

The sand and gravel resources of the country north of Harlow, Essex

Description of 1:25 000 resource sheet TL 41

P. M. Hopson

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

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

Any enquiries concerning this report may be addressed to Head, Industrial Minerals Assessment Unit, Institute of Geological Sciences, Keyworth, Nottingham NG12 5GG.

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 assessment of the resources of these minerals should be undertaken. The publication of information about the quantity and quality of deposits over large areas is intended to provide a comprehensive factual background against which planning decisions can be made.

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

This report describes the resources of sand and gravel of the country north of Harlow shown on the accompanying 1:25 000 resource sheet TL 41. The survey was by Mr P. M. Hopson assisted by Mr R. J. Marks and Mr J. W. Merritt. The work is based on a geological survey at the 1:10 560 scale in 1975–1976 by Dr B. Moorlock and Mr M. Heath of the East Anglia and South-Eastern England Unit. The inferred solid geology boundaries, based on the borehole data, are by Mr Hopson.

Mr J. W. Gardner, CBE, (Land Agent) was responsible for the negotiation of access to land for drilling. The ready cooperation of landowners and tenants in this work is appreciated. Information provided by members of the sand and gravel industry and by Hertfordshire and Essex County Councils is gratefully acknowledged.

Austin W. Woodland
Director

Institute of Geological Sciences
Exhibition Road
South Kensington
London SW7 2DE

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SUMMARY

The geological maps of the Institute of Geological Sciences, pre-existing borehole information and 98 boreholes drilled for the Industrial Minerals Assessment Unit, form the basis of the assessment of sand and gravel in the area north of Harlow, Essex.

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

The 1:25 000 map is divided into five resource blocks containing between 8.3 and 14.2 km² of sand and gravel. For each block the geology of the deposits is described and the mineral-bearing area, the mean thickness of overburden and mineral, and the mean gradings are stated. Detailed borehole data are also given. The geology, the position of the boreholes and the outlines of the resource blocks are shown on the accompanying map.

Bibliographic reference

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Note

All grid references quoted in this report fall within the 100-km grid square TL.

Author

P. M. Hopson, B.Sc
Institute of Geological Sciences
Keyworth, Nottingham NG12 5GG

INTRODUCTION

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

The survey provides information at the 'indicated' level 'for which tonnage and grade are computed partly from specific measurements, samples or production data and partly from projection for a reasonable distance on 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' (Bureau of Mines and Geological Survey, 1948, p. 15).

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

- a The deposit should average at least 1 m in thickness.
- b The ratio of overburden to sand and gravel should be no more than 3:1.
- c The proportion of fines (particles passing the No. 240 mesh BS sieve, about $\frac{1}{8}$ mm) should not exceed 40 per cent.
- d The deposit must lie within 25 m of the surface, this being taken as the likely maximum working depth under most circumstances. It follows from the second criterion that boreholes are drilled no deeper than 18 m if no sand and gravel has been proved.

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

For the particular needs of assessing sand and gravel resources, a grain-size classification based on the geometric scale $\frac{1}{8}$ mm, $\frac{1}{4}$ mm, 1 mm, 4 mm, 16 mm has been adopted. The boundaries between fines (that is,

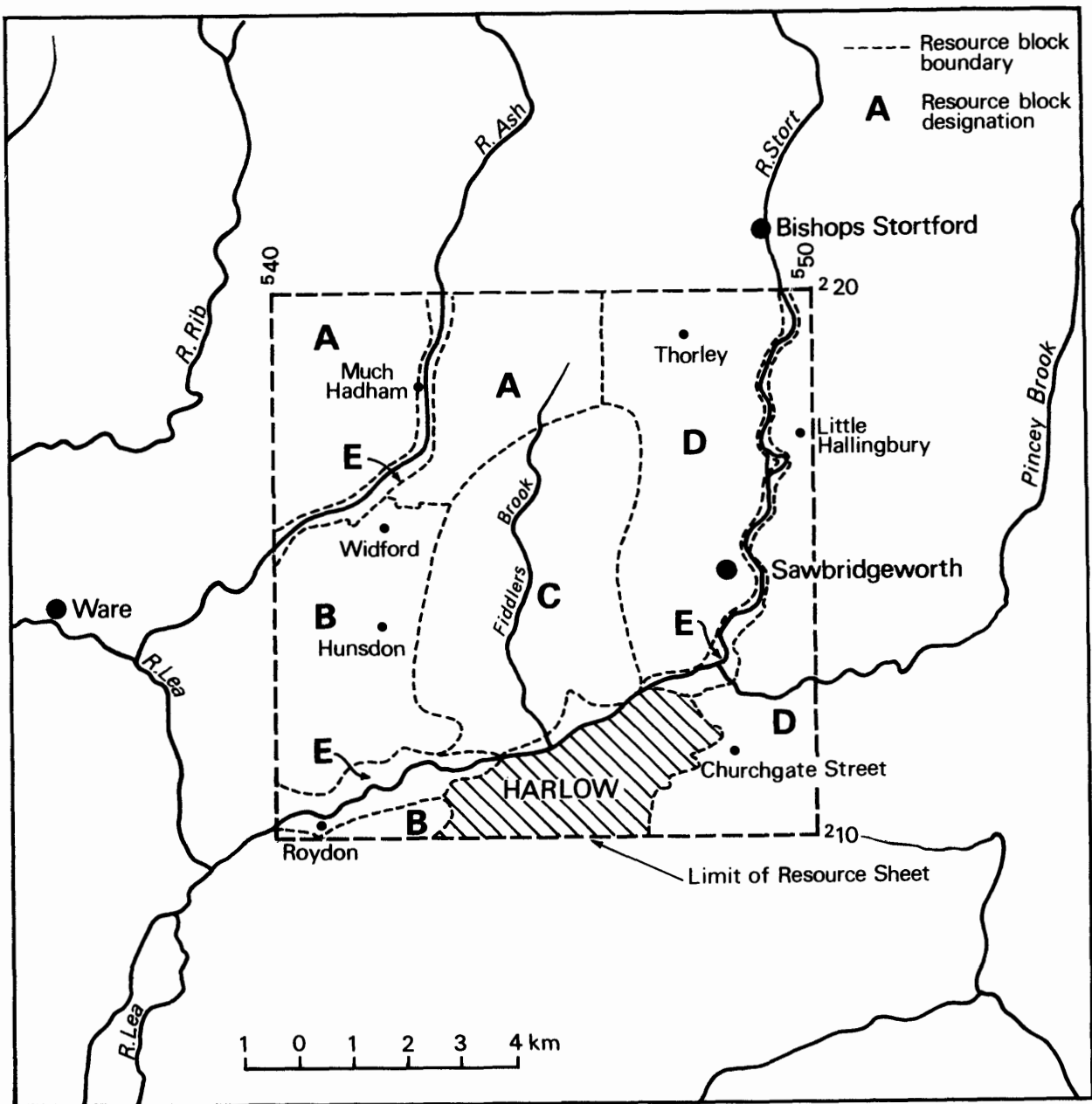


Figure 1 Sketch-map showing the location of sheet TL 41 and the position of the resource block boundaries

the clay and silt fractions) and sand, and between sand and gravel grade material, are placed at $\frac{1}{8}$ mm and 4 mm respectively (see Appendix C).

The volume and other characteristics are assessed within resource blocks, each of which, ideally, contains approximately 10 km² of sand and gravel. No account is taken of any factors, for example, roads, villages 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 actual sample points.

DESCRIPTION OF RESOURCE SHEET

GENERAL

The resource sheet (TL 41) covers 100 km² of country north of Harlow, Essex, (see Figure 1) of which 57.6 km² is gravel-bearing. Harlow is 25 km west of Chelmsford, Essex, and some 34 km north-east of central London. Both glacial and fluvial deposits have been assessed, the latter, associated with the rivers Ash and Stort, being found only within block E.

No assessment has been made of the northern built-up area of Harlow New Town, lying within the demarcated planning boundary of 1981.

TOPOGRAPHY

The area consists of a plateau of Boulder Clay which generally lies between 76 m (250 ft) and 91 m (300 ft) Ordnance Datum and which slopes gently to the south. It has been dissected by the River Ash in the north-west and by the River Stort (see Figure 2). Exceptionally, the plateau rises above 91 m (300 ft) Ordnance Datum in three areas; at Jobbers Wood [457 196] and Mathams

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MAP

The sand and gravel resources of the country north of Harlow, Essex *in pocket*

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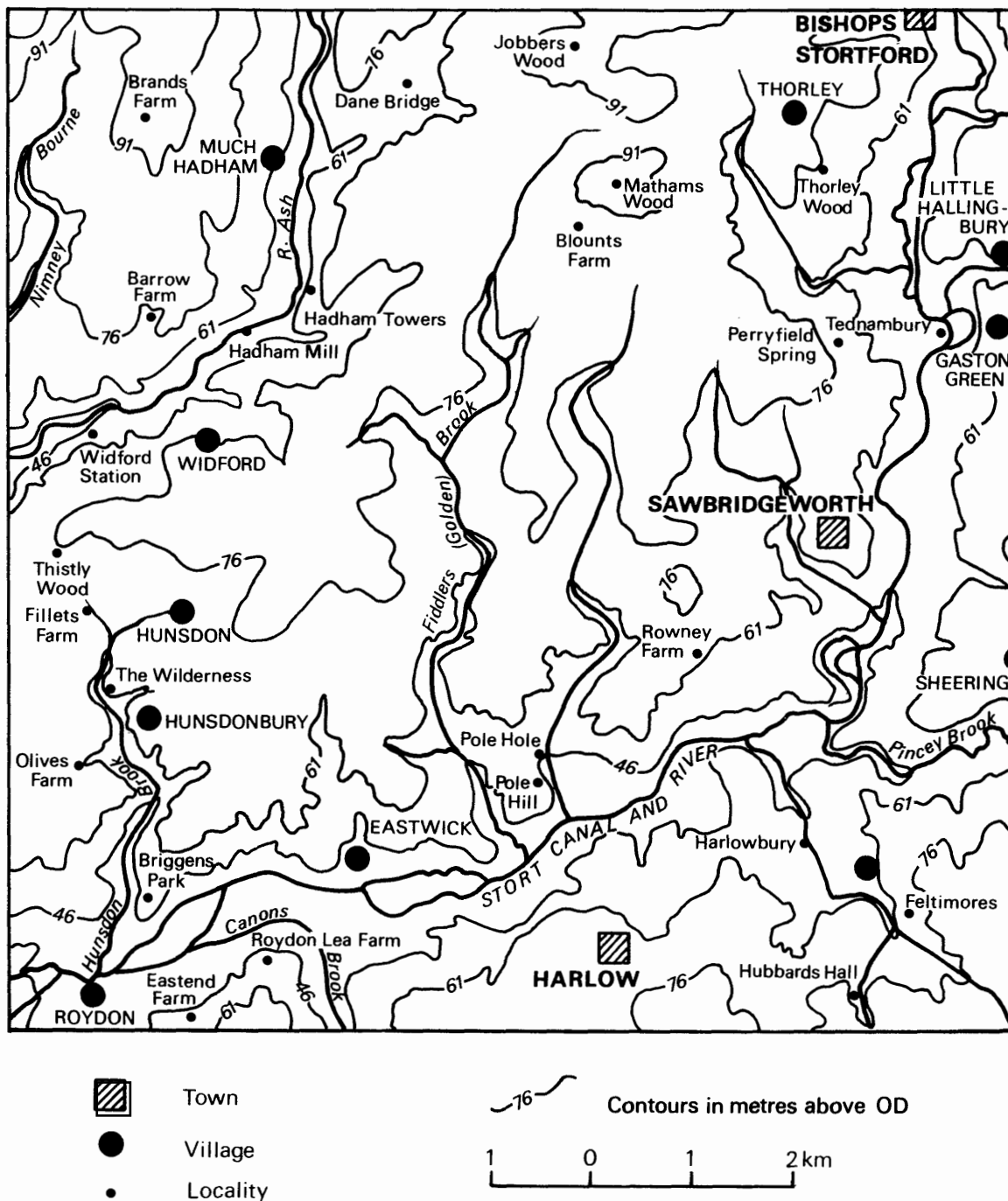


Figure 2 The topography in the area of sheet TL 41 showing the locations mentioned in the text

Wood [460 185] near Thorley, and at Brands Farm [413 191], Much Hadham, where the maximum elevation of 98 m (320 ft) Ordnance Datum is reached.

