 33	1	23	72	4	0	0
33 - 36	0	0	15	51	24	10
36 - 39	1	1	82	16	0	0
39 - 42	2	20	62	16	0	0
42 - 45	0	2	73	25	0	0
45 - 48	3	16	49	14	13	5
48 - 51	22	8	34	10	10	16

TL 72 NW 25 7485 2665 South East of Bovingdon Hall, Bocking

Surface level (+68.6 m) +225 ft
Water struck at (+57.9 m) +190 ft
Wirth B0 8 in diameter
May 1969

Waste (11.9 m) 39 ft
Bedrock (0.9 m+) 3 ft +

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown, then grey silty clay with flint and chalk pebbles	(8.5)	28	(9.8)	32
Glacial Sand and Gravel	Pebbly sand Gravel: fine to coarse subangular to subrounded flints and quartzite Sand: medium, fine and coarse; brown to grey-brown	(2.1)	7	(11.9)	39
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(12.8)	42

	%	mm		%
Gravel	9	+16	:	3
		-16+4	:	6
Sand	89	-4+1	:	16
		-1+¼	:	45
		-¼+1/16	:	28
Fines	2	-1/16	:	2

Percentages

Depth below surface (ft)	Fines -1/16	+1/16-¼	Sand +¼-1	-1+4	Gravel +4-16	-16
32 - 35	1	19	47	26	4	3
35 - 38	0	38	42	9	9	2
38 - 39	12	26	46	9	4	3

TL 72 NW 26 7461 2564 Near Little Priory Farm, Panfield

Surface level (+57.6 m) +189 ft
Water struck at (+50.0 m) +164 ft
Wirth B0 8 in diameter
May 1969

Waste (8.2 m) 27 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
? Chalky Boulder Clay	Brown silty clay becoming stiff brown clay with flints	(7.0)	23	(8.2)	27
London Clay	Firm brown clay	(0.9+)	3+	(9.1)	30

TL 72 NW 27 7448 2732 Near Bovingdon Hall, Bocking Block B

Surface level (+69.2 m) +227 ft
Water struck at +60.1 m (+ 197 ft)
Shell and auger 6 in diameter
November 1972

Overburden 0.1 m (0.5 ft)
Mineral 11.3 m (37.0 ft)
Bedrock 1.5 m+ (5.0 ft +)

		Thickness m	(ft)	Depth m	(ft)
Soil		0.1	(0.5)	0.1	(0.5)
Glacial Sand and Gravel	'Very clayey' pebbly sand Gravel: fine to coarse subangular flint some subrounded quartzite Sand: medium with some fine and coarse subangular to subrounded quartz, micaceous in parts. Orange/brown, silty and clayey in parts	11.3	(37.0)	11.4	(37.5)
London Clay	Firm orange/brown clay becoming stiff grey clay	1.5+	(5.0+)	12.9	(42.5)

	%	mm		%
Gravel	6	+16	:	2
		-16+4	:	4
Sand	64	-4+1	:	6
		-1+¼	:	50
		-¼+1/16	:	8
Fines	30	-1/16	:	30

Percentages

Depth below surface (m)	Fines -1/16	+1/16-¼	Sand +¼-1	+1-4	Gravel +4-16	+16
0.1 - 1.1	19	13	48	7	7	6
1.1 - 2.1	18	6	70	3	2	1
2.1 - 3.1	27	4	64	4	1	0
3.1 - 4.1	19	3	38	10	15	15
4.1 - 5.1	46	7	45	2	0	0
5.1 - 6.1	18	9	68	4	1	0
6.1 - 7.1	30	16	43	9	2	0
7.1 - 8.1	43	5	36	10	6	0
8.1 - 9.1	51	6	31	7	5	0
9.1 - 10.1	21	12	57	9	1	0
10.1 - 11.1	40	8	45	6	1	0
11.1 -11.4	9	13	64	11	2	1

TL 72 NE 1 7539 2936 Beechley Farm, Gosfield Block B

Surface level (+80.8 m) +265 ft
Water struck at (+68.9 m) +226 ft
Wirth B0 8 in diameter
April 1969

Overburden (6.1 m) 20 ft
Mineral (9.4 m) 31 ft
Bedrock (0.9 m+) 3 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
Soil			(0.9)	3	(0.9)	3
Chalky Boulder Clay		Brown silty clay becoming firm brown clay with pebbles of flint and chalk	(5.2)	17	(6.1)	20
Glacial Sand and Gravel	(a)	Sandy gravel Gravel: fine to coarse subangular to subrounded flints and quartzite with traces of chalk. Sand: medium with some coarse and fine. Brown to to pale grey.	(4.0)	13	(10.1)	33
	(b)	Sand (gravelley at top) Sand: fine to medium. Buff and red/brown.	(5.4)	18	(15.5)	51
London Clay		Firm brown clay	(0.9+)	3+	(16.5)	54

(a)	%	mm		%
		+16	:	14
Gravel	43	-16+4	:	29
		-4+1	:	11
Sand	56	-1+¼	:	41
		-¼+1/16	:	4
Fines	1	-1/16	:	1
(b)				
Gravel	7	+16	:	1
		-16+4	:	6
		-4+1	:	16
Sand	93	-1+¼	:	58
		-¼+1/16	:	19
Fines	0	-1/16	:	0

Percentages

Depth below surface (ft)	Fines -1/16	+1/16-¼	Sand +¼-1	Sand +1-4	Gravel +4-16	Gravel +16
20 - 21	0	1	26	21	37	15
21 - 24	1	4	65	6	16	8
24 - 27	1	5	64	7	16	7
27 - 30	1	2	27	7	44	19
30 - 33	2	6	25	12	35	20
33 - 36	0	26	37	14	19	4
36 - 39	0	34	49	11	5	1
39 - 42	0	27	40	30	3	0
42 - 45	0	5	92	2	1	0
45 - 48	No sample					
48 - 51	0	2	73	25	0	0

TL 72 NE 2 7578 2851 Hogg's Farm. Gosfield

Surface level (+86. 0 m) +282 ft
Water struck at (+75. 3 m) +247 ft
Wirth B0 8 in diameter
May 1969

Waste (18. 3 m+) 60 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0. 9)	3	(0. 9)	3
? Chalky Boulder Clay	Brown silty clay with flints passing down into firm grey, then brown, flinty clay	(17. 4+)	57+	(18. 3)	60

TL 72 NE 3 7557 2783 Beckwith's Farm, Bocking

Surface level (+78. 3 m) +257 ft
Water struck at (+70. 1 m) +230 ft
Wirth B0 8 in diameter
May 1969

Waste (18. 3m+) 60 ft+

		Thickness (m)	ft	Depth (m)	ft
Made Ground		(0. 9)	3	(0. 9)	3
Soil		(0. 9)	3	(1. 8)	6
Chalky Boulder Clay	Brown silty clay becoming grey silty clay with pebbles of flint and chalk	(16. 5+)	54+	(18. 3)	60

TL 72 NE 4 7638 2951 Parkhall Farm, Gosfield Block B

Surface level (+ 69. 8 m) +229 ft
Water struck at +64. 6 m (+212 ft)
Shell and auger 6 in diameter
November 1972

Overburden 1. 7 m (5. 5 ft)
Mineral 11. 1 m (36.5 ft)
Bedrock 1. 2 m + (4. 0 ft+)

			Thickness m	(ft)	Depth m	(ft)
Soil			0. 2	(0. 5)	0. 2	(0. 5)
Chalky Boulder Clay		Mottled grey/brown silty clay with flints becoming firm brown clay with flints and quartzite	1.5	(5.0)	1.7	(5.5)
Glacial Sand and Gravel	(a)	'Very clayey' sandy gravel Gravel: fine to coarse subangular to subrounded flints and quartzite Sand: medium with some fine and coarse quartz, orange brown clay in parts.	3. 0	(10. 0)	4. 7	(15. 5)
	(b)	'Very clayey' sand Sand: medium with fine and some coarse sub-angular to subrounded quartz Orange, silty. Flints and quartzite at base	8. 1	(26. 5)	12. 8	(42. 0)
London Clay		Firm grey clay	1. 2+	(4. 0+)	14. 0	(46. 0)

(a)	%	mm		%
Gravel	22	+16	:	11
		-16	:	11
Sand	53	-4+1	:	8
		-1+$\frac{1}{4}$	:	40
		-$\frac{1}{4}$+1/16	:	5
Fines	25	-1/16	:	25
(b)				
Gravel	2	+16	:	0
		-16+4	:	2
Sand	70	4+1	:	4
		-1+$\frac{1}{4}$	:	51
		$\frac{1}{4}$+1/16	:	15
Fines	28	-1/16	:	28

Percentages

Depth below surface (m)	Fines -1/16	Sand +1/16-$\frac{1}{4}$	Sand +$\frac{1}{4}$-1	Sand +1-4	Gravel +4-16	Gravel +16
1. 7 - 2. 7	37	5	41	8	7	2
2. 7 - 3. 7	19	3	28	9	18	23
3. 7 - 4. 7	18	8	52	7	6	9
4. 7 - 5. 7	27	14	58	1	0	0
5. 7 - 6. 7	43	29	28	0	0	0
6. 7 - 7. 7	38	24	38	0	0	0
7. 7 - 8. 7	20	15	65	0	0	0
8. 7 - 9. 7	32	14	51	3	0	0
9. 7 -10. 7	13	6	70	8	3	0
10. 7 -11. 7	24	12	49	13	2	0
11. 7 -12. 8	27	7	47	10	8	1

TL 72 NE 5 7659 2862 Harmas Farm, Gosfield Block B

Surface level (+79.2 m) +260 ft
Water struck (+68.6 m) +225 ft
Wirth B0 8 in diameter
April 1969

Overburden (8.5 m) 28 ft
Mineral (5.8 m) 19 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown silty clay becoming firm brown and grey clay with pebbles of flint and chalk	(7.3)	24	(8.5)	28
Glacial Sand and Gravel	(a) Sand Sand: medium and coarse. Red/ brown, traces of gravel.	(2.1)	7	(10.7)	35
	(b) Gravel Gravel: fine to coarse subangular flints and subrounded to rounded quartz and quartzite. Some subrounded chalk	(3.7)	12	(14.3)	47
London Clay	Firm brown clay	(0.9+)	3+	(15.2)	50

	%	mm		%	Depth below surface (ft)	Percentages Fines $-\frac{1}{4}$	$+1/16-\frac{1}{4}$	Sand $-\frac{1}{4}+1$	$-1+4$	Gravel $-4+16$	$+16$
(a)											
Gravel	1	+16	:	0	28 - 32	0	1	62	34	3	0
		-16+4	:	1	32 - 35	0	1	77	22	0	0
Sand	99	-4+1	:	28							
		$-1+\frac{1}{4}$	:	70							
		$-\frac{1}{4}+1/16$	:	1							
Fines	0	-1/16	:	0							
(b)											
Gravel	50	+16	:	15	35 - 38	0	0	39	18	28	15
		-16+4	:	35	38 - 41	2	6	49	7	26	10
					41 - 44	0	0	20	8	58	14
Sand	49	-4+1	:	11	44 - 47	0	3	37	11	26	23
		$-1+\frac{1}{4}$	:	36							
		$-\frac{1}{4}+1/16$	:	2							
Fines	1	-1/16	:	1							

TL 72 NE 6 7627 2762 Near Fennes, Bocking

Surface level (+79.2 m) +260 ft
Water struck at (+71.6 m)
Wirth B0 8 in diameter
May 1969

Waste (18.3 m+) 60 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown silty clay becoming grey silty clay with pebbles of flint and chalk	(17.1+)	56+	(18.3)	60

TL 72 NE 7 7606 2667 Home Farm, Bocking

Surface level (+66.8 m) +219 ft
Water struck at (+61.6 m) +202 ft
Wirth B0 8 in diameter
May 1969

Waste (8.5 m) 28 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
Chalky Boulder Clay	Brown silty clay with flints common towards base	(6.4)	21	(7.3)	24
? Glacial Sand and Gravel	Very clayey gravel	(1.2)	4	(8.5)	28
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(9.4)	31

TL 72 NE 8 7627 2535 Dorewood's Hall Bocking Block D

Surface level (+52.1 m) +171ft
Water struck at (+41.5 m) +136 ft
Wirth B0 8 in diameter
April 1969

Waste (14.6 m) 48 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
Chalky Boulder Clay	Brown silty clay becoming increasingly chalky downwards	(7.9)	26	(8.8)	29
? Glacial Lake Deposits	Soft silty clay	(2.4)	8	(11.3)	37
? Glacial Sand and Gravel	Gravel and silty clay	(3.4)	11	(14.6)	48
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(15.5)	51

TL 72 NE 9 7743 2988 Gosfield Hall Park, Gosfield Block B

Surface level (+75.3 m) +247 ft
Water struck at +70.3 (+231 ft)
Shell and auger 6 in diameter
December 1972

Overburden 2.2 m (7.0 ft)
Mineral 5.4 m (18.0 ft)
Bedrock 1.4 m+ (4.5 ft+)

		Thickness m	(ft)	Depth m	(ft)
Soil		0.1	(0.5)	0.1	(0.5)
Chalky Boulder Clay	Firm silty clay with flints becoming soft brown silty clay near base	2.1	(7.0)	2.2	(7.0)
Glacial Sand and Gravel	(a) 'Very clayey' pebbly sand. Gravel: fine to coarse subangular to subrounded flints, some subrounded quartzite. Sand: medium with coarse and fine subangular to subrounded quartz brown, clayey	2.0	(6.5)	4.2	(14.0)
	(b) 'Clayey' sand. Sand: medium with some fine and coarse subangular to subrounded quartz. Orange/brown. Silty	3.4	(11.0)	7.6	(25.0)
London Clay	Firm brown clay becoming firm grey clay	1.4+	(4.5+)	9.0	(29.5)

	%	mm		%
(a)				
Gravel	16	+16	:	6
		-16+4	:	10
Sand	62	-4+1	:	9
		$-1+\frac{1}{4}$	:	49
		$-\frac{1}{4}+1/16$	:	4
Fines	22	-1/16	:	22
(b)				
Gravel	1	+16	:	0
		-16+4	:	1
Sand	84	-4+1	:	4
		$-1+\frac{1}{4}$	:	71
		$-\frac{1}{4}+1/16$	:	9
Fines	15	-1/16	:	15

Percentages

Depth below surface (m)	Fines -1/16	+1/16-$\frac{1}{4}$	Sand +$\frac{1}{4}$-1	+1-4	Gravel +1-16	+16
2.2 - 3.2	20	5	46	13	10	6
3.2 - 4.2	24	2	52	5	10	7
4.2 - 5.2	19	5	74	2	0	0
5.2 - 6.2	16	10	72	2	0	0
6.2 - 7.2	12	10	75	3	0	0
7.2 - 7.6	14	11	62	10	3	0

TL 72 NE 10 7768 2850 Aylewards Farm, Gosfield

Surface level (+74.1 m) +243 ft
Water struck at (+59.7 m) +196 ft
Wirth B0 8 in diameter
March 1969

Waste (14.6 m) 48 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
Chalky Boulder Clay	Brown silty clay becoming brown and grey clay with pebbles of flint and chalk	(13.4)	44	(14.3)	47
? Glacial Sand and Gravel	Very clayey gravel	(0.3)	1	(14.6)	48
London Clay	Firm brown clay	(0.9+)	3+	(15.5)	51

TL 72 NE 12 7742 2658 High Garrett, Bocking Block D

Surface level (+73.5 m) +241 ft
Water struck at (+61.9 m) +203 ft
Wirth B0 8 in diameter
March 1969

Waste (11.6 m) 38 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown clay with pebbles of flint becoming very chalky downwards	(2.4)	8	(3.7)	12
? Glacial Sand and Gravel	Very clayey sand	(0.9)	3	(4.6)	15
Chalky Boulder Clay	Brown silty clay with pebbles of flint and chalk	(6.4)	21	(11.0)	36
? Glacial Sand and Gravel	Clayey gravel	(0.6)	2	(11.6)	38
London Clay	Firm brown clay	(0.9+)	3+	(12.5)	41

TL 72 NE 13 7757 2545 Lyons Hall, Braintree Block D

Surface level (+c. 68. 9 m) +c. 226 ft
Water struck at (+c. 53.0 m) +c. 174 ft
Wirth B0 8 in diameter
April 1969

		Thickness (m)	ft	Depth (m)	ft
Soil		(0. 9)	3	(0. 9)	3
? Chalky Boulder Clay	Brown clay with flints	(2. 1)	7	(3. 0)	10
Glacial Sand and Gravel	Clayey sand and gravel	(2. 7)	9	(5. 8)	19
	Pebbly sand (mainly sand from 25 ft (7. 6 m) to 43 ft (13. 1 m) Gravel: fine to coarse subangular flint with some subrounded quartzite Sand: medium and coarse a little fine. Brown to red/brown	(13. 7)	45	(19. 5)	64
London Clay	Firm brown clay becoming firm grey clay	(0. 9+)	3+	(20. 4)	67

	%	mm		%
Gravel	15	+16	:	4
		-16+4	:	11
Sand	84	-4+1	:	32
		-1+$\frac{1}{4}$	:	45
		-$\frac{1}{4}$+1/16	:	7
Fines	1	-1/16	:	1

Depth below surface (ft)	Percentages Fines	Sand	Gravel
19 - 22	17	41	42
22 - 25	0	88	12
25 - 28	1	99	0
28 - 31	0	91	9
31 - 34	0	98	2
34 - 37	0	98	2
37 - 40	0	93	7
40 - 43	0	90	10
43 - 46	0	64	36
46 - 49	0	89	11
49 - 52	0	90	10
52 - 55	2	86	12
55 - 58	0	65	35
58 - 61	0	93	7
61 - 64	0	69	31

TL 72 NE 14 7862 2973 Near Gosfield Block B

Surface level (+67.7 m) +222 ft
Water struck at (+66.4 m) +218 ft
Wirth B0 8 in diameter
April 1969

Overburden (1.2 m) 4 ft
Mineral (3.7 m) 12 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Glacial Sand and Gravel	Pebbly sand Gravel: fine with a little coarse, subangular to subrounded flint and quartzite Sand: medium and coarse. Red/brown	(3.7)	12	(4.9)	16
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(5.8)	19

	%	mm		%
Gravel	19	+16	:	1
		-16+4	:	18
Sand	80	-4+1	:	36
		-1+$\frac{1}{4}$	:	40
		-$\frac{1}{4}$-1/16	:	4
Fines	1	-1/16	:	1

Depth below surface (ft)	Percentages Fines	Sand	Gravel
4 - 7	0	84	16
7 - 10	0	68	32
10 - 13	2	83	15
13 - 16	0	88	12

TL 72 NE 15 7840 2873 Roman Road, Gosfield Block B

Surface level (+70.7 m) +232 ft
Water struck at +63.1 m (+207 ft)
Shell and auger 6 in diameter
December 1972

Overburden 2.6 m (8.5 ft)
Mineral 9.9 m (32.5 ft)
Bedrock 1.0 m + (3.5 ft+)

		Thickness m	(ft)	Depth m	(ft)
Soil		0.3	(1.0)	0.3	(1.0)
?Chalky Boulder Clay	Mottled orange/brown sandy clay with flints.	2.3	(7.5)	2.6	(8.5)
Glacial Sand and Gravel	'Clayey' sandy gravel (silty between 5.6 m to 7.6 m (18.5 to 25.0 ft) depth. Gravel: fine to coarse subangular to subrounded flint, quartzite and vein quartz. Sand: medium with fine and coarse subangular to subrounded quartz, orange, 'clayey'.	9.9	(32.5)	12.5	(41.0)
London Clay	Firm brown clay	1.0+	(3.5+)	13.5	44.5)

	%	mm		%
Gravel	36	+16	:	16
		-16+4	:	20
Sand	46	-4+1	:	9
		-1+¼	:	31
		-¼+1/16	:	6
Fines	18	-1/16	:	18

Depth below surface (m)	Percentages Fines	Sand	Gravel
2.6 - 3.6	45	49	6
3.6 - 4.6	22	66	12
4.6 - 5.6	19	39	42
5.6 - 7.6	Silty		
7.6 - 8.6	5	30	65
8.6 -. 9.6	2	39	59
9.6 - 10.6	5	46	49
10.6 - 11.6	14	46	40
11.6 - 12.5	34	53	13

TL 72 NE 16 7849 2753 Whiteash Wood, High Garrett

Surface level (+82.3 m) +270 ft
Water struck at (+71.3 m) +234 ft
Wirth B0 8 in diameter
March 1969

Waste (16.5 m+) 54 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
? Chalky Boulder Clay	Red/brown clay with bands of grey silt. Dark brown sandy clay at base.	(4.3)	14	(5.2)	17
Chalky Boulder Clay	Brown clay with flints becoming grey clay with pebbles of flint and chalk.	(11.3+)	37+	(16.5)	54

TL 72 NE 17 7880 2630 Kentish Farm, Stisted

Surface level (+c. 59.4 m) +c. 195 ft
Water level not recorded
Wirth B0 8 in diameter
May 1969

Waste (8.2 m) 27 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
? Chalky Boulder Clay	Brown silty clay with flints	(7.0)	23	(8.2)	27
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(9.1)	30

TL 72 NE 18 7860 2561 Woolmergreen Farm, Stisted Block D

Surface level (+63.1 m) +207 ft
Water struck at (+56.7 m) +186 ft
Wirth B0 8 in diameter
April 1969

Overburden (4.9 m) 16 ft
Mineral (3.4 m) 11 ft
Bedrock (0.9m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
Chalky Boulder Clay	Brown silty clay with pebbles of flint and chalk	(4.0)	13	(4.9)	16
Glacial Sand and Gravel	'Clayey' sandy gravel (fines in 3 ft (0.9m) band from 18 ft (5.5 m) to 21 ft (6.4 m) Gravel: fine to coarse subangular to subrounded flints and quartzite Sand: medium, coarse and fine. Brown, clayey in parts	(3.4)	11	(8.2)	27
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(9.1)	30

	%	mm		%
Gravel	31	+16	:	11
		-16+4	:	20
Sand	58	-4+1	:	19
		-1+$\frac{1}{4}$	:	29
		-$\frac{1}{4}$+1/16	:	10
Fines	11	-1/16	:	11

Depth below surface (ft)	Percentages Fines	Sand	Gravel
16 - 18	0	64	36
18 - 21	39	23	38
21 - 24	0	64	36
24 - 27	0	85	15

TL 72 NE 19 7934 2966 Highwood's Farm, Halsted Block B

Surface level (+71.6 m) +235 ft
Water struck at (+61.6 m) +202 ft
Wirth B0 8 in diameter
April 1969