The south-westward flowing River Ash falls from about 60 m (197 ft) Ordnance Datum at Much Hadham to 38 m (125 ft) Ordnance Datum south-west of Widford, a distance of 6 km. This stream flows in a steep-sided valley in the area of Widford Station [408 158]. It is joined by a number of unnamed tributaries around Much Hadham and Widford. The deeply incised valley of the Nimney Bourne, whose headwaters drain much of the Boulder Clay country westward of Much Hadham, joins the Ash just beyond the western boundary of the sheet.

The largest river, the River Stort, earlier in its history flowed from Bishops Stortford to Harlowbury [480 120] in a deeply incised tunnel valley (See Figure 3 and Woodland, A. W., 1970), which was subsequently infilled with thick glacial deposits. However, it now

flows in a broad valley over a veneer of its own fluvial deposits. The river, much of which was canalised in the late 1800's falls from 60 m (197 ft) Ordnance Datum at Bishops Stortford to about 30 m (99 ft) Ordnance Datum at Roydon, a distance of 17 km. Small tributaries join it on both banks, notably the Pincey, Fiddlers (Golden) and Canons brooks, which flow into the main stream north-east, north and west of Harlow respectively (Figure 2).

GEOLOGY

The assessment of resources is based on geological mapping at the six-inch scale by Dr B. Moorlock and Mr M. Heath in 1975–1976. The original Old Series one-inch geological survey by Messrs W. Whitaker, W. H. Penning, W. H. Dalton and F. J. Bennett was published in 1881 and the Drift edition in 1884. A geological classification of the deposits mapped is given in Table 1.

Table 1 Classification of mapped deposits; thicknesses quoted in metres

		Maximum recorded thickness m
DRIFT		
Recent and Pleistocene	Alluvium (including underlying terrace gravels)	8.1
	River Terrace Deposits	
	First Terrace	5.0*
	Second Terrace	1.3
	Undifferentiated Terrace	2.5*
	Head	3.9
	Head Gravel	6.3
	Lacustrine Deposits	15.2+†
	Boulder Clay	27.1
	Glacial Sand and Gravel	15.1
SOLID		
Eocene	London Clay	20.0
	Lower London Tertiaries	
	Woolwich and Reading Beds	17.0
	Thanet Beds (including Thanet Sand and the Bullhead Bed)	12.8
Upper Cretaceous	Upper Chalk	60.0

* The thickness of these deposits has been estimated as no borehole information is available.

† The base was not reached.

SOLID

The higher zones of the Upper Chalk, the Thanet Beds, the Woolwich and Reading Beds and the lowest part of the London Clay, with its associated Basement Bed, are represented in the area of Sheet TL 41 (see Figure 4). The low regional dip is estimated to be a few degrees to the south-east.

Upper Chalk:

The Upper Chalk is a soft white well-bedded and jointed limestone with beds and courses of nodular and thin tabular flint. Its thickness in the area of sheet TL 41 is of the order of 60 m (see non-IMAU borehole record TL 41 NW 43 [4196 1662]). Upper Chalk is only exposed in the north-west quadrant of the sheet but it subcrops under Pleistocene and Recent deposits in the extreme south-west and in the deep, drift-filled, Stört channel from Bishops Stortford to Harlowbury.

Numerous small exposures of Upper Chalk occur in the area around Much Hadham and Widford, and also in the deeply incised Nimney Bourne at Nobland Green [401 176].

Lower London Tertiaries:

The Lower London Tertiaries comprise two formations: the Thanet Beds, and the Woolwich and Reading Beds. Summaries of lithologies present on sheet TL 41 are given below but more detailed work has been published by Prestwich (1850, 1852, 1854) and other work comprehensively reviewed by Hester (1965).

Thanet Beds: This formation rests disconformably on the eroded surface of the Chalk. The base is marked by a well-developed flint pebble bed, with glauconitic quartz sand matrix (the Bullhead Bed). It reaches a

maximum recorded thickness in IMAU boreholes SW 17 [4072 1065] and SW 22 [4135 1062] of 0.5 m. The Thanet Sand above comprises drab olive green fine and medium glauconitic sands with varying amounts of silt and clay. The sands are commonly micaceous, and sometimes burrowed and finely bedded.

There is no exposure of the Thanet Beds, but from borehole data they are known to thin towards the north-west. Borehole records from Rowney Farm (SE 78 [4697 1372]) and north of Widford (NW 44 [4222 1658]) proved 8.2 m and 4.9 m of Thanet Beds respectively, but only the Bullhead Bed, overlain by Woolwich and Reading Beds clays, is present in IMAU borehole NW 4 [4068 1683]. In borehole NW 11 [4232 1989] the Woolwich and Reading Beds rest directly on the Upper Chalk.

Woolwich and Reading Beds: With the exception of an exposure [4305 1776] of clayey micaceous sand in a drainage ditch north of Hadham Towers Pit, this formation is concealed beneath drift deposits. From borehole data, the Woolwich and Reading Beds are represented by up to 17.0 m of very variable deposits, which may be divided into two broad lithological units: a lower sand and clayey sand unit and an upper mottled clay unit.

The lower unit comprises fine to medium-grained micaceous sand with varying amounts of silt and clay. Generally pale green, the unit can be mottled in a wide variety of colours. Up to three flint pebble beds with well rounded pebbles are found near the base; the lowest, except in the extreme NW, rests on the Thanet Beds.

The upper unit of mottled, waxy, stiff clays rests conformably on the lower predominantly sandy unit. The clay is generally brown mottled red and green but a wide variety of bright colours have been noted. It is in places sandy and silty and is rarely packed with concretionary carbonate nodules and bivalve shells.

London Clay

The London Clay which forms rock-head over much of the sheet rests without apparent break on the Woolwich and Reading Beds.

The lowest beds of the London Clay, commonly between 4.0 m and 5.0 m thick, are characteristically dark greyish green, clayey, silty, pyritic fine-grained sands and are called the Basement Bed. A pebble bed of black and brown well-rounded flints marks the base. It was formerly exposed at the Gaston Green Pit [4950 1625] and the Hadham Towers Pit [4310 1746].

Higher beds of the London Clay are firm, often fissured, bluish grey and dark grey clays, which often contain selenite crystals and pyrite nodules. When exposed as at Eastend Farm [419 101] and in Fiddlers (Golden) Brook [445 140], the London Clay is weathered to brown mottled yellowish brown silty clay.

A fossiliferous, waxy reddish brown clay, approximately 5.0 m in thickness, occurs in the valley from Feltimores [490 112] to Hubbards Hall [484 104]. It is probable that the maximum thickness (20.0 m+) of London Clay on this sheet occurs in this area.

DRIFT

Glacial Sand and Gravel

The deposits of Glacial Sand and Gravel represent the main resource of aggregate in the area of sheet TL 41.

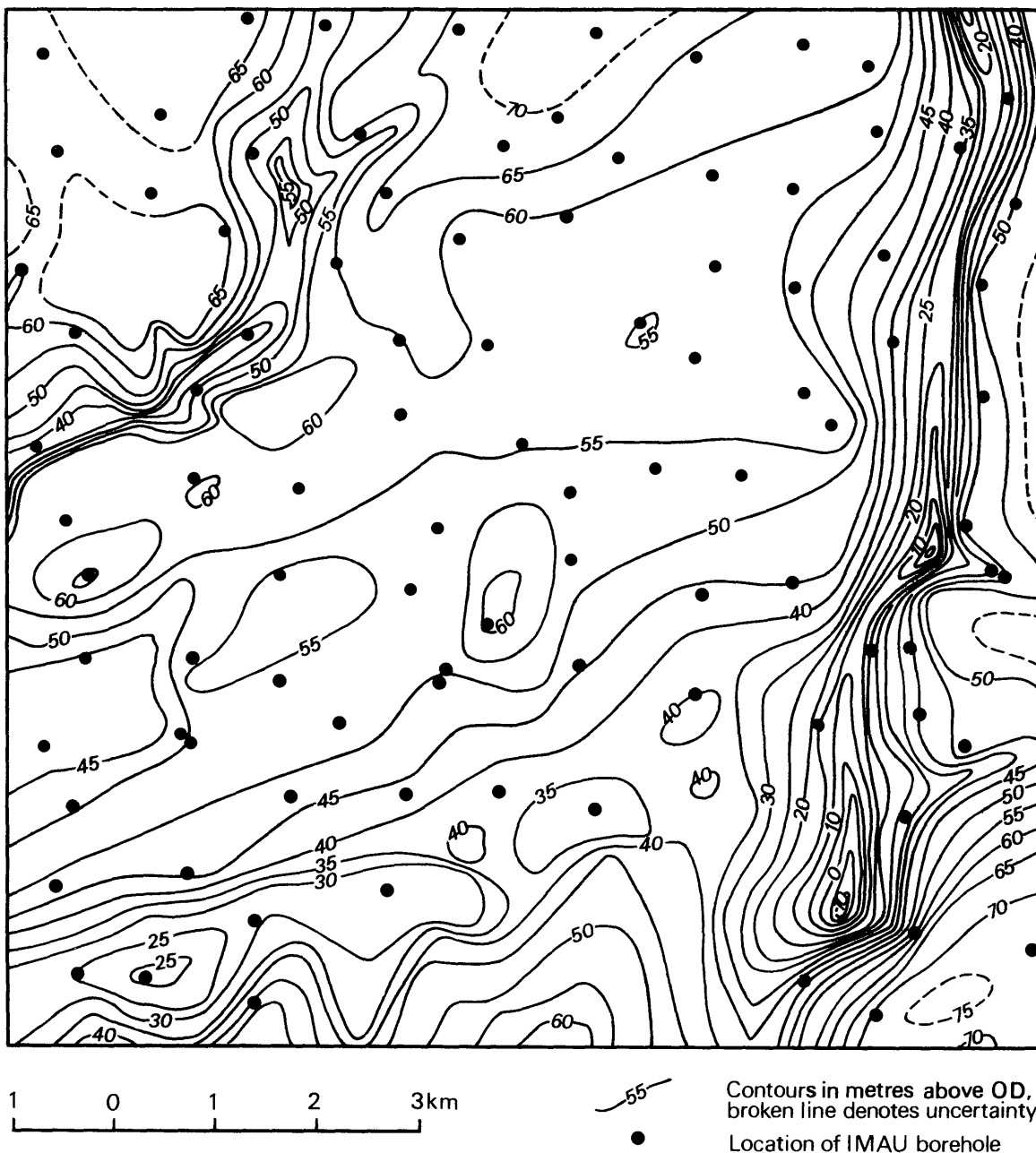


Figure 3 Contours on the sub-drift surface

They are now, however, only being worked at the Gaston Green Pit [495 164]. Aggregate has also been won, in the past, from pits at Hadham Towers [430 170] and Pole Hill [452 123, 458 128] and to a lesser extent from a pit [442 197] north-east of Dane Bridge.

The mineral is heterogeneous, ranging from sand to sandy gravel and gravel, generally 'clayey' or 'very clayey' (see Figure 11), and is often ironstained. Where ironstaining is heavy, as in the west and south-west of the sheet area, the deposit becomes locally cemented into a hard ferrocrete rock. This rock occurs particularly where the deposit is classified as sandy gravel and gravel.

Beds of silt, sometimes laminated and cross-bedded, occur locally in the sand and gravel as in IMAU borehole SW 21 [4178 1165] and in the pits at Hadham Towers and Gaston Green. At Hadham Towers a bed of finely laminated silt (see Figure 5) with chalky sand seams is intercalated between two beds of sandy gravel.

The pit north-east of Dane Bridge shows 4 m of 'clayey' sandy gravel resting on chalky Boulder Clay, and as with the sandy gravels at Hadham Towers, many derived fossil fragments are present.

The only other current exposure is at Gaston Green Pit where up to 5.5 m of sand and sandy gravel, cross-bedded on a large scale with units up to 1 m in thickness, are seen. In the north-east corner of this exposure 4 m of bedded gravel and sand, overlain by a structureless 'very clayey' gravel, rest with a sharp junction on laminated chalky silts similar to those of Hadham Towers Pit.

The origin of seams of chalky Boulder Clay found within the Glacial Sand and Gravel in many of the boreholes is conjectural; they are probably flow tills (Boulton, 1972).

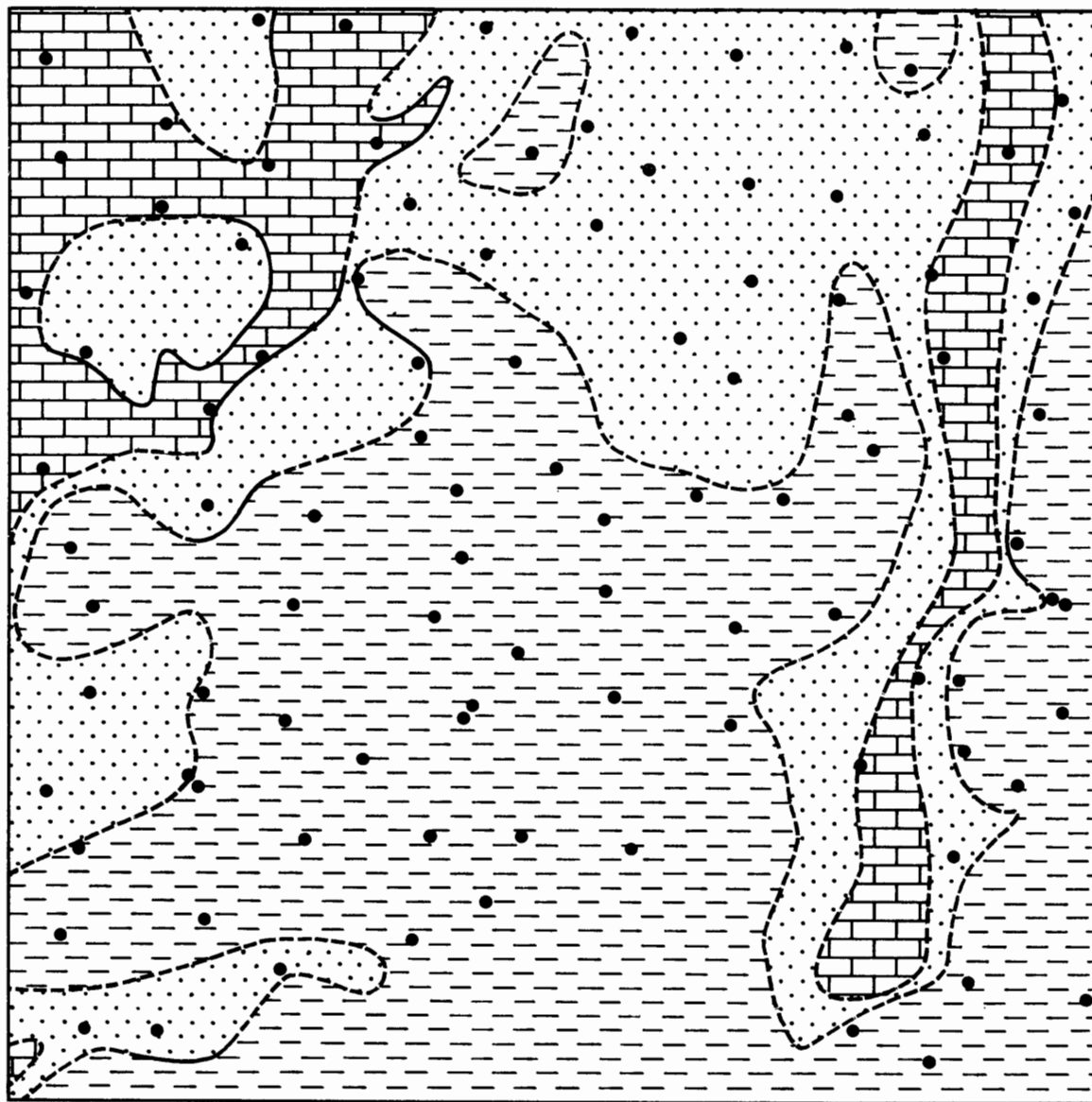


Figure 4 Sketch-map showing the sub-drift geology of sheet TL 41 incorporating new information from IMAU boreholes

Boulder Clay

The Boulder Clay is usually a grey to bluish grey stiff chalky clay with some silt and rarely sand. It contains many pebbles predominantly of rounded to angular flint, and rounded quartz and quartzite with scattered clasts of varying angularity and shape, of schist, limestone, mudstone and sandstone. Rarely, a bluish black very stiff clay with sand-sized chalk pellets is developed near the base of the Boulder Clay (e.g. IMAU borehole SW 25 [4272 1236]); it is often packed with quartz pebbles and fossil debris.

On weathering, the bulk of the Boulder Clay becomes ochre brown in colour but grey mottling persists around unleached chalk pellets. Weathering from the surface is generally up to 3m deep but exceptionally it is greater, as in IMAU borehole NE 22 [4663 1660], where it was proved to 7.9 m.

Occasionally the Boulder Clay becomes very silty and sandy and lenses of chalk gravel occur in some boreholes (e.g. NE 16 [4539 1795]). These gravels are usually saturated with water under sub-artesian head.

In boreholes NE 23 [4627 1552] and SW25 [4272 1236], rafts of Chalk and London Clay respectively were encountered.

The Boulder Clay appears to cut down into and in some cases through (e.g. NE 32 [4848 1760]) the underlying Glacial Sand and Gravel.

Clayton (1957) considered the Boulder Clay above the Glacial Sand and Gravel to be the equivalent of the Springfield Till. The Boulder Clay underlying the Glacial Sand and Gravel, and termed by Clayton the Maldon Till, is impersistent and proved only in a few boreholes on the western margin of this sheet.

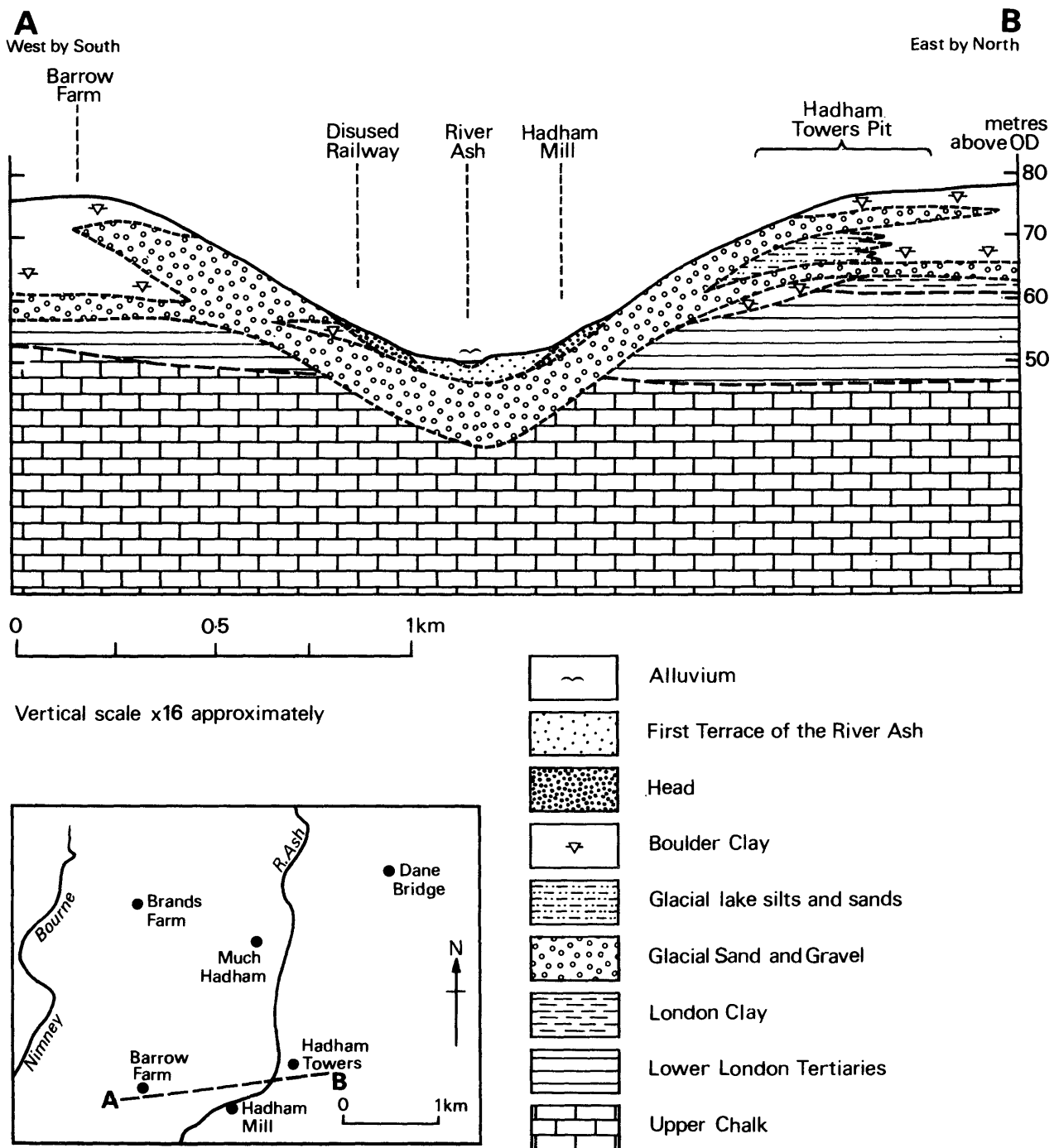


Figure 5 Sketch-diagram to demonstrate the probable relationship of the drift deposits in the vicinity of Barrow Farm to those at Hadham Towers

Lacustrine Deposits

The only exposure of these deposits is in a ditch eastward of Perryfield Spring [485 168] but they have also been proved in the nearby IMAU borehole NE 33 [4856 1676]. The ditch section shows dark brown to pale grey silty laminated clay and fine shelly sand with beds of thin peat containing wood, rootlets, mosses, seeds and bones.

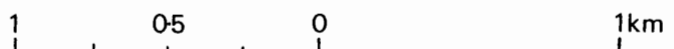
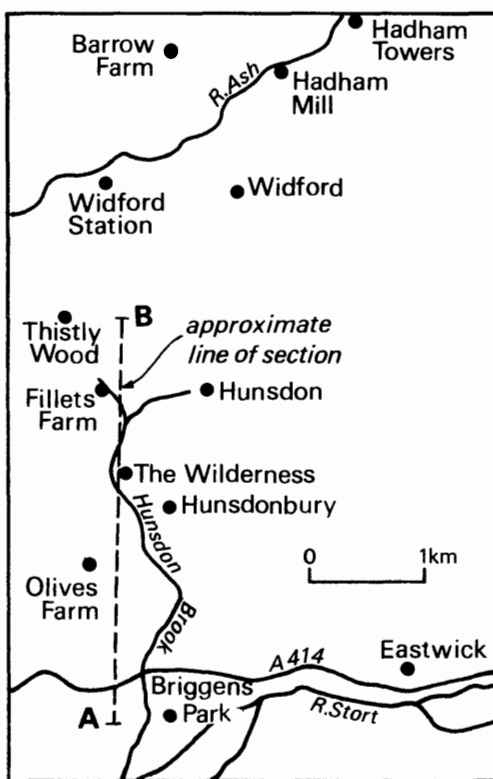
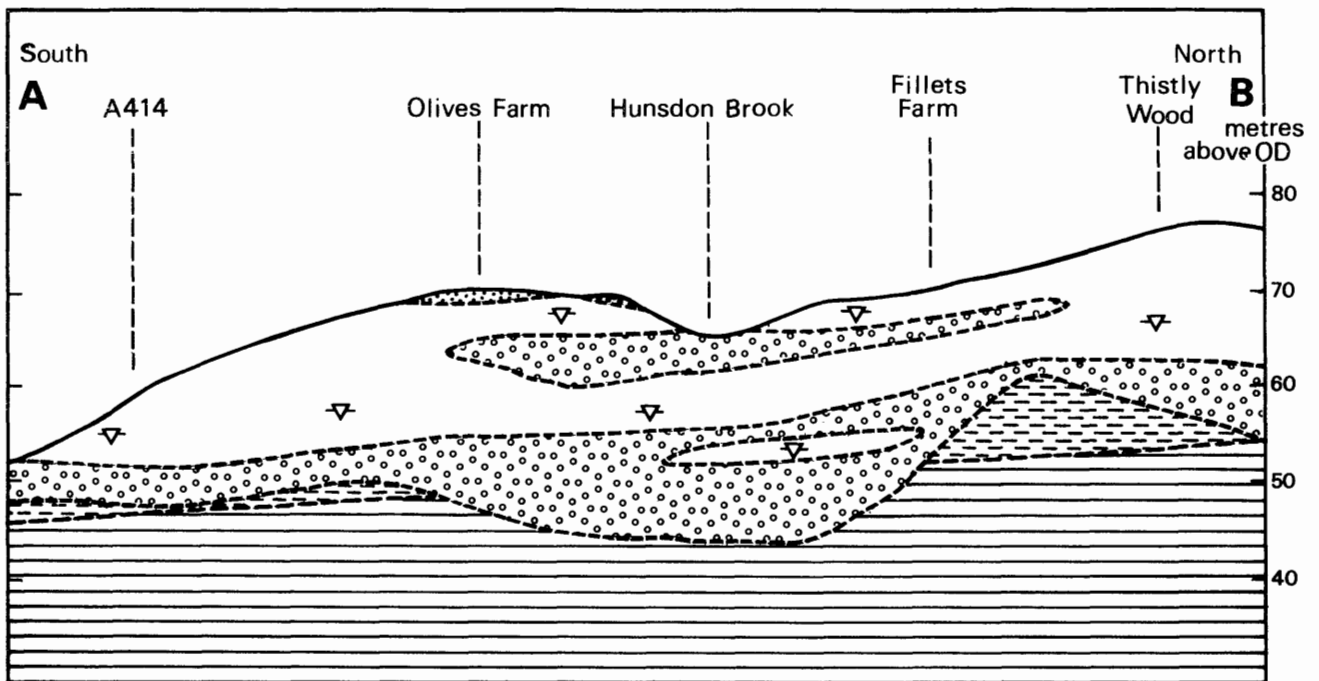
Head Gravel