Waste (10.1 m) 33 ft
Bedrock (0.9m+) 3 ft +

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
Chalky Boulder Clay	Brown silty clay with flint and chalk pebbles in lower part	(8.8)	29	(9.8)	32
? Glacial Sand and Gravel	Very clayey gravel	(0.3)	1	(10.1)	33
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(11.0)	36

TL 72 NE 20 7933 2852 Near Froyz Hall, Halsted Block B

Surface level (+70.1 m) +230 ft
Water struck at +62.8 m (+206 ft)
Shell and auger 6 in diameter
December 1972

Overburden 5.4 m (18 ft)
Mineral 2.4 m (8 ft)
Waste 1.1 m (3.5 ft)
Mineral 3.9 m (13 ft)
Bedrock 1.0m+ (3.5 ft+)

		Thickness m	(ft)	Depth m	(ft)
Soil		0.1	(0.5)	0.1	(0.5)
Made Ground		0.2	(0.5)	0.3	(1.0)
? Chalky Boulder Clay	Mottled grey/brown silty clay becoming firm orange/brown clay with flints and quartzite	3.6	(12.0)	3.9	(13.0)
? Glacial Lake Deposits	Soft, laminated, orange/brown silty clay with fawn bands	1.5	(5.0)	5.4	(18.0)
Glacial Sand and Gravel	(a) 'Very clayey' gravel Gravel: fine to coarse subangular to subrounded flint and quartzite and subrounded chalk Sand: medium and coarse subangular to subrounded quartz and chalk, brown, 'very clayey' (fawn silty clay from 7.8 m to 8.9 m (25.5 ft to 29.0 ft) depth	5.5	(18.0)	10.9	(36.0)
	(b) 'Clayey' sand Gravel: fine to coarse angular subangular and subrounded flint and angular chalk Sand: medium with fine and coarse subrounded quartz with some fine subrounded chalk. Greenish-grey, 'clayey'	1.9	(6.0)	12.8	(42.0)
London Clay	Stiff dark grey silty clay	1.0+	(3.5+)	13.8	(45.5)

	%	mm		%
(a) Gravel	42	+16	:	17
		-16+4	:	25
Sand	37	-4+1	:	12
		-1+¼	:	23
		-¼+1/16	:	2
Fines	21	1/16	:	21

Percentages

Depth below surface (m)	Fines -1/16	Sand +1/16-¼	Sand +¼-1	Sand +1-4	Gravel +4-16	Gravel +16
5.4 - 6.4	44	2	31	9	9	5
6.4 - 7.8	9	2	16	14	25	34
7.8 - 8.9	clay band					
8.9 - 9.9	20	2	16	12	38	12
9.9. - 10.9	15	4	29	14	29	9

cont.....

TL 72 NE 20 (cont) 7933 2852 Near Froyz Hall, Halsted Block B

	%	mm	%
(b)			
Gravel	1	+16	0
		-16+4	1
Sand	85	-4+1	14
		-1+$\frac{1}{4}$	58
		-$\frac{1}{4}$+1/16	13
Fines	14	-1/16	14

Percentages

Depth below surface (m)	Fines -1/16	Sand +1/16-$\frac{1}{4}$	Sand +$\frac{1}{4}$-1	Sand +1-4	Gravel +4-16
10.9 - 11.9	17	17	59	6	1
11.9 - 12.8	11	9	56	23	1

TL 72 NE 21 7932 2748 Rayne Hatch Wood, Stisted

Surface level (+82.0 m) +269 ft
Water struck at (+78.0 m) +256 ft
Wirth B0 8 in diameter
March 1969

Waste (16.5 m+) 54 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown silty clay with chalk pebbles	(7.0)	23	(8.2)	27
	Grey silty clay with flint and chalk pebbles and dark brown sandy clay at base	(3.4)	11.0	(11.6)	38
	Brown silty clay very chalky	(2.1)	7	(13.7)	45
	Grey silty clay, with pebbles of flint and chalk	(2.7+)	9+	(16.5)	54

TL 72 NE 22 7961 2652 Church Farm, Stisted

Surface level (+68.9 m) +226 ft
Water struck at (+57.6 m) +189 ft
Wirth B0 9 in diameter
March 1969

Waste (12.2 m) 40 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown silty clay with pebbles of flint and chalk. Clayey gravel seams between 20 ft (6.1 m) and 24 ft (7.3 m) and between 37 ft (11.3 m) and 40 ft (12.2 m)	(11.0)	36	(12.2)	40
London Clay	Firm brown clay	(0.9+)	3+	(13.1)	43

TL 72 NE 23 7946 2562 Near The White House, Stisted Block D

Surface level (+65.2 m) +214 ft
Water struck at (+54.3 m) +178 ft
Wirth B0 8 in diameter
March 1969

Overburden (1.8 m) 6 ft
Mineral (13.7 m) 45 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
? Chalky Boulder Clay	Brown silty clay with flints	(0.9)	3	(1.8)	6
Glacial Sand and Gravel	(a) Gravel Gravel: fine to coarse subangular to subrounded flint and subrounded quartzite Sand: medium and coarse a little fine. Pale grey	(6.4)	21	(8.2)	27
	(b) Pebbly sand (gravelley at base and between 36 ft (11.0 m) and 39 ft (11.9 m) Gravel: fine to coarse subrounded flint and quartz Sand: medium, fine and coarse red/brown to yellow/brown	(7.3)	24	(15.5)	51
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(16.5)	54

	%	mm		%
(a)				
Gravel	56	+16	:	28
		-16+4	:	28
Sand	43	-4+1	:	13
		-1+¼	:	28
		-¼+1/16	:	2
Fines	1	-1/16	:	1
(b)				
Gravel	14	+16	:	2
		-16+4	:	12
Sand	86	-4+1	:	13
		-1+¼	:	50
		-¼+1/16	:	23
Fines	0	-1/16	:	0

Percentages

Depth below surface(ft)	Fines -1/16	Sand +1/16-¼	Sand +¼-1	Sand +1-4	Gravel +4-16	Gravel +16
6 - 9	0	5	27	5	23	40
9 - 12	7	5	14	7	27	40
12 - 15	0	0	15	13	35	37
15 - 18	0	2	39	13	30	16
18 - 21	0	1	34	10	28	27
21 - 24	0	1	34	26	27	12
24 - 27	0	3	31	14	26	26
27 - 30	0	11	70	12	5	2
30 - 33	0	30	45	12	9	4
33 - 36	0	20	74	5	1	0
36 - 39	0	3	40	21	30	6
39 - 42	No sample					
42 - 45	0	28	55	14	3	0
45 - 48	1	47	37	12	3	0
48 - 51	0	24	27	16	32	1

TL 72 NE 24 7605 2527 The Chase, Bocking Block D

Surface level (+43.9 m) +144 ft
Water not struck
Shell and auger 6 in diameter
December 1972

Overburden 1.5 m (5.0 ft)
Mineral 1.0 m (3.5 ft)
Waste 2.7 m (9.0 ft)
Bedrock 1.0 m+ (3.5 ft+)

		Thickness m	Thickness (ft)	Depth m	Depth (ft)
Soil		0.2	(0.5)	0.2	(0.5)
Undifferentiated Terrace Deposits	Fawn silty clay becoming sandy with subrounded to subangular pebbles of flint and quartzite	1.3	(4.5)	1.5	(5.0)
	'Clayey' gravel Gravel: fine to coarse subangular to subrounded flint and quartzite Sand: medium and coarse subangular to subrounded quartz. Dark brown, clayey	1.0	(3.5)	2.5	(8.0)
London Clay (reworked)	Firm brown clay with subangular to angular flints and some fine-med. orange sand. Becoming firm mottled grey/brown clay with iron staining	0.7	(2.5)	3.2	(10.5)
	Soft bluish-grey silty clay with orange/yellow staining	2.0	(6.5)	5.2	(17.0)
London Clay	Firm bluish-grey silty clay	1.0+	(3.5+)	6.2	(20.5)

	%	mm		%
Gravel	55	+16	:	29
		-16+4	:	26
Sand	30	-4+1	:	9
		-1+$\frac{1}{4}$	:	20
		-$\frac{1}{4}$+1/16	:	1
Fines	15	-1/16	:	15

Percentages

Depth below surface (m)	Fines	Sand	Gravel
1.5 - 2.5	15	30	55

TL 72 NE 25 7715 2671 Near Garrett Farm, Bocking Block D

Surface level (+67.4 m) +221 ft
Water struck at (+62.4 m) (+205 ft)
Shell and auger 6 in diameter
December 1972

Overburden 0.5 m (1.5 ft)
Mineral 8.1 m (26.5 ft)
Bedrock 1.3 m+ (4.5 ft+)

		Thickness m	(ft)	Depth m	(ft)
Soil		0.2	(0.5)	0.2	(0.5)
? Chalky Boulder Clay	Light brown sandy clay with pebbles of subrounded quartzite	0.3	(1.0)	0.5	(1.5)
Glacial Sand and Gravel	(a) 'Very clayey' sandy gravel Clay band from 1.7 m (5.5ft) to 2.0 m (6.5 ft) Gravel: fine to coarse subangular to subrounded flint and quartzite Sand: medium with fine and coarse subangular to subrounded quartz yellow and orange. Clayey in parts	6.5	(21.5)	7.0	(23.0)
	(b) 'Very clayey' sand Sand: medium with fine and coarse subangular to subrounded quartz. Orange clayey	1.6	(5.5)	8.6	(28.0)
London Clay	Firm brown clay becoming firm grey clay	1.3+	(4.5+)	9.9	(32.5)

	%	mm		%
(a)				
Gravel	30	+16	:	16
		-16+4	:	14
Sand	46	-4+1	:	9
		-1+¼	:	30
		-¼+1/16	:	7
Fines	24	-1/16	:	24
(b)				
Gravel	3	+16	:	0
		-16+4	:	3
Sand	69	-4+1	:	13
		1+¼	:	42
		-¼+1/16	:	14
Fines	28	-1/16	:	28

Percentages

Depth below surface (m)	Fines -1/16	Sand +1/16-¼	Sand +¼-1	Gravel +1-4	Gravel +4-16	Gravel +16
0.5 - 1.7	33	4	40	8	6	9
1.7 - 2.0	clay band					
2.3 - 3.0	44	6	30	4	9	7
3.0 - 4.0	33	23	10	4	2	28
4.0 - 5.0	9	1	25	12	31	22
5.0 - 6.0	12	1	29	15	24	19
6.0 - 7.0	14	7	44	11	11	13
7.0 - 8.0	27	14	44	10	5	0
8.0 - 8.6	29	14	40	15	2	0

TL 72 SW 1 7074 2468 Park's Farm, Great Saling

Surface level (+79.2 m) +260 ft
Water struck at (+69.5 m) +228 ft
Wirth B0 8 in diameter
June 1969

Waste (18.3 m+) 60 ft+

		Thickness (m)	ft	Depth (m)	ft
Made Ground		(1.2)	4	(1.2)	4
Soil		(0.9)	3	(2.1)	7
Chalky Boulder Clay	Brown clay with flint and chalk pebbles, becoming grey silty clay with flint and chalk pebbles below 33 ft (10.1 m). Seam of clayey gravel between 44 ft (13.4 m) and 45 ft (13.7 m)	(16.2+)	53+	(18.3)	60