These are poorly sorted, and apparently structureless, clayey, angular to rounded gravels with varying amounts of sand, which overlie both the Boulder Clay and Glacial Sand and Gravel. The only small exposure of this material, at the junction [498 187] of Port Lane and the B1005 near Little Hallingbury, shows 1.5 m of clayey fine angular flint gravel resting on decalcified

Boulder Clay. The maximum recorded thickness, 6.3 m, is in IMAU borehole NE 36 [4977 1813] where 2 m of 'clayey' sandy gravel rests on 2 m of sand and silt and this on 2.3 m of 'clayey' pebbly sand. These gravels occur in patches around Little Hallingbury [500 176], Hunsdon [416 141] and Churchgate Street [485 115]. Their origin is not clear but their structureless nature and poor sorting at outcrop suggest that they may have been deposited during the melting of dead ice.

Head

Head of dominantly sandy silt is well developed in the valleys of the rivers Stort and Ash. It is however variable in composition being predominantly gravelly when overlying Glacial Sand and Gravel and clayey when overlying either Boulder Clay or London Clay. In



Vertical scale x16 (approximately)

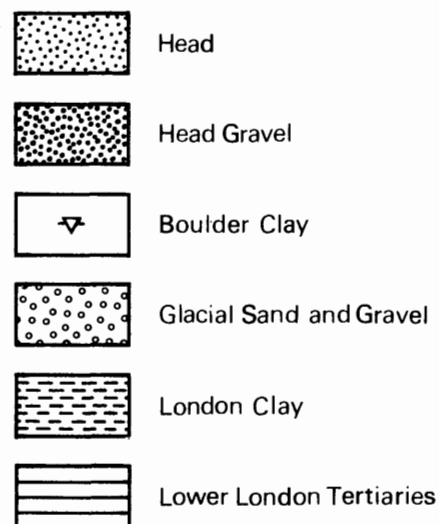


Figure 6 Sketch-diagram from Thistly Wood to the A414 demonstrating the relationship between the drift deposits

some areas, as at Tednambury [491 169] and Eastend Farm [419 101], very clayey Head is directly derived from the London Clay.

Numerous patches of Head have been mapped at high elevations on the Boulder Clay plateau, principally at Jobbers Wood [457 196], Blounts Farm [460 175] and Olives Farm [405 126]. IMAU boreholes and IGS trial pits have shown them to be composed of occasionally laminated brown silts, and silty clays.

River Terrace Deposits

Terraces are found along the valleys of the River Stort and River Ash where the First and Second Terraces form low features, 1 to 2 m and 3 to 4.5 m, respectively,

above the flood plain.

The Undifferentiated Terrace [429 181] mapped at Much Hadham is an erosional feature 2 to 3 m above the flood plain and may be a remnant, left by the meandering River Ash, of a once continuous sheet of Glacial Sand and Gravel.

The First and Second terraces are typically gravelly and chalky and usually clayey and silty in the topmost metre. In the valley of the River Stort the First Terrace has been worked [495 195] at Bishops Stortford, the Second Terrace [410 103] at Roydon and both at Sheering [485 136]: the First Terrace of the River Ash has been dug [423 168] at Widford.

Table 2 Mean percentage composition by weight of mineral, by block and type of deposit

Block	Chalk	Flint and chert	Quartz and quartzite	Fossil debris	Sandstone	Others*
A	6	61.25	22	0.25	6	4.5
B	13	62	14	1	6	4
C	2	71	17	—	6	4
D	5	63.25	18.25	0.5	8	5
E	10.25	72	9	0.5	4.25	4
A to E	7	66	16.5	0.5	6	4

Deposit type	Chalk	Flint and chert	Quartz and quartzite	Fossil debris	Sandstone	Others*
Glacial Sand and Gravel	7.5	64	17	0.5	7	4
Alluvium†	3.5	79	11	—	3.5	3
First and Second Terrace	—	86.5	8	—	3	2.5
Head Gravel	1	81	8	—	6	4

* Including limestone, igneous, metamorphic, etc.

† Including underlying terrace gravel

Alluvium (including underlying terrace gravels)

In general, the Alluvium is represented by silty sandy clay with Recent gastropod shells and seams of chalky sand resting on variable thicknesses of peat and chalky, flinty terrace gravel.

Large spreads of Alluvium occur in the River Stort valley but in the valley of the River Ash the Alluvium forms a narrow sinuous belt closely following the present stream. The Alluvium is generally thin but, where the underlying terrace gravels are thick, up to 8.1 m of deposits have been proved (e.g. SW 17 [4072 1065]).

COMPOSITION OF SAND AND GRAVEL DEPOSITS

Deposits of Pleistocene and Recent age cover 98 per cent of the resource sheet. Of the nine formations mapped, six contain potentially workable sand and gravel: Glacial Sand and Gravel, Head Gravel, three terraces of different ages and the terrace gravels underlying the Alluvium.

The potentially workable sand and gravel deposits are predominantly composed of flint with varying amounts of chalk, quartz, quartzite, sandstone and traces of mudstone, limestone, metamorphic and igneous rocks. The Glacial Sand and Gravel has supplied much of the material from which the other gravels are derived. Although upon reworking the soft deleterious (for aggregates), less durable, material is usually destroyed, the sand and gravel underlying the Alluvium contains some chalk.

Table 2 shows the percentage composition, by weight, of mineral by block and type of deposit, based on a count of all samples within the range 4 mm to 16 mm. Of the five blocks, block E shows the greatest deviation from the mean, having a higher content of flint and less sandstone, quartz and quartzite than any other block.

Figure 7 shows the grading characteristics of mineral in IMAU boreholes in the area of sheet TL 41.

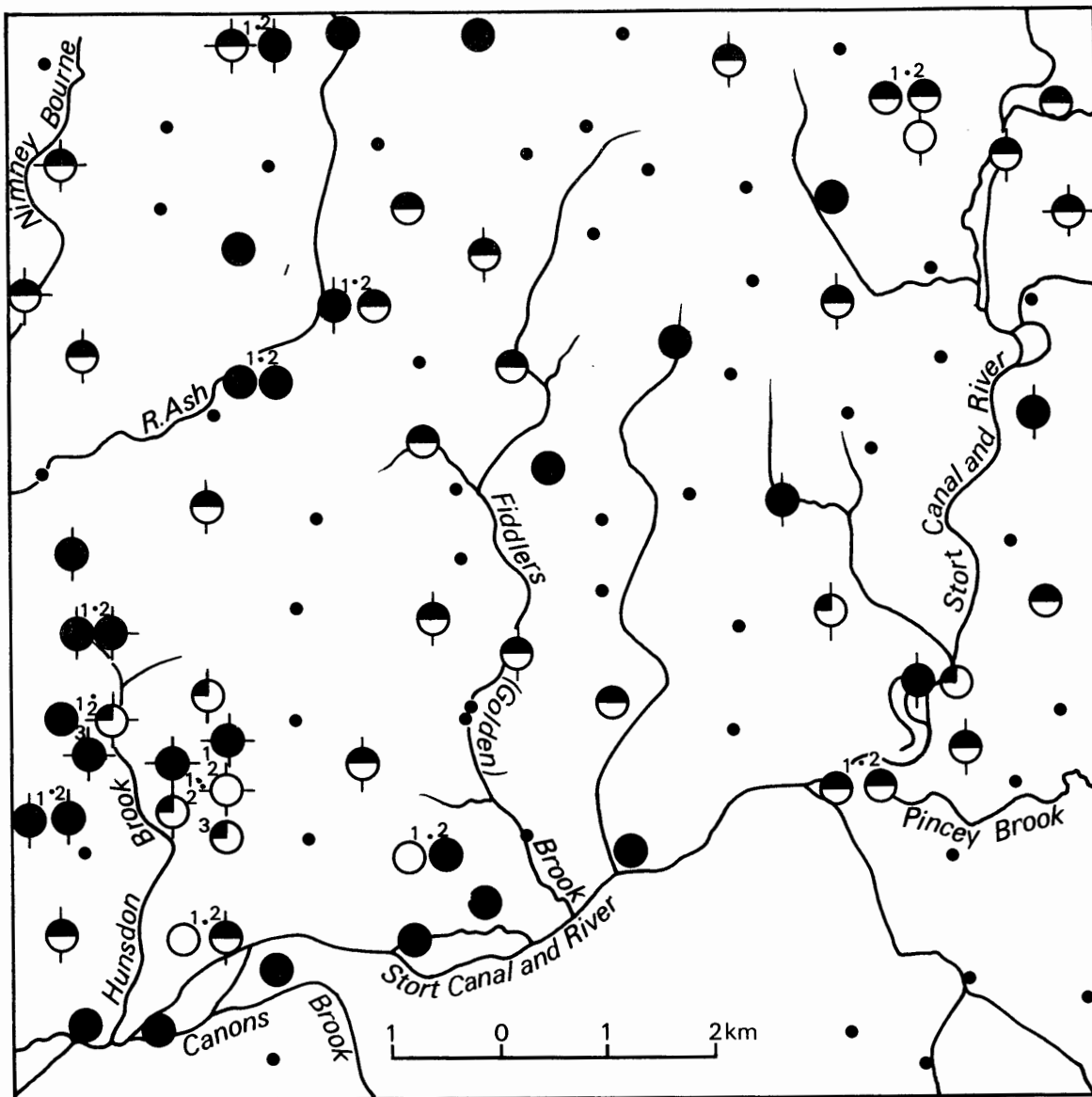
Glacial Sand and Gravel: All twelve IMAU mineral categories have been proved within the Glacial Sand and Gravel, demonstrating the extreme variability of this deposit on sheet TL 41. However, the categories gravel, sandy gravel and 'clayey' sandy gravel represent 62 per cent of the proved mineral while sand, 'clayey' sand and 'very clayey' sand represent only 8 per cent.

The gravel fraction is composed of angular to sub-angular with some rounded, black, brown and white flint, with rounded to well rounded white, pale brown and occasionally red quartz, and purple, grey or liver-coloured quartzite. Some pebbles of rounded white and pale yellow chalk, and subrounded to tabular sandstone occur. A trace of fossil debris occurs in 50 per cent of the IMAU boreholes usually in the form of fragmentary belemnite guards and thick-shelled bivalves. Mudstone, limestone and various igneous and metamorphic rocks were represented by a few pebbles in most of the samples.

The sands are predominantly medium-grained with fine and some coarse grades. Generally the sand is sub-angular to rounded quartz with some angular flint and a trace of chalk and sandstone. However, the coarse sand, when present in significant quantities, is composed of equal proportions of angular flint and sub-rounded to rounded quartz.

Some ironstaining and cementing does occur but is only pronounced in the Hunsdon and Widford areas near the western margin of the sheet (see for example: IMAU borehole NW 2 [4050 1862]).

Occasionally gravels with a very high chalk content (for example 68 per cent in IMAU borehole SW 23 [4262 1449]) are found but they usually occur in association with the Boulder Clay and not the Glacial Sand and Gravel. They are considered to be proximal outwash gravel derived from the chalky till.



- | | | | |
|---|--------------|----------------|--|
| ○ | Sand | ○ | 'Clayey' |
| ◐ | Pebbly sand | ◐ | 'Very clayey' |
| ◑ | Sandy gravel | ● ₁ | Superposition of distinct beds
of mineral with borehole
location |
| ● | Gravel | ○ ₂ | |
| | | ● | Borehole proving non-mineral |

Figure 7 Grading characteristics of sand and gravel (mineral) proved in IMAU boreholes, expressed as the mean grading of each distinct bed of mineral

Head Gravel: Only one borehole (NE 36 [4977 1813]) was drilled in undoubted Head Gravel. The mineral falls within the category 'very clayey' sandy gravel, and is predominantly of flint with some quartz, quartzite and sandstone, and a trace of chalk. The sand is predominantly medium-grained with fine and some coarse grade ironstained quartz, with some flint.

First and Second Terrace: These deposits have a very high flint content (> 85 per cent) with some quartz and quartzite, and a trace of sandstone. The sand is predominantly of rounded quartz with rounded to subangular flint and a trace of subangular sandstone. The two IMAU boreholes SE 42 [4847 1404] and NW 14 [4231 1679] proved 'clayey' gravel and gravel respectively.

Alluvium (including underlying terrace gravels). Five boreholes drilled in the lower reaches of the River Stort proved sand and gravel underlying a silty sandy clay and peat. The sand and gravel deposits proved all fall within the category gravel and have a composition intermediate between terrace and Glacial Sand and Gravel. They have a high pebble content (mean of 61 per cent) composed predominantly of flint (79 per cent) with some rounded quartz, quartzite and sandstone and a trace of rounded chalk.

The sand is medium and coarse grained with a trace of fine grade and it is composed of angular flint and rounded quartz in equal proportions with a trace of chalk and sandstone.

Table 3 The sand and gravel resources of sheet TL 41: summary of statistical results

Resource Block	Area		Mean thickness		Volume of mineral			Mean grading percentage		
	Block km ²	Mineral km ²	Overburden m	Mineral m	m ³ ×10 ⁶	Limits at the 95% confidence level		Fines - $\frac{1}{8}$ mm	Sand +16-4 mm	Gravel +4 mm
						±%	± m ³ ×10 ⁶			
A	19.6	11.5	7.1	6.3	72	24	17	12	46	42
B	14.7	12.0	6.9	6.8	82	35	29	14	51	35
C	19.1	11.6	9.5	5.6	65	20	13	8	49	43
D	29.8	14.2	6.7	6.5	92	19	18	11	54	35
E	8.7	8.3	1.6	4.2	35	47	16	7	43	50
A to E	91.9	57.6	6.1	5.8	334	13	43			

THE MAP

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

Geological data: The geological boundary lines, symbols, etc., shown are taken from the geological maps of this area, which was surveyed at the scale of 1:10 560 in 1975-1976. Borehole data, which include the stratigraphic relation and mean particle-size distribution of the sand and gravel samples collected during the assessment survey, are also shown.

The geological boundaries represent the best available interpretation of the information available at the time of survey. However, it is inevitable, particularly with glacial deposits (such as those in the area of sheet TL 41) which change rapidly vertically and laterally, that local irregularities or discrepancies will be revealed by some boreholes (for example, in boreholes SE 39 and SW 27). 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 beneath overburden. The mineral is identified as 'exposed' where the overburden, commonly consisting only of soil and subsoil, averages less than 1 m (3.25 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 that did not find potentially workable sand and gravel and the distribution of barren boreholes within the 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 the 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.

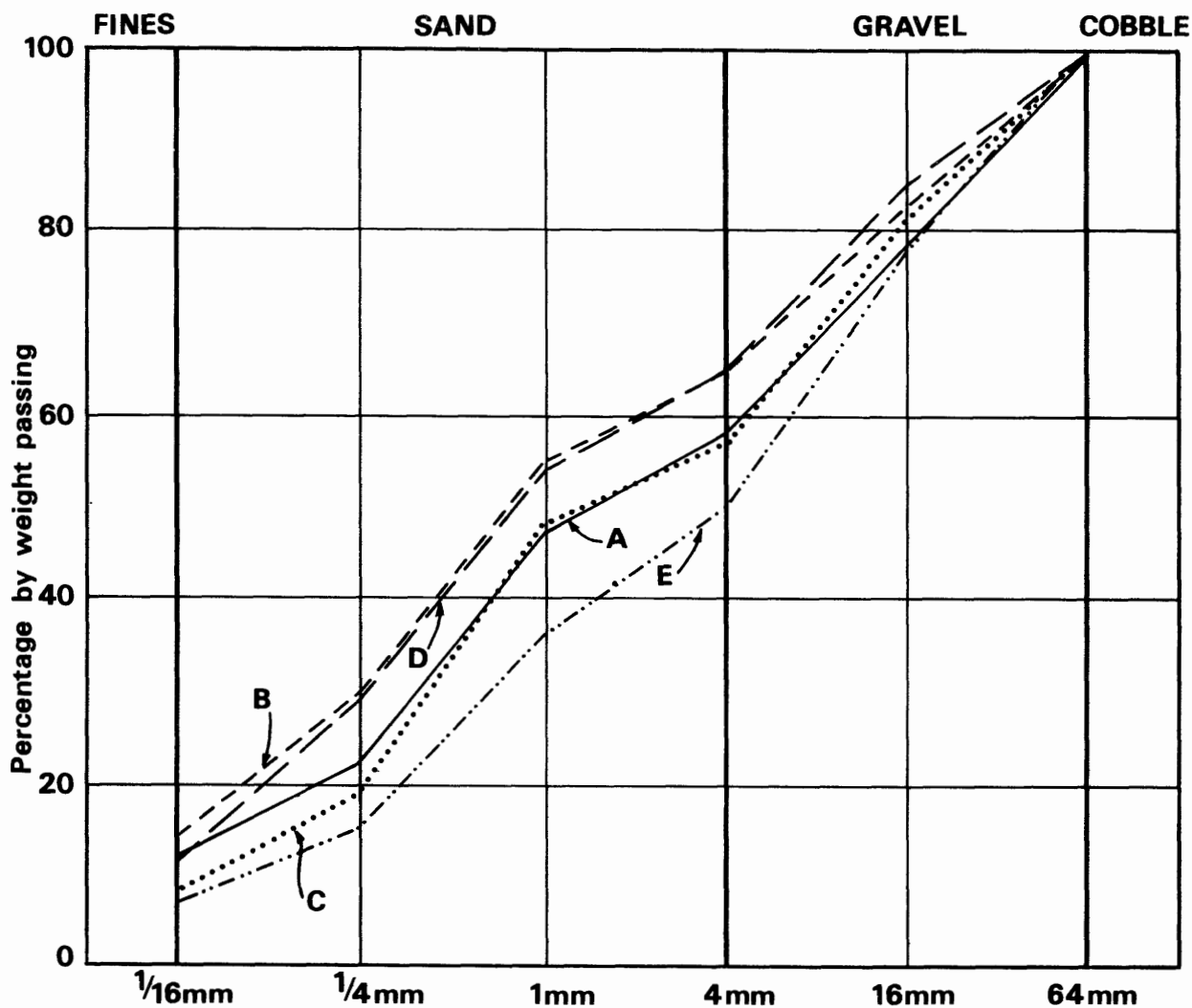
In such areas it has been assumed that mineral is absent except in infrequent and relatively minor patches which can neither be outlined nor assessed quantitatively in the context of this survey. The use of the term 'excessive overburden' on the map, implies that the overburden exceeds 18 m in thickness or that it is more than three times the thickness of the sand and gravel, or both. 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 is used.

RESULTS

The statistical results are summarised in Table 3. Fuller grading particulars are shown in Figure 8.

Accuracy of the results: For the five resource blocks (A to E) assessed statistically, the accuracy of the results at the symmetrical 95 per cent probability level (that is, it is probable that 19 times out of 20 the true volume lies within the given limits) varies between 19 and 47 per cent. However, the true values are more likely to be nearer the volumes calculated than either of the limits. Moreover, it is probable that roughly the same percentage limits would apply for the estimate of volume of a much smaller parcel of ground (say 100 hectares) containing similar sand and gravel deposits if the results from the same number of sample points (as provided by, say, ten boreholes) were used in the calculation. Thus, if closer limits are needed for the quotation of reserves of parts of a block, it can be expected that data from more than ten sample points will be required even if the area is quite small. This point can be illustrated by considering the whole of the statistically assessed sand and gravel on the sheet. The volume, 334 million m³, can be estimated to limits of



Percentage by weight passing

Block	$\frac{1}{16}$ mm	$\frac{1}{4}$ mm	1 mm	4 mm	16 mm	64 mm
A	12	22	47	58	79	99
B	14	30	55	65	83	100
C	8	19	46	57	81	99
D	11	29	54	65	85	100
E	7	15	36	50	78	100

Figure 8 Particle-size distribution for the assessed thickness of mineral in resource blocks A to E

± 13 per cent at the symmetrical 95 per cent probability level, by a calculation based on 61 data points in blocks A to E.

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

NOTES ON RESOURCE BLOCKS

The block boundaries (see Figure 1) have been drawn to separate Glacial Sand and Gravel, both exposed and covered by Boulder Clay (blocks A, B, C, and D), from the fluvial deposits of the rivers Ash and Stort (block E).

Block A

This block comprises two areas of mineral separated by the fluvial deposits of the River Ash, which have been assessed in block E. The deposits are entirely glacial in origin with the superposition (normal for the sheet) of Boulder Clay upon Glacial Sand and Gravel.

The Boulder Clay overburden is thickest (19.7 m+, see, e.g. NE 15 [4281 1531]) on the relatively flat interfluvies, where it appears to cut down into (e.g. NE 14 [4532 1891]) the Glacial Sand and Gravel. The overburden in boreholes used in the assessment ranges in thickness from 15.5 m in NW 18 [4370 1818] to 2.2 m in NW 22 [4436 1978] and has a mean of 7.1 m.

The Glacial Sand and Gravel, which represents the mineral in this block, is generally buried beneath Boulder Clay but is exposed on the sides of the Ash valley. It ranges in thickness from 9.9 m in NW 22

[4436 1978] to 3.3 m in NW 3 [4014 1741] and has a mean of 6.3 m. However field evidence and other borehole records show that up to 13.5 m of mineral is present in the area south-east and east of Barrow Farm [417 171].

There are at present two main exposures of mineral in this block, at Dane Bridge [442 197] and at Hadham Towers [430 170]. The two small pits north of Dane Bridge show gravelly topsoil grading down into 4.0 m of sandy gravel containing fossil debris. This sandy gravel rests on bluish grey mottled brown chalky flinty clay whose base was not seen.

The Hadham Towers Pit shows a more complicated stratigraphy (see Figure 5), with two glacial gravels, the uppermost with derived fossils, separated by laminated silts and chalky fine sands. These silts and sands interdigitate with a chalky Boulder Clay towards the east.

The deposits at Hadham Towers and the thick sands and gravels around Barrow Farm may be attributed to ponding in a blocked pre-glacial valley. This valley has subsequently been deepened by the River Ash.

The volume of mineral in block A is calculated to be 72 million m³, ± 24 per cent (see Table 3) at the 95 per cent probability level. Its mean grading is fines 12 per cent, sand 46 per cent and gravel 42 per cent (including 1 per cent of cobble grade) giving an overall mineral classification of 'clayey' sandy gravel.

Block B

This block, as with block A, comprises two areas of mineral-bearing ground, which are, in this case, separated by the lower reaches of the River Stort whose associated mineral deposits have been assessed in block E.

As in block A, Boulder Clay usually rests on Glacial Sand and Gravel which is exposed on the valley sides. This sequence is demonstrated, for example, in IMAU boreholes NW 10 [4183 1543] and SW 16 [4048 1151]. However, in the area around Hunsdon and Hunsdonbury, in a shallow broad depression floored by Woolwich and Reading Beds, lenses of chalky, flinty brown clay and 'clayey' sandy gravel were found in the Glacial Sand and Gravel and Boulder Clay respectively (see Figure 6).

Further high-level, often 'very clayey' sandy gravels and silts resting on Boulder Clay have been mapped as Head, where they are predominantly composed of silt grade material, and Head Gravel where sand and gravel grades predominate. The occurrences extend from south of Widford south-west to Olives Farm [405 126].