TL 72 SW 2 7017 2396 Muchmore Cottages, Great Saling Block C

Surface level (+78.0 m) +256 ft
Water struck (+69.2 m) +227 ft
Wirth B0 8 in diameter
June 1969

Overburden (10.4 m) 34 ft
Mineral (5.5 m) 18 ft
Bedrock(0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown silty clay with pebbles of flint and chalk	(9.1)	30	(10.4)	34
Glacial Sand and Gravel	Pebbly sand Gravel: fine to coarse subangular to subrounded flint and quartzite Sand: medium with coarse and fine. Pale grey/brown	(5.5)	18	(15.8)	52
London Clay	Firm brown clay	(0.9+)	3+	(16.8)	55

	%	mm		%	Depth below surface (ft)	Percentages Fines	Sand	Gravel
Gravel	23	+16	:	9	34-37	2	87	11
		-16+4	:	14	37-40	0	65	35
					40-43	0	66	34
Sand	76	-4+1	:	19	43-46	0	65	35
		-1+$\frac{1}{4}$	:	49	46-49	1	87	12
		-$\frac{1}{4}$+1/16	:	8	49-52	1	87	12
Fines	1	-1/16	:	1				

TL 72 SW 3 7029 2284 Blake End, Great Saling Block C

Surface level (+c. 71.6 m) +c 235 ft
Water struck at (+c 69.8 m) +c.229 ft
Shell and auger 6 in diameter
November 1972

Overburden 0. 6 m (2. 0 ft)
Mineral 7. 0 m (23. 0 ft)
Bedrock 1. 4 m+ (4. 5 ft+)

		Thickness m	(ft)	Depth m	(ft)
Soil		0. 2	(0. 5)	0. 2	(0. 5)
? Chalky Boulder Clay	Firm brown clay	0. 4	(1. 5)	0. 6	(2. 0)
Glacial Sand and Gravel	'Clayey' gravel Gravel: fine to coarse subangular to subrounded flints and quartzite Sand: medium and coarse with a little fine subangular to subrounded quartz. Light brown, clayey	7. 0	(23. 0)	7. 6	(25. 0)
London Clay	Firm grey silty clay	1. 4+	(4. 5+)	9. 0	(29. 5)

	%	mm		%
Gravel	44	+16	:	23
		-16+4	:	21
Sand	39	-4+1	:	10
		-1+$\frac{1}{4}$	:	26
		-$\frac{1}{4}$+1/16	:	3
Fines	17	-1/16	:	17

Depth below surface (m)	Percentages Fines	Sand	Gravel
0. 6 - 1. 6	39	32	29
1. 6 - 2. 6	26	42	32
2. 6 - 3. 6	21	51	28
3. 6 - 4. 6	7	26	67
4. 6 - 5. 6	10	32	58
5. 6 - 6. 6	6	50	44
6. 6 - 7. 6	8	45	47

TL 72 SW 4 7056 2193 Graunt's Court, Felsted

Surface level (+71.9 m) + 236 ft
Water struck at (+65.8 m) +216 ft
Wirth B0 8 in diameter
June 1969

Waste (9.4 m) 31 ft
Bedrock (0.9 m+) 3ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown clay with flints becoming grey with pebbles of flint and chalk below 19 ft (5.8 m)	(7.6)	25	(8.8)	29
	Clayey gravel	(0.6)	2	(9.4)	31
London Clay	Firm brown clay becoming firm bluish-grey clay	(0.9+)	3+	(10.4)	34

TL 72 SW 5 7065 2094 Frenches Farm, Felsted

Surface level (+66.8 m) +219 ft
Water struck at (+58.2 m) +191 ft
Wirth B0 8 in diameter
June 1969

Waste (10.1 m) 33 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
? Chalky Boulder Clay	Brown silty clay	(2.7)	9	(4.0)	13
? Glacial Sand and Gravel	Very clayey gravel	(3.4)	11	(7.3)	24
Chalky Boulder Clay	Grey silty clay with flint and chalk pebbles	(2.7)	9	(10.1)	33
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(11.0)	36

TL 72 SW 6 7166 2428 Old Hall, Rayne Block C

Surface level (+70.7 m) +232 ft
Water struck at (+65.5 m) +215 ft
Wirth B0 8 in diameter
June 1969

Overburden (2.1 m) 7 ft
Mineral (10.1 m) 33 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
? Chalky Boulder Clay	Brown silty clay	(0.9)	3	(2.1)	7
Glacial Sand and Gravel	Sandy gravel. Very gravelly at top, between 13 ft (4.0 m) and 25 ft (7.6 m), and at base. Gravel: fine to coarse subangular to subrounded flints and quartzite. Sand: medium, with coarse and fine, brown to yellow/brown	(10.1)	33	(12.2)	40
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(13.1)	43

	%	mm		%
Gravel	35	+16	:	14
		-16	:	21
Sand	64	-4+1	:	16
		$-1+\frac{1}{4}$	:	40
		$-\frac{1}{4}+1/16$	:	8
Fines	1	-1/16	:	1

Depth below surface (ft)	Percentages Fines	Sand	Gravel
7 - 10	1	46	53
10 - 13	0	97	3
13 - 16	0	46	54
16 - 19	1	47	52
19 - 22	2	44	54
22 - 25	1	46	54
25 - 28	1	86	13
28 - 31	0	95	5
31 - 34	3	80	17
34 - 37	2	78	20
37 - 40	0	35	65

TL 72 SW 7 7158 2338 Moor's Farm, Rayne Block C

Surface level (+76.5 m) +251 ft
Water struck at (+71. 9 m) +236 ft
Wirth B0 8 in diameter
June 1969

Overburden (5.8 m) 19 ft
Mineral (7. 6 m) 25 ft
Bedrock (0. 9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Made Ground		(0. 6)	2	(0. 6)	2
Soil		(0. 9)	3	(1. 5)	5
? Glacial Lake Deposits	Black soft silty clay	(2. 4)	8	(4. 0)	13
Glacial Sand and Gravel	Silty gravel	(1. 8)	6	(5. 8)	19
	Sandy gravel Gravel: fine to coarse subangular to subrounded flint and quartzite Sand: medium and coarse, a little fine, brown	(7. 6)	25	(13. 4)	44
London Clay	Firm brown clay	(0. 9+)	3+	(14. 3)	47

	%	mm		%
Gravel	27	+16	:	9
		-16+4	:	18
Sand	72	-4+1	:	29
		-1+$\frac{1}{4}$	:	40
		-$\frac{1}{4}$+1/16	:	3
Fines	1	-1/16	:	1

Depth below surface (ft)	Percentages Fines	Sand	Gravel
19 - 22	0	71	29
22 - 25	1	71	28
25 - 28	1	85	14
28 - 31	0	83	17
31 - 34	0	85	15
34 - 37	1	56	43
37 - 40	8	58	34
40 - 43	1	66	33
43 - 44	1	64	35

TL 72 SW 8 7200 2251 Near Broadfield Farm, Rayne

Surface level (+78.9 m) +259 ft
Water struck at (+74.1 m) +243 ft
Wirth B0 8 in diameter
June 1969

Waste (18.3 m+) 60 ft+

		Thickness (m)	ft	Depth (m)	ft
Made Ground		(0.9)	3	(0.9)	3
Soil		(1.2)	4	(2.1)	7
?Glacial Sand and Gravel	Very clayey sand and gravel	(4.0)	13	(6.1)	20
Chalky Boulder Clay	Soft brown silty clay	(3.4)	11	(9.4)	31
	Brown clay becoming grey clay with flint and chalk pebbles below 48 ft (14.6 m)	(8.8+)	29+	(18.3)	60

TL 72 SW 9 7189 2175 **Draper's Farm, Rayne**

Surface level (+75.6 m) +248 ft
Water struck at (+62.5 m) +205 ft
Wirth B0 8 in diameter
June 1969

Waste (15.2 m) 50 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown clay becoming grey clay with flint and chalk pebbles	(11.0)	36	(12.2)	40
Glacial Sand and Gravel	Sandy gravel Gravel: fine to coarse subangular to subrounded flint with some subrounded quartz and quartzite Sand: coarse, and medium a little fine. Yellow/brown	(3.0)	10	(15.2)	50
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(16.2)	53

	%	mm		%
Gravel	29	+16	:	14
		-16+4	:	15
Sand	63	-4+1	:	31
		-1+$\frac{1}{4}$	:	28
		-$\frac{1}{4}$+1/16	:	4
Fines	8	-1/16	:	8

Depth below surface (ft)	Percentages Fines	Sand	Gravel
40 - 43	22	45	33
43 - 46	0	88	12
46 - 49	0	55	45
49 - 50	17	58	25

TL 72 SW 10 7114 2035 Pye's Farm, Felsted Block C

Surface level (+70.7 m) + 232 ft
Water struck at (+63.4 m) +208 ft
Shell and auger 6 in diameter
November 1972

Overburden 3.1 m (10.0 ft)
Mineral 9.4 m (31.0 ft)
Bedrock 1.2 m+ (4.0 ft+)

		Thickness		Depth	
		m	(ft)	m	(ft)
Soil		0.2	(0.5)	0.2	(0.5)
? Chalky Boulder Clay	Mottled orange/grey sandy clay with flint and quartzite pebbles	2.9	(9.5)	3.1	(10.0)
Glacial Sand and Gravel	'Clayey' sandy gravel Gravel: fine to coarse subangular to subrounded flint and quartzite Sand: medium with coarse and a little fine, subangular to subrounded quartz. Orange brown	9.4	(31.0)	12.5	(41.0)
London Clay	Firm orange/brown clay becoming firm dark grey clay	1.2+	(4.0+)	13.7	(45.0)

	%	mm		%
Gravel	40	+16	:	19
		-16+4	:	21
Sand	48	-4+1	:	11
		-1+¼	:	34
		-¼+1/16	:	3
Fines	12	-1/16	:	12

Depth below surface (m)	Fines	Sand	Gravel
3.1 - 4.1	34	36	30
4.1 - 5.1	15	66	19
5.1 - 6.1	16	72	12
6.1 - 7.1	10	53	37
7.1 - 8.1	13	48	39
8.1 - 9.1	5	27	68
9.1 -10.1	13	37	50
10.1 -11.1	3	40	57
11.1 -12.5	7	46	47
	5	55	40

TL 72 SW 11 7289 2444 Perry Child's Farm, Panfield

Surface level (+c 65.5 m) + c. 215 ft
Water struck at (+c.57. 3 m) + c. 188 ft
Wirth B0 8 in diameter
June 1969

Waste (13. 1 m) 43 ft
Bedrock (0. 9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1. 2)	4	(1. 2)	4
? Chalky Boulder Clay	Brown silty clay with flints	(9. 4)	31	(10. 7)	35
	Grey silt	(2. 4)	8	(13. 1)	43
London Clay	Firm brown clay becoming firm grey clay	(0. 9+)	3+	(14. 0)	46

TL 72 SW 12 7242 2315 Gould's Farm, Rayne

Surface level (+74. 4 m) +244 ft
Water struck at (+72. 2 m) + 237 ft
Wirth B0 8 in diameter
June 1969

Waste (18. 3 m+) 60 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1. 2)	4	(1. 2)	4
Chalky Boulder Clay	Soft brown silty clay	(0. 9)	3	(2. 1)	7
	Clayey Gravel	(1. 2)	4	(3. 4)	11
	Brown clay with flints passing into silty sand at 23 ft (7. 0 m) and becoming grey clay with pebbles of flint and chalk	(14. 9+)	49+	(18. 3)	60