The mineral which ranges in thickness from 3.0 m in IMAU borehole SW 12 [4077 1450] to a total of 14.6 m in SW 14 [4037 1285], has a mean of 6.8 m. Overburden, which ranges from 15.0 m thick in borehole NW 10 [4183 1543] to 1.2 m in borehole SW 21 [4178 1165] has a mean of 6.9 m.

The estimated volume of mineral present in this block is 82 million m³ ± 35 per cent at the 95 per cent probability level. Its mean grading is fines 14 per cent, sand 51 per cent and gravel 35 per cent, placing it in the 'clayey' sandy gravel category.

Block C

In block C, which occupies the central part of the resource sheet, all but 5 per cent of the mineral lies

beneath a cover of Boulder Clay. Small patches of Glacial Sand and Gravel outcrop in the Fiddlers (Golden) Brook and in the vicinity of Pole Hole [454 127]. Much of the mineral previously exposed in the area of Pole Hole has been extracted and the three pits, covering 0.35 km², have been restored to agriculture.

To the north, and on both east and west sides of this block, the Boulder Clay overburden thickens and appears to cut down into or through the underlying mineral, as shown by IMAU boreholes NE 17 [4546 1527], NE 23 [4627 1552] and SW 32 [4411 1496]. In borehole SW 30 [4385 1240] there is a thin development of **boulder clay** within the mineral.

Head deposits in Fiddlers (Golden) Brook contain some reworked glacial gravels but they are commonly thin and impersistent and have been assessed as not potentially workable.

The Boulder Clay overburden ranges in recorded thickness from a maximum of 18.0 m in borehole NE 21 [4614 1694] to 1.1 m in SW 37 [4435 1178]: it has a mean of 9.5 m. The mineral, which is entirely glacial in origin, ranges from 3.3 m in SW 37 [4435 1178] to 8.5 m+ in SW 28 [4793 1594] and has a mean of 5.6 m.

The estimated volume of mineral in the block is 65 million m³ ± 20 per cent, at the 95 per cent probability level: it has a mean grading of fines 8 per cent, sand 49 per cent and gravel 43 per cent (including 1 per cent of cobble grade) giving an overall mineral classification of sandy gravel.

Block D

This block is divided by the upper reaches of the River Stort whose alluvial, terrace and buried channel deposits have been assessed in block E. In the larger western portion the typical succession of Boulder Clay resting on Glacial Sand and Gravel is maintained. The Boulder Clay contains subordinate beds of sand and gravel: for example in IMAU borehole SE 39 [4756 1446] a thick (8.0 m) 'clayey' pebbly sand lens was encountered high in the Boulder Clay, and similar but smaller lenses are exposed around Thorley Wood [484 185].

The Boulder Clay thickens and cuts down into or replaces the Glacial Sand and Gravel towards the western margin of this block as demonstrated by IMAU boreholes NE 27 [4769 1625], NE 28 [4793 1594] and NE 24 [4768 1961]; in borehole NE 32 [4848 1760] no sand and gravel was present and Boulder Clay rested directly on the Upper Chalk.

East of the River Stort, Head Gravel overlies Boulder Clay and Glacial Sand and Gravel in the vicinity of Little Hallingbury [498 180]. The Glacial Sand and Gravel becomes thin or absent on the eastern margin of the sheet and to the south-east, where London Clay is exposed in the valley to the south of Churchgate Street [485 115].

Glacial Sand and Gravel is exposed in a pit at Gaston Green [495 164] where large-scale cross-bedded gravels and sandy gravels can be seen resting on a thin London Clay and mottled clays of the Woolwich and Reading Beds.

Overburden, which comprises mainly Boulder Clay with some Head, ranges in thickness from 0.8 m in borehole NE 38 [4943 1624] to 16.3 m in borehole NE 18 [4667 1953] and has a mean of 6.7 m. Mineral comprising Glacial Sand and Gravel and Head Gravel

ranges in recorded thickness from 3.6 m in borehole NE 31 [4842 1884] to 9.8 m in borehole NE 25 [4758 1828] and has a mean of 6.5 m.

The estimate of the volume of mineral is 92 million m³ ±19 per cent at the 95 per cent probability level. The mineral has a mean grading of fines 11 per cent, sand 54 per cent and gravel 35 per cent, which gives a mineral classification of 'clayey' sandy gravel.

Block E

This block is divided into three mineral-bearing areas associated with the valley of the River Ash in the north-west and the valley of the River Stort in the east and south-west. Both fluvial and glacial deposits have been assessed.

In general the Alluvium and underlying terrace gravels are flanked by small laterally impersistent terraces and Head. In the Ash valley at Hadham Mill the Alluvium overlies terrace gravels and a thick sequence of Glacial Sand and Gravel (see Figure 5). From Bishops Stortford to Churchgate Street in the Stort valley the Alluvium and Head overlie a thick complicated sequence of Boulder Clay, Glacial Sand and Gravel and Lacustrine Deposits which fill a buried tunnel valley.

The overburden ranges in thickness from 0.5 m in borehole NW 14 [4231 1679] to 2.9 m in borehole NW 5 [4029 1573] and has a mean of 1.6 m. The mineral ranges in thickness from 0.7 m in borehole NW 5* to a total of 15.1 m in SE 40 [4790 1302], and has a mean of 4.2 m based on data from IMAU boreholes, commercial records and Hydrogeological Department records.

The block contains an estimated 35 million m³ of mineral ±47 per cent at the 95 per cent probability level; the mineral has a mean grading of fines 7 per cent, sand 43 per cent and gravel 50 per cent which classifies the mineral as gravel.

*Data from this borehole have been used in the calculation of the volume of mineral in this block.

APPENDIX A:

FIELD AND LABORATORY PROCEDURES

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

The mineral shown on each 1:25 000 sheet is divided into resource blocks. The arbitrary size selected, 10 km², is a compromise to meet the aims of the survey by providing sufficient sample points in each block. As far as possible the block boundaries are determined by geological boundaries so that, for example, glacial and river terrace gravels are separated. Otherwise division is by arbitrary lines, which may bear no relationship to the geology. 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(1967). Random checks on the accuracy of the grading are made in the Institute's laboratories.

All data, including mean grading analysis figures calculated for the total thickness of the mineral, are entered on standard

record sheets, abbreviated copies of which are reproduced in Appendix F.

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

APPENDIX B

STATISTICAL PROCEDURE

Statistical assessment

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

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

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

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

4 The above relationship may be transposed such that

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

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

If, therefore, the standard deviation for area is small with respect to that for 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 $l_{m1}, l_{m2}, \dots, l_{mn}$, then the best estimate of mean thickness, \bar{l}_m , is given by

$$\Sigma(l_{m1} + l_{m2} + \dots + l_{mn})/n.$$

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

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

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

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

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

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

$\pm (t/\sqrt{n}) \times S_{\bar{l}_m}$ or as a percentage

$\pm (t/\sqrt{n}) \times S_{\bar{l}_m} \times (100/\bar{l}_m)$ per cent, where t is Student's t at the 95 per cent probability level for $(n-1)$ degrees of freedom, evaluated by reference to statistical tables. (In applying Student's t it is assumed that the measurements are distributed normally.)

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

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

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

9 In calculating confidence limits for volume, L_V , the following inequality corresponding to equation [3] is applied: $L_{L_m} \leq L_V \leq 1.05 L_{U_m}$

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

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

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

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

per cent.

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

Inferred assessment

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

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

14 No assessment is attempted for an isolated area of mineral less than 0.25 km².

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

APPENDIX C

CLASSIFICATION AND DESCRIPTION OF SAND AND GRAVEL

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

The terminology commonly used by geologists when describing sedimentary rocks (Wentworth, 1922) is not entirely satisfactory for this purpose. For example, Wentworth proposed that a deposit should be described as a 'gravelly sand' when it contains more sand than gravel and there is at least 10 per cent of gravel, provided that there is less than 10 per cent of material finer than sand (less than $\frac{1}{8}$ mm) and coarser than pebbles (more than 64 mm in diameter). Because deposits containing more than 10 per cent fines are not embraced by this system a modified binary classification based on Willman (1942) has been adopted.

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

The term 'clay' (as written, with single quote marks) is used to describe all material passing $\frac{1}{8}$ mm. Thus it has no mineralogical significance and includes particles falling within the size range of silt. The normal meaning applies to the term clay where it does not appear in single quotation marks.

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

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

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

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

Many differing proposals exist for the classification of the grain size of sediments (Atterberg, 1905; Udden, 1914; Wentworth, 1922; Wentworth, 1935; Allen, 1936; Twenhofel, 1937; Lane and others, 1947). As Archer (1970a, b) has emphasised, there is a pressing need for a simple metric scale acceptable to both scientific and engineering interests, for which the class limit sizes correspond closely with certain marked changes in the natural properties of mineral particles. For example, there is an important change in the degree of cohesion between particles at about the $\frac{1}{8}$ -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 (+ $\frac{1}{8}$ - $\frac{1}{4}$ mm), medium (+ $\frac{1}{4}$ - 1 mm) and coarse (+ 1 - 4 mm). The boundary at 16 mm distinguishes a range of finer gravel (+ 4 - 16 mm), often characterised by abundance of worn tough pebbles of vein-quartz, from larger pebbles often of notably different materials. The boundary at 64 mm distinguishes pebbles from cobbles. The term 'gravel' is used loosely to denote both pebble-sized and cobble-sized material.

The size distribution of borehole samples is determined by sieve analysis, which is presented by the laboratory as logarithmic cumulative curves (see, for example, British

Block Calculation 1:25 000
Block } Fictitious

Area
Block: 11.08 km²
Mineral: 8.32 km²

Mean thickness
Overburden: 2.5 m
Mineral: 6.5 m

Volume
Overburden: 21 million m³
Mineral: 54 million m³

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

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

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

$\sum (l_m - \bar{l}_m)^2 = 15.82$
 $n = 8$
 $t = 2.365$

L_V is calculated as

$1.05 (t/\bar{l}_m) \sqrt{[\sum (l_m - \bar{l}_m)^2 / n(n-1)]} \times 100$
 $= 1.05 \times (2.365/6.5) \sqrt{[15.82 / (8 \times 7)]} \times 100$
 $= 20.3$
 ≈ 20 per cent.

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

Figure 9 Example of resource block assessment: calculation and results

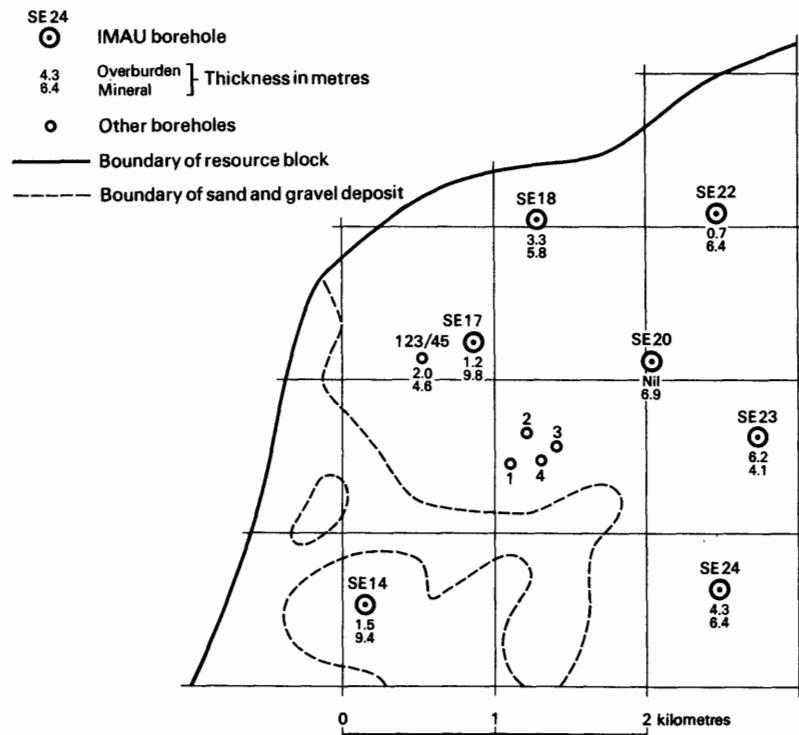


Figure 10 Example of resource block assessment: map of a fictitious block

Standard 1377:1967). In this report the grading is tabulated on the borehole record sheets (Appendix F), the intercepts corresponding with the simple geometric scale $\frac{1}{8}$ mm, $\frac{1}{4}$ mm, 1 mm, 4 mm, 16 mm and so on as required. Original sample grading curves are available for reference at the appropriate office of the Institute.

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

The relative proportions of the rock types present in the gravel fraction are indicated by the use of the words 'and' or 'with'. For example, 'flint and quartz' indicates 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		
16 mm -	Pebble	Coarse	Gravel
4 mm -		Fine	
1 mm -		Coarse	
$\frac{1}{4}$ mm -	Sand	Medium	Sand
$\frac{1}{8}$ mm -		Fine	
	Fines (silt and clay)		Fines

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

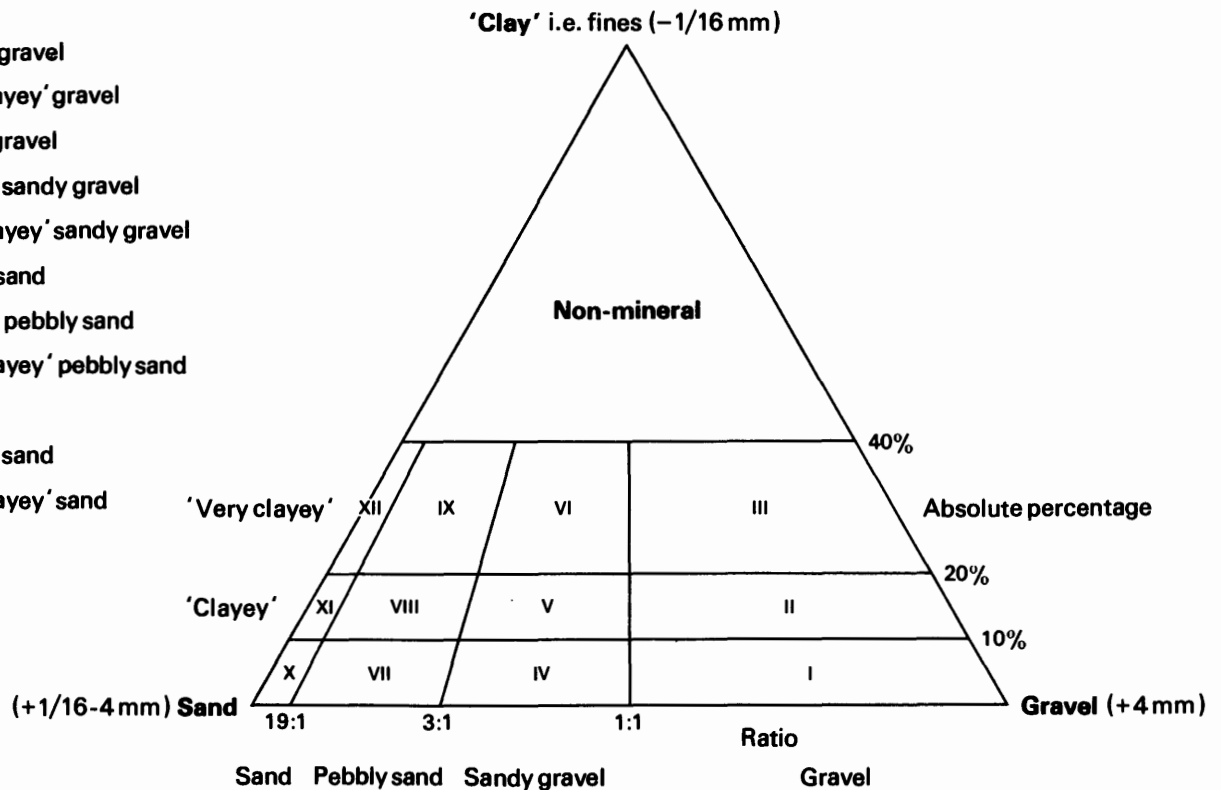


Figure 11 Diagram to show the descriptive categories used in the classification of sand and gravel

APPENDIX D

EXPLANATION OF THE BOREHOLE RECORDS

ANNOTATED EXAMPLE

TL 41 NE 29¹ 4710 1548² Tharbies Lodge, Sawbridgeworth³

Block D

Surface level + 68.2 m⁴
 Water not struck⁵
 Shell 152 mm diameter⁶
 October 1975

Overburden⁷ 11.4 m
 Mineral 4.2 m
 Waste 0.3 m
 Bedrock 6.5 m+⁹

Log

<i>Geological classification</i> ¹⁰	<i>Lithology</i> ¹¹	<i>Thickness</i> m	<i>Depth</i> ⁸ m
	Soil	0.3	0.3
Boulder Clay	Clay, very silty, chalky, pebbly, yellow brown, soft	3.6	3.9
	Clay, chalky, silty, blue grey becoming dark grey, with some flint and quartz pebbles, firm becoming stiff	7.0	10.9
	Clay, silty, sandy, very pebbly, dark brown, firm	0.5	11.4
Glacial Sand and Gravel	'Clayey' gravel Sand: medium and coarse with fine, predominantly quartz, with some coarse angular flints, yellow brown Gravel: fine and coarse, subrounded to angular flint, with some rounded quartz and quartzite, and a trace of sandstone	4.2	15.6
	Clay, sandy, pebbly, yellow brown, soft	0.3	15.9
London Clay (Basement Bed)	Sand, very silty, clayey, fine with some medium, laminations in parts, some shell debris, poorly developed horizon of rounded brown and black flint pebbles at base, drab olive green	5.9	21.8
Woolwich and Reading Beds	Clay, mottled blue, red and brown, stiff, becoming hard, waxy	0.6+	22.4

Grading¹³

<i>Mean for deposit</i> ¹⁴ <i>percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>					
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>	<i>Sand</i>			<i>Gravel</i>	
				$-\frac{1}{2}$	$+\frac{1}{2}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
11	40	49	¹² 11.4-12.4	10	7	19	12	29	23
			12.4-13.4	9	7	20	12	22	30
			13.4-14.4	11	9	19	12	25	24
			14.4-15.6	12	10	19	14	28	17
			Mean	11	8	19	13	26	23

Composition¹⁵

<i>Depth below surface (m)</i>	<i>Percentages by weight in + 4-16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
11.4-12.4	-	79	14	-	4	3
12.4-13.4	-	75	14	-	7	4
13.4-14.4	-	71	18	-	7	4
14.4-15.6	-	68	21	-	7	4
Mean	-	73	17	-	6	4

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

1 Borehole Registration Number

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

a The number of the 1:25 000 sheet on which the borehole lies, that is TL 41

b The quarter of the 1:25 000 on which the borehole lies and its number in a series for that quarter, for example NE 29. Thus the full Registration Number is TL 41 NE 29. Usually this is abbreviated to NE 29 in the text.

2 National Grid reference

All National Grid references in this publication lie within the 100-km square TL. Grid references are given to eight figures, accurate to within 10 m for borehole location and pit exposures. (In the text six-figure grid references are used for more approximated location, for example farms, woods etc.)

3 Location

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

4 Surface level

The surface level at the borehole site is given in metres above Ordnance Datum.

5 Groundwater conditions

If groundwater was present the level at which it was encountered is normally given (in metres above Ordnance Datum). If no water was encountered the words 'water not struck' are used.

6 Type of drill and date of drilling

The type of machine, the external diameter of the casing used, and the month and year in which drilling took place 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

All measurements were made in metres. Conversions to imperial measure have been omitted from the logs but a table of conversions metres to feet (rounded to the nearest 0.5 ft) is given in Appendix H.

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

10 Geological classification

The geological classification is given wherever 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 1 m of depth. Samples obtained by the bailing technique (that is, from deposits below the water table) are indicated by an asterisk.

13 Grading results

The limits are as follows: gravel, +4 mm; sand, -4 mm + $\frac{1}{8}$ mm; fines, - $\frac{1}{8}$ mm. A fuller classification is given in Table 4. No attempt has been made to estimate the grading where, exceptionally, results are not available.

14 Mean grading

The grading of the full thickness of the mineral identified in the log is the mean of the individual sample gradings weighted by the thicknesses represented, if these vary.

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

15 Composition

The composition of the fine gravel fraction (+4 -16 mm) is given. Material of metamorphic, igneous and sedimentary origin, which individually occurs rarely (for example, schist, granite, basalt, siltstone, limestone and mudstone) is included in the column headed 'Others'. The mean composition is quoted for the full mineral thickness.

APPENDIX E:

LIST OF BOREHOLES USED IN THE ASSESSMENT OF RESOURCES

Borehole number*	Grid reference†	Borehole number*	Grid reference†	Borehole number*	Grid reference†	Borehole number*	Grid reference†
IMAU BOREHOLES							
NW 1	4036 1954	NW 26	4498 1579	NE 36	4977 1813	SW 33	4464 1404
2	4050 1862	27	4408 1557	37	4939 1732	34	4421 1353
3	4014 1741	NE 13	4570 1976	38	4943 1624	35	4417 1349
4	4068 1683	14	4532 1891	39	4917 1505	36	4472 1238
5	4029 1573	15	4589 1850	SW 12	4077 1450	37	4435 1178
6	4059 1504	16	4539 1795	13	4076 1372	SE 34	4543 1464
7	4147 1893	17	4546 1527	14	4037 1285	35	4553 1361
8	4143 1814	18	4667 1953	15	4067 1226	36	4570 1227
9	4186 1627	19	4678 1835	16	4048 1151	37	4667 1431
10	4183 1543	20	4684 1747	17	4072 1065	38	4660 1338
11	4232 1989	21	4614 1694	18	4182 1372	39	4756 1446
12	4239 1856	22	4663 1660	19	4172 1289	40	4790 1302
13	4213 1783	23	4627 1552	20	4172 1289	41	4770 1061
14	4231 1679	24	4768 1961	21	4178 1165	42	4847 1404
15	4281 1531	25	4758 1828	22	4135 1062	43	4875 1319
16	4312 1983	26	4764 1729	23	4262 1449	44	4862 1220
17	4338 1875	27	4769 1625	24	4259 1343	45	4876 1109
18	4370 1818	28	4793 1594	25	4272 1236	46	4837 1030
19	4319 1751	29	4710 1548	26	4245 1118	47	4961 1455
20	4378 1675	30	4829 1940	27	4239 1034	48	4956 1452
21	4381 1604	31	4842 1884	28	4388 1437	49	4963 1351
22	4436 1978	32	4848 1760	29	4328 1308	50	4922 1285
23	4480 1867	33	4856 1676	30	4385 1240	51	4985 1089
24	4440 1775	34	4967 1915	31	4371 1143		
25	4465 1670	35	4920 1867	32	4411 1496		

* By sheet quadrant
 † All fall within TL 41

HYDROGEOLOGICAL DEPARTMENT RECORDS† (all fall within TL 41)

NW: 28, 29, 30, 34, 35, 41, 43, 44, 50, 52, 59.
 NE: 47, 48, 50, 51, 52, 53, 57, 58, 59, 60, 62, 64.
 SW: 39, 42, 43, 44, 46, 47, 51, 56.
 SE: 70, 71, 78, 80.

RECORDS FROM OTHER SOURCES

Information from 85 sample points (boreholes and trial pits) was also used in the assessment. This information was obtained from Local and County Councils, the minerals industry, private individuals and from the Institute's borehole register.

† The Hydrogeological Department records have now been incorporated in the Institute's borehole register. The new registered numbers are quoted above.