TL 72 SW 13 7269 2147 Near Little Common, Rayne

Surface level (+71. 9 m) +236 ft
Water struck at (+64.0 m) +210 ft
Wirth B0 8 in diameter
June 1969

Waste (13. 7 m) 45 ft
Bedrock (0. 9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1. 2)	4	(1. 2)	4
? Chalky Boulder Clay	Brown silty clay with flints	(12. 5)	41	(13. 7)	45
London Clay	Firm brown clay becoming firm grey clay	(0. 9+)	3+	(14. 6)	48

TL 72 SW 14 7219 2060 Blackley's Farm, Felsted Block C

Surface level (+66.8 m) +219 ft
Water struck at (+57.3 m) +188 ft
Shell and auger 6 in diameter
November 1972

Overburden 7.7 m (25.5 ft)
Mineral 5.6 m (18.5 ft)
Bedrock 1.1 m+ (3.5 ft+)

		Thickness m	(ft)	Depth m	(ft)
Made Ground		0.3	(1.0)	0.3	(1.0)
Soil		0.2	(0.5)	0.5	(1.5)
Chalky Boulder Clay	Mottled orange/grey silty clay with flints	0.9	(3.0)	1.4	(4.5)
	Grey plastic clay with subrounded chalk pebbles becoming red/brown clay with pebbles of chalk and flint	2.2	(7.0)	3.6	(12.0)
	Red/brown clay with flints and bands of medium sand. Gravelly at base	4.1	(13.5)	7.7	(25.0)
Glacial Sand and Gravel	'Clayey' sandy gravel Gravel: fine to coarse angular subangular and subrounded flint and subrounded quartzite Sand: medium and coarse a little fine, subangular to subrounded quartz, orange, clayey in parts	5.6	(18.5)	13.3	(43.5)
London Clay	Stiff dark grey/brown clay	1.1+	(3.5+)	14.4	(47.0)

	%	mm		%
Gravel	34	+16	:	14
		-16+4	:	20
Sand	47	-4+1	:	13
		$-1+\frac{1}{4}$	:	31
		$-\frac{1}{4}+1/16$	:	3
Fines	19	-1/16	:	19

Depth below surface (m)	Percentages Fines	Sand	Gravel
7.7 - 8.5	53	40	7
8.5 - 9.5	22	36	42
9.5 - 10.5	10	64	26
10.5 - 11.5	15	45	40
11.5 - 12.5	4	48	48
12.5 - 13.3	19	46	35

TL 72 SW 15 7350 2487 Panfield Farm, Panfield

Surface level (+75.0 m) +246 ft
Water struck at (+67.4 m) +221 ft
Wirth B0 8 in diameter
June 1969

Waste (18.3 m +) 60 ft+

		Thickness (m)	ft	Depth (m)	ft
Made Ground		(0.6)	2	(0.6)	2
Soil		(0.9)	3	(1.5)	5
Chalky Boulder Clay	Brown clay with flints becoming becoming grey clay with pebbles of flint and chalk below 30 ft (9.1 m). Clayey gravel seam from 28 ft (8.5 m) to 30 ft (9.1 m).	(16.8+)	55+	(18.3)	60

TL 72 SW 16 7353 2377 Near The Rectory, Rayne

Surface level (+c. 68.0 m) +c. 223 ft
Water struck at (+c. 57.3 m) +c. 188 ft
Wirth B0 8 in diameter
June 1969

Waste (16.5 m) 54 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown clay with flints becoming grey clay with pebbles of flint and chalk, below 31 ft (9.4 m)	(14.3)	47	(15.5)	51
	Clayey gravel	(0.9)	3	(16.5)	54
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(17.4)	57

TL 72 SW 17 7341 2239 Near Stock's Farm, Braintree Block C

Surface level (+70.1 m) +230 ft
Water struck at (+66.1 m) +217 ft
Shell and auger 6 in diameter
November 1972

Overburden 1.3 m (4.5 ft)
Mineral 6.4 m (21.0 ft)
Bedrock 1.5 m + (5.0 ft+)

		Thickness m	(ft)	Depth m	(ft)
Soil		0.2	(0.5)	0.2	(0.5)
? Chalky Boulder Clay	Mottled orange/grey sandy clay with pebbles of subangular flint and subrounded quartzite	1.1	(3.5)	1.3	(4.5)
Glacial Sand and Gravel	'Clayey' sandy gravel Gravel: fine to coarse subangular to subrounded flint and quartzite Sand: medium and coarse with some fine subangular to subrounded quartz, orange in parts	6.4	(21.0)	7.7	(25.5)
London Clay	'Clayey' firm brown clay becoming firm grey silty clay	1.5+	(5.0+)	9.2	(30.0)

	%	mm		%
Gravel	31	+16	:	12
		-16+4	:	19
Sand	58	-4+1	:	17
		-1+$\frac{1}{4}$	:	36
		-$\frac{1}{4}$+1/16	:	5
Fines	11	-1/16	:	11

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.3 - 2.3	15	49	36
2.3 - 3.3	15	42	43
3.3 - 4.3	3	54	43
4.3 - 5.3	9	46	45
5.3 - 6.3	12	79	9
6.3 - 7.3	10	79	11
7.3 - 7.7	19	54	27

TL 72 SW 19 7315 2045 Slamsey's Farm, Black Notley

Surface level (+67.4 m) +221 ft
Water struck at (+59.7 m) +196 ft
Wirth B0 8 in diameter
June 1969

Waste (10.1 m) 33 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
? Chalky Boulder Clay	Brown silty clay with flints	(7.9)	26	(9.1)	30
	Clayey gravel	(0.9)	3	(10.1)	33
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(11.0)	36

TL 72 SW 20 7471 2441 Park Farm, Bocking

Surface level (+65.5 m) +215 ft
Water struck at (+55.2 m) +181 ft
Wirth B0 8 in diameter
June 1969

Waste (13.4 m) 44 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
? Chalky Boulder Clay	Brown clay with flints	(6.7)	22	(7.9)	26
	Soft brown stony and silty clay	(5.5)	18	(13.4)	44
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(14.3)	47

TL 72 SW 21 7436 2321 Rayne Lodge, Rayne Block C

Surface level (+67. 7 m) +222 ft
Water struck at (+57. 0 m) +187 ft
Wirth B0 8 in diameter
July 1969

Overburden (0. 6 m) 2 ft
Mineral (15. 8 m) 52 ft
Bedrock (0. 9 m+) 3 ft+

			Thickness (m)	ft	Depth (m)	ft
Soil			(0. 6)	2	(0. 6)	2
Glacial Sand and Gravel	(a)	Pebbly sand Gravel: fine to coarse subangular to subrounded flint and quartzite Sand: fine to coarse quartz yellow	(5. 4)	18	(6. 1)	20
	(b)	Sand Sand: fine to coarse subangular to subrounded quartz. Yellow and red/brown	(10. 3)	34	(16. 5)	54
London Clay		Firm brown clay becoming firm grey clay	(0. 9+)	3+	(17. 4)	57

	%	mm		%
(a)				
Gravel	13	+16	:	7
		-16+4	:	6
Sand	87	-4+1	:	4
		-1+¼	:	71
		-¼+1/16	:	12
Fines	0	-1/16	:	0
(b)				
Gravel	5	+16	:	0
		-16+4	:	5
Sand	94	-4+1	:	19
		-1+¼	:	38
		-¼+1/16	:	37
Fines	1	-1/16	:	1

Depth below surface (ft)	Percentages: Fines -1/16	Sand +1/16-¼	Sand +¼-1	Gravel +1-4	Gravel +4-16	Gravel +16
2 - 5	0	9	77	4	6	4
5 - 8	0	17	63	2	6	12
8 - 11	0	14	73	5	4	4
11 - 14	0	13	75	1	7	4
14 - 17	0	6	87	2	2	3
17 - 20	1	13	51	11	9	15
20 - 23	0	25	53	19	3	0
23 - 26	2	38	40	13	4	3
26 - 29	1	29	47	14	7	2
29 - 32	0	28	51	19	2	0
32 - 35	1	19	42	38	0	0
35 - 38	0	34	34	29	3	0
38 - 41	0	36	33	28	3	0
41 - 44	2	57	24	14	3	0
44 - 47	0	63	25	10	2	0
47 - 50	1	49	33	10	7	0
50 - 53	3	35	34	16	10	2
53 - 54	0	18	44	27	8	3

TL 72 SW 22 7442 2219 Near Queenborough Lane, Braintree

Surface level (+c. 60.4 m) +c. 198 ft
Water struck at (+c. 55.5 m) +c. 182 ft
Wirth B0 8 in diameter
July 1969

Waste (7.6 m) 25 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown clay becoming grey clay with pebbles of flint, chalk and occasional quartzite	(6.4)	21	(7.6)	25
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(8.5)	28

TL 72 SW 23 7463 2147 Beddall's End, Braintree

Surface level (+69.5 m) +229 ft
Water level not recorded
Wirth B0 8 in diameter
July 1969

Waste (6.7 m) 22 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.6)	2	(0.6)	2
? Chalky Boulder Clay	Brown silty clay with flints	(6.1)	20	(6.7)	22
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(7.6)	25

TL 72 SW 24 7220 2177 Mill Lane, Rayne Block C

Surface level (+75.3 m) +247 ft
Water struck at (71.3 m) +234 ft
Shell and auger 6 in diameter
November 1972

Overburden 0.5 m (1.5 ft)
Mineral 6.6 m (21.5 ft)
Waste 2.5 m (8.0 ft)
Bedrock 1.1 m+ (3.5 ft+)

		Thickness m	(ft)	Depth m	(ft)
Soil		0.3	(1.0)	0.3	(1.0)
? Head	Pale brown silty clay	0.2	(0.5)	0.5	(1.5)
Glacial Sand and Gravel	'Very clayey' sandy gravel (clay band from 6.3 m to 6.6 m (20.5 ft to 21.5 ft) depth Gravel: fine to coarse subangular to subrounded flint and quartzite Sand: medium with coarse and fine subangular to subrounded quartz. Orange, clayey in parts	6.6	(21.5)	7.1	(23.5)
	Plastic orange/brown clay with bands of flint gravel and sand lenses	2.5	(8.0)	9.6	(31.5)
London Clay	Firm orange/brown clay becoming stiff bluish grey clay	1.1+	(3.5+)	10.7	(35.0)

	%	mm		%
Gravel	32	+16	:	12
		-16+4	:	20
Sand	46	-4+1	:	10
		-1+$\frac{1}{4}$	:	30
		-$\frac{1}{4}$+1/16	:	6
Fines	22	-1/16	:	22

Depth below surface(m)	Percentages Fines	Sand	Gravel
0.5 - 1.5	16	59	25
1.5- 2.5	23	41	36
2.5 - 3.5	25	63	12
3.5 - 4.5	42	35	23
4.5 - 5.5	14	28	58
5.5 - 6.3	9	44	47
6.3 - 6.6	clay band		
6.6 - 7.1	21	57	22

TL 72 SW 25 7422 2068 Cut Hedge Farm, Black Notley Block C

Surface level (+74.4 m) +244 ft
Water struck +61.9 m (+203 ft)
Shell and auger 6 in diameter
November 1972

Overburden 8.7 m (28.5 ft)
Mineral 11.9 m (39.0 ft)
Bedrock 1.0 m+ (3.5 ft+)

			Thickness m	(ft)	Depth m	(ft)
Soil			0.2	(0.5)	0.2	(0.5)
Made Ground			0.2	(0.5)	0.4	(1.5)
Chalky Boulder Clay		Light grey/brown stiff clay packed with chalk pebbles and occasional flints becoming stiff dark brown silty clay with chalk and flint pebbles.	5.6	(18.5)	6.0	(19.5)
		Firm brown clay, some flint pebbles	0.8	(2.5)	6.8	(22.5)
Glacial Sand and Gravel		Sand and gravel with thin clay partings	0.5	(1.5)	7.3	(24.0)
		Stiff red/brown sandy clays with bands of flint and quartzite gravel.	1.4	(4.5)	8.7	(28.5)
	(a)	'Clayey' sandy gravel Gravel: fine to coarse subangular to subrounded flint with some subrounded quartzite Sand: medium with some coarse and fine quartz. Orange clayey.	2.0	(6.5)	10.7	(35.0)
	(b)	'Clayey' pebbly sand Gravel : fine to coarse subangular to subrounded flint, quartzite and chalk Sand: medium some coarse, a little fine subangular to subrounded quartz. Yellow light brown and grey	5.0	(16.5)	15.7	(51.5)
	(c)	Gravel Gravel: fine to coarse subangular to subrounded flint and quartzite Sand: medium and coarse subangular to subrounded quartz. Grey/light brown	4.9	(16.0)	20.6	(67.5)
London Clay		Firm dark grey silty clay	1.0+	(3.5+)	21.6	(71.0)

TL 72 SW 25 cont'd

(a)	%	mm	%	Depth below surface (m)	Fines -1/16	Percentages Sand +1/16-¼	Sand +¼-1	Sand +1-4	Gravel +4-16	Gravel +16
Gravel	22	+16	: 7	8.7 - 9.7	21	1	39	8	19	12
		-16+4	: 15	9.7 - 10.7	17	5	58	7	11	2
Sand	59	-4+1	: 7							
		-1+¼	: 49							
		-¼+1/16	: 3							
Fines	19	-1/16	: 19							
(b)										
Gravel	4	+16	: 0	10.7 - 11.7	16	4	75	3	2	0
		-16+4	: 4	11.7 - 12.7	13	5	64	9	9	0
				12.7 - 13.7	5	5	77	11	2	0
Sand	82	-4+1	: 8	13.7 - 14.7	18	6	67	7	2	0
		-1+¼	: 70	14.7 - 15.7	16	3	67	7	6	1
		-¼+1/16	: 4							
Fines	14	-1/16	: 14							
(c)										
Gravel	61	+16	: 33	15.7 - 16.7	4	2	18	10	18	48
		-16+4	: 28	16.7 - 17.7	3	1	37	11	25	23
				17.7 - 18.7	3	2	26	14	26	29
Sand	36	-4+1	: 12	18.7 - 19.7	3	2	19	11	34	31
		-1+¼	: 22	19.7 - 20.6	2	1	13	14	37	33
		-¼+1/16	: 2							
Fines	3	-1/16	: 3							

TL 72 SW 26 7438 2183 Nr. Panner's Farm, Braintree

Surface level (+66.1 m) +217 ft
Water not struck
Shell and auger 6 in diameter
November 1972

Waste 4.4 m (14.5 ft)
Bedrock 7.1 m+ (23.5 ft+)

		Thickness m	Thickness (ft)	Depth m	Depth (ft)
Soil		0.2	(0.5)	0.2	(0.5)
? Head	Soft light brown/grey mottled clay	2.4	(8.0)	2.6	(8.5)
Chalky Boulder Clay	Light brown plastic clay with chalk pebbles becoming dark grey/brown silty clay with pebbles of chalk and occasional subrounded quartzite and subangular flint	1.8	(6.0)	4.4	(14.5)
London Clay	Firm brown clay becoming stiff dark grey/brown clay	7.1+	(23.5+)	11.5	(37.5)

TL 72 SE 1 7537 2471 Panfield Lane, Braintree Block C

Surface level (+56.1 m) +184 ft
Water struck at (+49.4 m) +162 ft
Wirth B0 8 in diameter
June 1969

Overburden (4.9 m) 16 ft
Mineral (4.0 m) 13 ft
Waste (5.5 m) 18 ft
Bedrock (0.9 m +) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown chalky clay with flints	(3.7)	12	(4.9)	16
Glacial Sand and Gravel	Sandy gravel Gravel: fine to coarse subangular to subrounded flint with some quartz and quartzite Sand: medium and coarse with a little fine; dark brown to yellow/brown	(4.0)	13	(8.8)	29
Chalky Boulder Clay	Grey silty clay with pebbles of flint and chalk	(5.5)	18	(14.3)	47
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(15.2)	50

	%	mm		%
Gravel	33	+16	:	13
		-16+4	:	20
Sand	72	-4+1	:	31
		-1+$\frac{1}{4}$	:	36
		-$\frac{1}{4}$+1/16	:	5
Fines	5	-1/16	:	5

Percentages

Depth below surface (ft)	Fines	Sand	Gravel
16-19	16	56	28
19-22	0	56	44
22-25	1	80	19
25-28	2	52	46
28-29	2	82	16

TL 72 SE 2 7588 2200 Buckwood's Farm Braintree Block C

Surface level (+64.3 m) +211 ft
Water level not recorded
Wirth B0 8 in diameter
February 1969

Overburden (0.9 m) 3 ft
Mineral (7.6 m) 25 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Made Ground		(0.9)	3	(0.9)	3
Glacial Sand and Gravel	'Clayey' pebbly sand Gravel: fine to coarse subangular flint with subrounded to rounded quartzite and quartz A few cobble size flints present Sand: medium with fine and coarse red brown. Clayey	(7.6)	25	(8.5)	28
London Clay	Firm brown clay	(0.9+)	3+	(9.4)	31

	%	mm		%
Gravel	23	+16	:	10
		-16+4	:	13
Sand	67	-4+1	:	18
		-1+$\frac{1}{4}$	:	38
		-$\frac{1}{4}$+1/16	:	11
Fines	10	-1/16	:	10

Depth below surface (ft)	Percentages Fines	Sand	Gravel
3 - 6	10	44	46
6 - 9	7	47	46
9 - 12	12	58	30
12 - 15	13	70	17
15 - 18	1	82	17
18 - 21	0	92	8
21 - 24	10	84	6
24 - 28	21	65	14

TL 73 SE 3 7518 2075 Pickpocket Lane Black Notley

Surface level (+69.8 m) +229 ft
Water struck at (+56.1 m) +184 ft
Wirth B0 8 in diameter
February 1969

Waste (15.5 m) 51 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
Chalky Boulder Clay	Brown silty clay becoming grey silty clay with pebbles of flint and chalk	(11.0)	36	(11.9)	39
Glacial Sand and Gravel	'Clayey' sandy gravel Gravel: fine to coarse (becoming coarser downwards) subangular to subrounded flint and quartzite Sand: medium with fine and some coarse. Grey/brown clayey	(3.7)	12	(15.5)	51
London Clay	Firm brown clay	(0.9+)	3+	(16.5)	54

	%	mm		%
Gravel	25	+16	:	8
		-16+4	:	17
Sand	64	-4+1	:	9
		$-1+\frac{1}{4}$	:	37
		$-\frac{1}{4}+1/16$	:	18
Fines	11	-1/16	:	11

Percentages

Depth below surface (ft)	Fines	Sand	Gravel
39-42	15	64	21
42-45	0	80	20
45-48	17	62	21
48-51	12	51	37

TL 72 SE 4 7639 2474 Near Highfield Stile Farm, Bocking Block D

Surface level (+54.3 m) +178 ft
Water struck at (+44.5 m) +146 ft
Wirth B0 8 in diameter
April 1969

Overburden (3.4) 11 ft
Mineral (10.1 m) 33 ft
Bedrock (0.9 m +) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Very clayey gravel	(2.7)	9	(3.4)	11
	Sandy gravel Gravel: fine to coarse subangular flint with subrounded quartz at top becoming subangular to subrounded quartz with flint and quartzite. Sand: medium and coarse, red/brown	(10.1)	33	(13.4)	44
London Clay	Firm brown clay	(0.9+)	3+	(14.3)	47

	%	mm		%
Gravel	36	+16	:	14
		-16+4	:	22
Sand	61	-4+1	:	27
		-1+$\frac{1}{4}$	:	30
		-$\frac{1}{4}$+1/16	:	4
Fines	3	-1/16	:	3

Depth below surface (ft)	Percentages Fines	Sand	Gravel
11-14	26	63	11
14-17	0	78	22
17-20	0	17	83
20-23	2	40	58
23-26	0	29	71
26-29	0	72	28
29-32	1	78	21
32-35	2	65	33
35-38	0	68	32
38-41	0	71	29
41-44	2	91	7

TL 72 SE 5 7613 2086 Near Black Notley Hall, Black Notley Block C

Surface level (+60.4 m) +198 ft
Water struck at (+52.4 m) +172 ft
Wirth B0 8 in diameter
February 1969

Overburden (5.5 m) 18 ft
Mineral (3.7 m) 12 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.6)	2	(0.6)	2
? Chalky Boulder Clay	Brown silty clay with flints	(4.0)	13	(4.6)	15
Glacial Sand and Gravel	Very clayey gravel	(0.9)	3	(5.5)	18
	'Clayey' sandy gravel Gravel: fine to coarse flint and quartzite; mostly subangular at top becoming subangular to subrounded downwards Sand: medium with coarse and fine red brown or grey clayey	(3.7)	12	(9.1)	30
London Clay	Firm brown clay	(0.9+)	3+	(10.1)	33

	%	mm		%
Gravel	40	+16	:	17
		-16+4	:	23
Sand	48	-4+1	:	14
		-1+$\frac{1}{4}$	:	26
		-$\frac{1}{4}$+1/16	:	8
Fines	12	-1/16	:	12

Depth below surface (ft)	Percentages Fines	Sand	Gravel
18-21	13	66	21
21-24	9	46	45
24-27	12	43	45
27-30	12	41	47

TL 72 SE 6 7769 2486 Lyons Hall, Braintree Block D

Surface level (+c. 59. 7 m) +c. 195 ft
Water struck at (+c. 52. 4 m) +172 ft
Wirth B0 8 in diameter
March 1969

Overburden (0. 3 m) 1 ft
Mineral (10. 1 m) 33 ft
Bedrock (0. 9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0. 3)	1	(0. 3)	1
Glacial Sand and Gravel	Pebbly sand. Gravelly at top, between 13 ft (4. 0 m) and 19 ft (5. 8 m) and below 24 ft (7. 3 m) Gravel: fine to coarse subangular to subrounded mainly flint with subordinate quartzite and quartz Sand: medium, coarse and fine; red/brown becoming brown to yellow/brown	(10. 1)	33	(10. 4)	34
London Clay	Firm brown clay	(0. 9+)	3+	(11. 3)	37

	%	mm		%
Gravel	20	+16	:	5
		-16+4	:	15
Sand	77	-4+1	:	25
		-1+¼	:	39
		-¼+1/16	:	13
Fines	3	-1/16	:	3

Depth below surface (ft)	Percentages Fines	Sand	Gravel
1 - 4	0	76	24
4 - 7	2	98	0
7 - 10	3	91	6
10 - 13	0	90	10
13 - 16	2	77	21
16 - 19	0	37	63
19 - 21	15	78	7
21 - 24	11	77	12
24 - 27	0	73	27
27 - 30	0	73	27
30 - 33	0	76	24

TL 72 SE 7 7764 2347 Mark's Farm, Braintree Block D

Surface level (+67.7 m) +222 ft
Water struck at (+56.1 m) +184 ft
Wirth B0 8 in diameter
April 1969

Overburden (6.1 m) 20 ft
Mineral (7.3 m) 24 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Made Ground		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown silty clay with flint and chalk pebbles	(4.9)	16	(6.1)	20
Glacial Sand and Gravel	Pebbly sand. Gravelly between 23 ft (7.0 m) and 29 ft (8.8 m) Gravel: fine to coarse subangular to subrounded becoming subrounded to rounded flint and quartzite Sand: medium coarse and fine red/brown	(7.3)	24	(13.4)	44
London Clay	Firm brown clay	(0.9+)	3+	(14.3)	47

	%	mm		%
Gravel	13	+16	:	3
		-16+4	:	10
Sand	87	-4+1	:	32
		-1+$\frac{1}{4}$	:	44
		-$\frac{1}{4}$+1/16	:	11
Fines	0	-1/16	:	0

Depth below surface (ft)	Percentages Fines	Sand	Gravel
20-23	0	89	11
23-26	0	75	25
26-29	0	78	22
29-32	0	86	14
32-35	0	83	17
35-38	0	89	11
38-41	0	90	10
41-44	0	97	3

TL 72 SE 8 7741 2288 Stubb's Farm, Braintree

Surface level (+68.9 m) +226 ft
Water level not recorded
Wirth B0 8 in diameter
February 1969

Waste (11.6 m) 38 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown silty clay with pebbles of flint and chalk	(8.5)	28	(9.8)	32
Glacial Sand and Gravel	'Clayey' pebbly sand. Gravel: fine to coarse subangular flint Sand: medium and fine some coarse red/brown clayey	(1.8)	6	(11.6)	38
London Clay	Firm brown clay	(0.9+)	3+	(12.5)	41

	%	mm		%
Gravel	18	+16	:	8
		-16+4	:	10
Sand	72	-4+1	:	6
		$-1+\frac{1}{4}$	:	44
		$-\frac{1}{4}+1/16$	:	22
Fines	10	-1/16	:	10

Depth beloq surface (ft)	Percentages Fines	Sand	Gravel
32-35	0	72	28
35-38	20	73	7

TL 72 SE 9 7766 2154 North of Dean's Farm, Cressing

Surface level (+66.8 m) 219 ft
Water level not recorded
Wirth B0 8 in diameter
February 1969

Waste (11.3 m) 37 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.6)	2	(0.6)	2
Chalky Boulder Clay	Grey silty clay with chalk pebbles	(3.0)	10	(3.7)	12
	Brown clay with chalk pebbles	(2.1)	7	(5.8)	19
	Grey silty clay with pebbles of chalk and flint	(5.5)	18	(11.3)	37
London Clay	Firm brown clay	(0.9+)	3+	(12.2)	40

TL 72 SE 10 7792 2030 Jeffrey's Farm, Cressing

Surface level (+62.5 m) +205 ft
Water not struck
Wirth B0 8 in diameter
May 1970

Waste (8.5 m) 28 ft
Bedrock (1.5 m+) 5 ft+

		Thickness (m)	ft	Depth (m)	ft
Made Ground		(0.5)	1.5	(0.5)	1.5
Chalky Boulder Clay	Brown clay with pebbles of chalk	(4.7)	15.5	(5.2)	17
? Glacial Sand and Gravel	Very gravelly brown clay	(1.8)	6	(7.0)	23
	Clayey sand with gravel and bands of gravelly clay	(1.5)	5	(8.5)	28
London Clay	Firm brown clay	(1.5+)	5+	(10.1)	33

TL 72 SE 11 7851 2485 Covenbrook Hall, Stisted Block D

Surface level (+47.2 m) +155 ft
Water struck at (+34.7 m) +114 ft
Wirth B0 8 in diameter
April 1969

Overburden (2.4) 8 ft
Mineral (11.9 m) 39 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown clay with chalk pebbles	(1.2)	4	(2.4)	8
Glacial Sand and Gravel	Sandy gravel Gravel: fine subrounded to rounded flint and quartz with coarse subangular quartzite and quartz Sand: medium with coarse and some fine. Red brown and yellow brown	(11.9)	39	(14.3)	47
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(15.2)	50

	%	mm		%
Gravel	44	+16	:	19
		-16+4	:	25
Sand	55	-4+1	:	14
		-1+$\frac{1}{4}$	:	35
		-$\frac{1}{4}$+1/16	:	6
Fines	1	-1/16	:	1

Percentages

Depth below surface (ft)	Fines	Sand	Gravel
8-11	1	67	32
11-14	0	35	65
14-17	0	53	47
17-20	0	54	46
20-23	7	48	45
23-26	0	57	43
26-29	2	59	39
29-32	0	78	22
32-35	0	65	35
35-38	0	52	48
38-41	0	43	57
41-44	0	50	50
44-47	0	58	42

TL 72 SE 12 7854 2402 Jenkin's Farm, Stisted Block D

Surface level (+54.6 m) +179 ft
Water level not recorded
Wirth B0 8 in diameter
April 1969

Waste (3.4 m) 11 ft
Bedrock (5.5 m+) 18 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.6)	2	(0.6)	2
Chalky Boulder Clay	Brown sandy clay with flint and chalk pebbles	(1.8)	6	(2.4)	8
Glacial Sand and Gravel	Very clayey fine to coarse gravel. Mainly quartzite and flint	(0.9)	3	(3.4)	11
London Clay	Brown and grey clay silty in part	(5.5+)	18+	(8.8)	29

TL 72 SE 13 7887 2235 Lower Farm, Cressing Block D

Surface level (+64.0 m) +210 ft
Water struck at (+88.1 m) +298 ft
Wirth B0 8 in diameter
February 1969

Overburden (4.6 m) 15 ft
Mineral (3.7 m) 12 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.5)	5	(1.5)	5
Glacial Sand and Gravel	Brown clayey gravel	(3.0)	10	(4.6)	15
Glacial Sand and Gravel	'Very clayey' sandy gravel Gravel: fine to coarse subangular to subrounded flint and quartzite; some cobbles of subangular flint Sand: medium with fine and coarse; dark brown to yellow-brown, very clayey	(3.7)	12	(8.2)	27
London Clay	Firm brown clay becoming firm grey clay	(0.9+)	3+	(9.1)	30

	%	mm		%
Gravel	34	+16	:	15
		-16+4	:	19
Sand	44	-4+1	:	12
		-$\frac{1}{4}$+1	:	20
		-$\frac{1}{4}$+1/16	:	12
Fines	22	-1/16	:	22

Depth below surface (ft)	Percentages Fines	Sand	Gravel
15-18	13	34	53
18-21	17	36	47
21-24	35	48	17
24-27	25	58	17

TL 72 SE 14 7856 2166 Stacey's Farm, Cressing

Surface level (+66.8 m) +219 ft
Water struck at (+59.1 m) +194 ft
Wirth B0 9 in diameter
February 1969

Waste (9.1 m) 30 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
Chalky Boulder Clay	Brown clay with chalk and flint pebbles	(6.4)	21	(7.3)	24
Glacial Sand and Gravel	'Clayey' pebbly sand Gravel: fine to coarse subrounded to rounded quartz and quartzite Sand: medium with fine yellow/brown, clayey	(1.8)	6	(9.1)	30
London Clay	Firm brown clay	(0.9+)	3+	(10.1)	33

	%	mm		%
Gravel	13	+16	:	4
		-16+4	:	9
Sand	75	-4+1	:	3
		-1+$\frac{1}{4}$	:	54
		-$\frac{1}{4}$+1/16	:	18
Fines	12	-1/16	:	12

	Percentages		
Depth below surface (ft)	Fines	Sand	Gravel
24-27	13	73	14
27-30	12	76	12

TL 72 SE 15 7863 2050 Holder's Farm, Cressing

Surface level (+c. 65. 5 m) +c. 215 ft
Water struck at (+c. 54. 9 m) +c. 180 ft
Wirth B0 8 in diameter
February 1969

Waste (10. 7 m+) 35 ft+

		Thickness (m)	ft	Depth (m)	ft
Made Ground		(0. 9)	3	(0. 9)	3
Chalky Boulder Clay	Brown, clay with flint and chalk pebbles becoming grey clay with flint and chalk pebbles at 17 ft (5.2 m)	(9. 1)	30	(10. 1)	33
Glacial Sand and Gravel	Coarse sand and fine to coarse gravel	(0. 6+)	2+	(10. 7)	35

Borehole terminated

TL 72 SE 16 7980 2482 Sisted Hall Park, Sisted Block D

Surface level (+57. 3 m) +188 ft
Water level not recorded
Wirth B0 8 in diameter
April 1969

Waste (8. 8 m) 29 ft
Bedrock (0. 9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1. 2)	4	(1. 2)	4
? Chalky Boulder Clay	Brown silty clay	(5. 8)	19	(7. 0)	23
Glacial Sand and Gravel	Medium sand and fine to coarse gravel subangular to subrounded flint and quartzite	(1. 8)	6	(8. 8)	29
London Clay	Firm brown clay becoming firm grey clay	(0. 9+)	3+	(9. 8)	32

No grading available

TL 72 SE 17 7924 2335 Baytree Farm, Braintree Block D

Surface level (+60.7 m) +199 ft
Water struck (+52.1 m) +171 ft
Wirth B0 8 in diameter
February 1969

Overburden (5.8) 19 ft
Mineral (4.6) 15 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(0.9)	3	(0.9)	3
Chalky Boulder Clay	Brown clay with flint and chalk pebbles	(4.9)	16	(5.8)	19
Glacial Sand and Gravel	Pebbly sand Gravel: fine to coarse subangular to subrounded flint and quartzite Sand: medium, fine and coarse grey brown to red/brown to yellow/brown	(4.6)	15	(10.4)	34
London Clay	Brown clay becoming firm, grey clay	(0.9+)	3+	(11.3)	37

	%	mm		%
Gravel	7	+16	:	1
		-16+4	:	6
Sand	84	-4+1	:	16
		-1+$\frac{1}{4}$	:	47
		-$\frac{1}{4}$+1/16	:	21
Fines	9	-1/16	:	9

Percentages

Depth below surface (ft)	Fines	Sand	Gravel
19-22	10	79	11
22-25	0	95	5
25-28	8	87	5
28-31	9	84	7
31-34	18	76	6

TL 72 SE 18 7985 2275 Stisted Cottage Farm, Braintree Block D

Surface level (+c. 61. 0 m) +c. 200 ft
Water level not recorded
Wirth B0 8 in diameter
February 1969

Waste (8. 2 m) 27 ft
Bedrock (0. 9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1. 2)	4	(1. 2)	4
Chalky Boulder Clay	Brown clay with flint and chalk pebbles	(5. 2)	17	(6. 4)	21
Glacial Sand and Gravel	Gravel, clayey at base Gravel: fine to coarse; subangular to subrounded flint and quartzite Sand: medium, coarse and fine; brown, clayey in parts	(1. 8)	6	(8. 2)	27
London Clay	Firm brown clay	(0. 9+)	3+	(9. 1)	30

	%	mm		%
Gravel	47	+16	:	20
		-16+4	:	27
Sand	45	-4+1	:	15
		-1+¼	:	22
		-¼+1/	:	8
Fines	8	-1/16	:	8

	Percentages		
Depth below surface (ft)	Fines	Sand	Gravel
21-24	6	46	48
24-27	11	43	46

TL 72 SE 19 7956 2148 Lanham Green, Cressing

Surface level (+65. 8 m) +216 ft
Water level not recorded
Wirth B0 8 in diameter
June 1969

Waste (11. 3 m) 37 ft
Bedrock (0. 9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Made Ground		(0. 9)	3	(0. 9)	3
Chalky Boulder Clay	Brown silty clay becoming grey silty clay with flints and chalk	(8.2)	27	(9.1)	30
	Clayey gravel	(2. 1)	7	(11. 3)	37
London Clay	Firm brown clay becoming firm grey clay	(0. 9+)	3+	(12. 2)	40

TL 72 SE 20 7941 2056 Shardloe's Farm, Cressing Block D

Surface level (+53.9 m) +177 ft
Water level not recorded
Wirth B0 8 in diameter
February 1969

Overburden (4.6 m) 15 ft
Mineral (3.7 m) 12 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Soil		(1.2)	4	(1.2)	4
Chalky Boulder Clay	Brown sandy clay with flints and chalk pebbles	(3.4)	11	(4.6)	15
Glacial Sand and Gravel	'Very clayey' pebbly sand Gravel: fine subangular to subrounded flint and quartzite Sand: Fine and medium, brown, very clayey	(3.7)	12	(8.2)	27
London Clay	Firm brown clay	(0.9+)	3+	(9.1)	30

	%	mm		%
Gravel	6	+16	:	3
		-16+4	:	3
Sand	60	-4+1	:	2
		-1+$\frac{1}{4}$	:	25
		-$\frac{1}{4}$+1/16	:	33
Fines	34	-1/16	:	34

Depth below surface (ft)	Percentages Fines	Sand	Gravel
15-18	26	66	8
18-21	52	41	7
21-24	14	86	0
24-27	45	48	7

Appendix G: List of Workings

The list of working and disused pits known to have worked the Glacial Sand and Gravel deposits in this area is shown below.

Working Pits

Name	Location
Beazley End Pit	735 289
Shalford Pit	722 286
Straits Mill Pit	770 247

Disused Pits

Name	Location
Codham Hall Pit	738 283
Rayne Road Pit	746 228
Wells Farm Pit	786 296

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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No. 1 The sand and gravel resources of the country south-east of Norwich, Norfolk: Description of 1 : 25 000 resource sheet TG 20. By E. F. P. Nickless. Price £1.15. Report No. 71/20

No. 2 The sand and gravel resources of the country around Witham, Essex: Description of 1 : 25 000 resource sheet TL 81. By H. J. E. Haggard. Price £1.20. Report No. 72/6

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INSTITUTE OF GEOLOGICAL SCIENCES

MINERAL ASSESSMENT UNIT

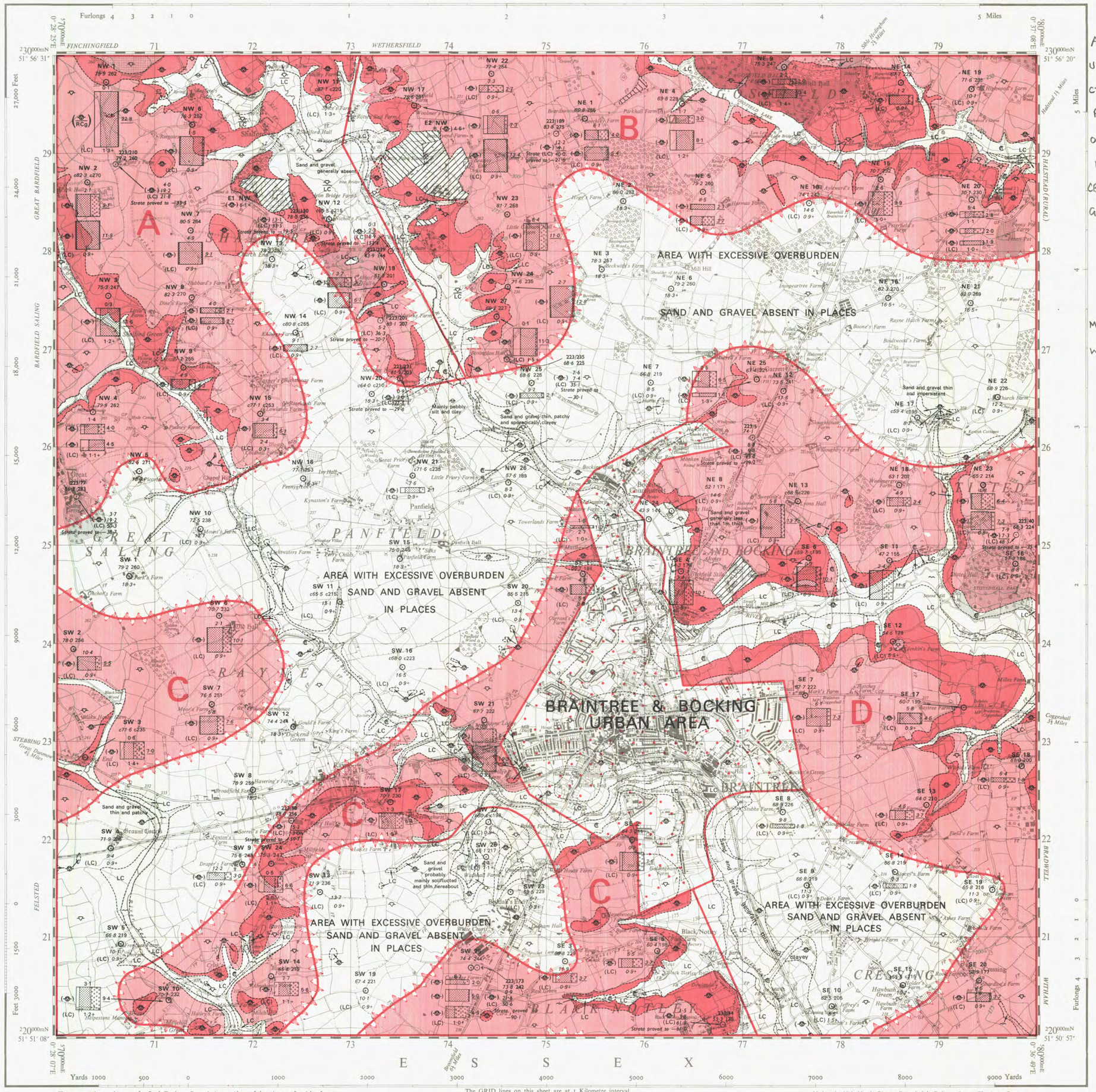
THE SAND & GRAVEL RESOURCES OF SHEET TL 72 (BRAINTREE, ESSEX)

16

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

ORDNANCE SURVEY
SHEET TL72
PROVISIONAL EDITION

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



EXPLANATION OF SYMBOLS AND ABBREVIATIONS

RECENT AND PLEISTOCENE / EOCENE

DRIFT

A-10	~	**Alluvium**- clays and silty clays with occasional pebbles.
UT-1	⅄	**Undifferentiated Terrace Deposits**- silty clays and clayey sand with some gravel.
CT-1	⅄	**Calcareous Tufa**- soft pale grey earthy calcareous deposits.
P-2	⌒	**Peat**- soft black partially decomposed organic matter.
OR-2	⌓	**Older River Deposits**- sandy clays with coarse gravel.
H-2	⌓	**Head**- clayey, pebbly silts and sands derived by solifluction from adjacent deposits.
CBC-4	⌓	**Chalky Boulder Clay**- brown and grey silty clay with pebbles of chalk, flint and quartzite.
GS-10	⌓	**Glacial Sand and Gravel**- clean poorly sorted sands and gravels comprising flint, vein-quartz and quartzite, including clean, well sorted fine to medium sands (? Chillesford Beds) which underly the Glacial Sand and Gravel in the NW part of the sheet area. (see Report)

SOLID

RCg		**Red Crag**- orange-brown sands with shell debris
LC		**London Clay**- bluish grey silty clay weathered brown at the surface. Cementstone nodules at some horizons.
MG-2		**Made Ground**
WO-1		**Worked-out Ground**

BOUNDARY LINES

- Geological boundary, Drift.
- Inferred boundary between categories of deposits recognized.
- Resource Block boundary and limit of assessed areas.

BOREHOLE DATA

SITE LOCATIONS

- ⊙ Mineral Assessment Unit (M.A.U.) Boreholes.
- ⊙ Other Boreholes.

M.A.U. BOREHOLES

Borehole Registration Number: NE 20
70·1 230 — Surface level in metres and feet above O.D. (Newlyn).
Borehole Site.
5·4 — Overburden.
Grading Diagram: 2·4 — Mineral (sand and gravel).
1·1 — Waste.
2·0 — Mineral (sand and gravel).
Geological Classification: 1·9
(LC) 1·0+ — Bedrock.
Thicknesses in metres

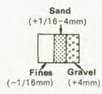
Note:
1. Figures underlined denote thicknesses used in the assessment of resources.
2. The + sign indicates that the base of the deposit was not reached.
3. The figures in *italics* are conversions to metres of measurements recorded in feet.
4. The Geological Classification is given only for mineral and bedrock.

Borehole Registration Number

Each M.A.U. borehole is identified by a Registration Number, e.g., NE 20. 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 NE 20 is TL 72 NE 20.

Grading Diagrams

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 proportions of **Fines** **Sand** and **Gravel**

OTHER BOREHOLES

The layout of information is the same as for M.A.U. boreholes, although data available may not be as comprehensive. They are registered in the same series, except for records in the Hydrogeological Department: for example **223/40** signifies Hydrogeological Department borehole 40 on New Series One-Inch Geological Sheet 223. The final depth of deep boreholes is quoted in metres above or below Ordnance Datum.

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 thickness are shown

CATEGORIES OF DEPOSITS

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

Where appropriate on other sheets, a fifth category; ' Discontinuous spreads of sand and gravel beneath overburden' is recognized.

RESOURCE BLOCKS

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

Any enquires concerning this map may be addressed to: Head, Mineral Assessment Unit. Institute of Geological Sciences, Exhibition Road, London. SW7 2DE.

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 C. R. Bristow and F. C. Cox in 1971 (mainly the south-western part), and by R. Allender and J. D. Ambrose in 1971-72 . S. C. A. Holmes, District Geologist. Included in One-Inch Geological Sheet 223.

Sand and Gravel Survey by J. D. Ambrose and N. E. Bradbury in 1969-70; Additional survey by M. R. Clarke in 1972. R. G. Thurrell, Head, Mineral Assessment Unit.

1:25 000 Sand and Gravel Resource Sheet, published 1975.
Sir Kingsley Dunham, D.Sc., F.R.S., Director, Institute of Geological Sciences, incorporating the Geological Survey of Great Britain, the Museum of Practical Geology and Oversees Geological Surveys.
1550/75

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 1915-21. Other partial systematic revision 1938-54 has been incorporated.

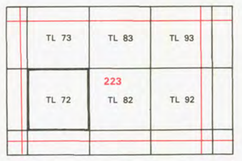


Diagram showing the relation of the National Grid 1:25 000 sheets with the One-Inch Geological Sheet 223.

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