**APPENDIX F:
INDUSTRIAL MINERALS ASSESSMENT UNIT
BOREHOLE RECORDS**

TL 41 NW 1 4036 1954 Bartram Wood, Standon

Block A

Surface level +85.5 m
Water not struck
Shell (modified) 152 mm diameter
February 1976

Waste 18.7 m+

Log		Thickness	Depth
<i>Geological classification</i>	<i>Lithology</i>	m	m
	Soil	0.4	0.4
Boulder Clay	Clay, silty, chalky, sandy, brown, with some angular flints, firm	2.6	3.0
	Clay, silty, sandy, grey, stiff	1.0	4.0
	Clay, silty, chalky, dark grey becoming dark olive grey, with some angular flints and rounded quartz pebbles, stiff	11.2	15.2
	Clay, silty, chalky, yellow grey becoming dark grey, chalky sand bands in upper 0.5 m, some flint and quartz with a trace of Jurassic material, stiff	3.5+	18.7

Surface level +87.1 m
 Water struck at +70.8 m
 Shell and Auger 152 mm diameter
 June 1972

Overburden 11.3 m
 Mineral 7.0 m
 Bedrock 0.9 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.1	0.1
Boulder Clay	Clay, brown, with angular flints and chalk fragments, friable	0.4	0.5
	Clay, silty, chalky, grey, with some flint, soft	2.7	3.2
	Clay, chalky, grey, soft	3.9	7.1
	Clay, chalky, brown, soft	0.2	7.3
	'Very clayey' sand, medium with some fine, brown, soft	0.4	7.7
	Clay, chalky, grey, soft	3.2	10.9
	Clay, chalky, pebbly, brown, soft	0.4	11.3
Glacial Sand and Gravel	'Very clayey' sandy gravel, pebbly sand in upper 3.0 m becomes progressively more iron-cemented with depth	7.0	18.3
	Sand: medium with some coarse and fine, brown Gravel: fine with coarse, subangular to angular flint, with some subrounded to well rounded quartz, quartzite and sandstone		
	Clay, brown, with angular flints and small subangular quartz pebbles, soft	0.8	19.1
Upper Chalk	Chalk, white, soft	0.1+	19.2

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand		Gravel		
				- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16
28	71	1	7.3-7.7	28	12	57	2	1	-
22	55	23	11.3-12.3	No sample					
			12.3-13.3	17	4	67	3	7	2
			13.3-14.3	32	4	53	4	6	1
			14.3-15.3	34	2	32	2	8	22
			15.3-16.3	24	5	39	5	10	17
			16.3-17.3*	12	6	22	20	36	4
			17.3-18.3*	15	12	29	19	21	4
			Mean	22	6	40	9	15	8

Surface level +65.9 m
 Water not struck
 Shell 152 mm diameter
 October 1975

Overburden 2.7 m
 Mineral 3.3 m
 Bedrock 0.5 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.2	0.2
Boulder Clay	Clay, sandy, chalky, brown, with some flint, firm	2.5	2.7
Glacial Sand and Gravel	'Very clayey' sandy gravel, becomes more gravelly with depth Sand: medium with fine and some coarse, predominantly quartz, brown Gravel: Coarse and fine, subrounded to rounded flints, with a trace of angular flint, and some rounded quartz and quartzite, with a trace of sandstone	3.3	6.0
Upper Chalk	Chalk, pugged up, white streaked brown, with occasional black and blue flints	0.5+	6.5

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16
18	46	36	2.7-3.7	31	10	27	5	11	16
			3.7-4.7	9	24	33	7	11	16
			4.7-5.7	16	10	13	8	25	28
			5.7-6.0	No sample					
			Mean	18	15	24	7	16	20

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
2.7-3.7	-	77	14	-	3	6
3.7-4.7	-	63	21	-	10	6
4.7-5.7	-	92	6	-	1	1
Mean	-	77	14	-	5	4

Surface level +73.1 m
 Water not struck
 Shell 152 mm diameter
 September–October 1975

Overburden 9.9 m
 Mineral 4.1 m
 Bedrock 2.0 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, chalky, silty, pale blue, soft	1.1	1.3
	Clay, chalky, silty, yellow brown becoming grey blue, with some flint and quartz pebbles, firm becoming stiff	8.1	9.4
	Clay, pebbly, chalky, sandy, silty, brown, firm	0.5	9.9
Glacial Sand and Gravel	'Clayey' sandy gravel, becomes 'very clayey' and less gravelly with depth Sand: medium with coarse and fine, predominantly quartz with angular coarse flint Gravel: fine and coarse with a trace of cobble, angular and rounded black and brown flints, with rounded quartz, quartzite and sandstone, and a trace of rounded chalk	4.1	14.0
Woolwich and Reading Beds	Clay, very silty, sandy, faintly laminated, mottled red, yellow, green and brown, with a trace of rounded black flints and very rare rounded cream quartz at base, firm	1.3	15.3
Thanet Beds (Bullhead Bed)	Sand, fine, dark olive green, glauconitic with many angular black flints, firm	0.3	15.6
Upper Chalk	Chalk, white, streaked brown, gritty, pugged up, soft	0.4+	16.0

Grading

Mean for deposit percentages			Depth below surface (m)	percentages							
Fines	Sand	Gravel		Fines	Sand			Gravel			
				$-\frac{1}{8}$	$+\frac{1}{8}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	$+64$
15	39	46	9.9–10.9	5	6	17	13	25	34	–	
			10.9–11.9	12	8	14	15	25	22	4	
			11.9–12.9	14	11	18	11	24	22	–	
			12.9–14.0	27	13	19	9	20	12	–	
			Mean	15	10	17	12	23	22	1	

Composition

Depth below surface (m)	Percentages by weight in + 4–16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
9.9–10.9	3	52	25	–	14	6
10.9–11.9	1	69	18	–	11	1
11.9–12.9	4	68	12	–	11	5
12.9–14.0	7	65	16	–	8	4
Mean	4	63	18	–	11	4

TL 41 NW 5 4029 1573 Wareside Lodge, Ware Rural

Block E

Surface level +40.8 m
 Water struck at +37.8 m
 Shell 152 mm diameter
 October 1975

Overburden 2.9 m
 Mineral 0.7 m
 Bedrock 0.1 m+

Log			<i>Thickness</i>	<i>Depth</i>
<i>Geological classification</i>	<i>Lithology</i>		m	m
	Soil		0.1	0.1
Alluvium	Clay, pebbly, mid-brown, soft		0.4	0.5
	Clay, sandy, silty, chalky, pebbly, brown streaked grey becoming blue and carbonaceous		2.4	2.9
	'Very clayey' gravel Sand: coarse angular flint with a trace of medium and fine, grey Gravel: fine and coarse, rounded to well rounded flint with rounded quartz		0.7	3.6
Upper Chalk	Chalk, white streaked brown, pugged up, with fresh angular black flints		0.1+	3.7

TL 41 NW 6 4059 1504 Thistly Wood, Widford

Block B

Surface level +77.4 m
 Water struck at +59.4 m
 Shell and Auger 152 mm diameter
 June-July 1972

Overburden 13.3 m
 Mineral 6.2 m
 Bedrock 2.3 m+

Log			<i>Thickness</i>	<i>Depth</i>
<i>Geological classification</i>	<i>Lithology</i>		m	m
	Soil		0.3	0.3
Boulder Clay	Clay, chalky, grey, soft		12.5	12.8
	Clay, chalky, sandy, pebbly, brown, soft		0.5	13.3
Glacial Sand and Gravel	Gravel: Sand: medium with coarse and a trace of fine, predominantly angular flint with some rounded quartz Gravel: fine and coarse, subangular to angular flint, with some subrounded to well rounded flint quartz and quartzite		6.2	19.5
	London Clay	Clay, silty, grey, stiff	2.3	21.8
Woolwich and Reading Beds	Clay, mottled blue and green, stiff, waxy		Just Penetrated	

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				- 1/8	+ 1/8 - 1/4	+ 1/4 - 1	+ 1-4	+ 4-16	+ 16
9	43	48	14.2-15.2	5	2	16	13	45	19
			15.2-16.2	18	3	49	8	17	5
			16.2-17.2	No sample					
			17.2-18.0	10	3	30	13	21	23
			18.0-19.0*	2	1	16	16	28	37
			19.0-19.5*	15	3	28	18	20	16
			Mean	9	2	28	13	28	20

TL 41 NW 7 4147 1893 Brands Farm, Much Hadham

Block A

Surface level +93.4 m
Water not struck
Shell (modified) 152 mm diameter
February 1976

Waste 18.8 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Boulder Clay	Clay, extremely chalky, silty, yellow grey, with flint pebbles, firm	5.3	5.6
	Clay, silty, chalky, dark grey, stiff	2.8	8.4
	Clay, silty, chalky, dark grey to olive grey, with flint, sandstone, mudstone, quartz and quartzite pebbles, dark grey shelly limestone boulder between 12.4 and 12.6 m	9.8	18.2
	Clay, silty, chalky, pebbly, grey brown, stiff	0.4	18.6
Glacial Sand and Gravel	'Very clayey' sandy gravel Sand: medium to coarse with some fine, predominantly angular flint, orange brown Gravel: coarse and cobble sized well rounded quartz, quartzite and flint, with some angular flint	0.2+	18.8

Surface level +90.1 m
 Water struck at +81.6 m
 Shell (modified) 152 mm diameter
 February 1976

Waste 25.0 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.1	0.1
Boulder Clay	Clay, chalky, silty, brown, soft	1.6	1.7
	Clay, chalky, pebbly, grey brown, soft	0.2	1.9
	Sand, very clayey, pebbly, brown, firm	0.1	2.0
	Clay, chalky, silty, brown to grey, some flint, soft	3.1	5.1
	Clay, silty, chalky, blue grey, some flint and black shale, stiff	3.4	8.5
	Clay, chalky, sandy, brown, soft	0.1	8.6
	Clay, silty, chalky, with some flint pebbles, blue grey, stiff	2.9	11.5
	Clay, chalky, silty, dark blue grey with dark brown tinge at depth, stiff	6.0	17.5
	Clay, silty, very sandy, ochre brown, soft	0.6	18.1
	Clay, extremely pebbly and sandy, brown, firm	0.6	18.7
	Clay, silty, sandy, white flints, orange, firm	0.6	19.3
Glacial Sand and Gravel	Sandy gravel, 'very clayey' to 'clayey' in upper 2.0 m Sand: medium with some coarse and fine, predominantly rounded quartz, with angular coarse flint, orange brown Gravel: fine with coarse, subrounded to angular flint, with some quartz, quartzite and sandstone	5.7+	25.0

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand		Gravel		
				- 1/8	+ 1/8 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16
9	52	39	19.3-20.0	22	17	57	2	2	-
			20.0-21.0	10	6	25	11	27	21
			21.0-22.0	9	5	28	11	28	19
			22.0-23.0	7	12	31	7	24	19
			23.0-24.0	6	6	40	7	24	17
			24.0-25.0	6	7	40	9	23	15
			Mean	9	8	36	8	23	16

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
19.3-20.0	-	71	18	-	5 1/2	5 1/2
20.0-21.0	-	70	18	-	9	3
21.0-22.0	-	72	23	-	4	1
22.0-23.0	-	75	12	-	8	5
23.0-24.0	-	73	17	-	8	2
24.0-25.0	-	61	22	-	11	6
Mean	-	70	18	-	8	4

TL 41 NW 9 4186 1627 Pegs Lane, Widford

Block A

Surface level +47.9 m
Water not struck
Shell 152 mm diameter
October 1975

Waste 0.7 m
Bedrock 1.3 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i>	<i>Depth</i>
		m	m
	Soil	0.2	0.2
Head	Clay, silty, pebbly, brown, friable	0.5	0.7
Upper Chalk	Chalk, pugged up, white streaked brown	1.3+	2.0

Surface level +82.2 m
 Water not struck
 Shell 152 mm diameter
 October 1975

Overburden 15.0 m
 Mineral 7.2 m
 Bedrock 1.8 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.1	0.1
Boulder Clay	Clay, very sandy, very pebbly, brown, with flint and quartz pebbles, firm	1.4	1.5
	Clay, pebbly, chalky, silty, brown, firm	3.5	5.0
	Clay, chalky, blue grey, with some flint and quartz pebbles, stiff	9.7	14.7
	Clay, chalky, pebbly, sandy, brown, firm	0.3	15.0
Glacial Sand and Gravel	'Clayey' sandy gravel, fine to medium sand in topmost 1.0 m, becoming progressively more pebbly in next 1.4 m, becomes more clayey and coarser with depth	7.2	22.2
	Sand: medium and fine with some coarse, predominantly rounded quartz, with angular coarse and medium flint, yellow becoming brown Gravel: fine with coarse and a trace of cobble, subangular to rounded flint, with rounded to subrounded quartz, quartzite and sandstone, and a trace of chalk		
Woolwich and Reading Beds	Clay, sandy becoming very sandy, green mottled brown and rarely red, firm	0.7	22.9
	Sand, clayey, buff, fine and medium, soft	1.1+	24.0

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>							
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>	<i>Sand</i>			<i>Gravel</i>			
				$-\frac{1}{8}$	$+\frac{1}{8}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	$+64$
14	59	27	15.0-16.0	11	65	23	1	-	-	-	-
			16.0-17.0	11	27	53	4	2	3	-	-
			17.0-17.4	19	19	39	5	7	6	5	-
			17.4-18.4	20	13	22	12	24	9	-	-
			18.4-19.4	16	13	20	16	25	10	-	-
			19.4-20.4	18	14	18	15	22	13	-	-
			20.4-21.2	19	15	20	15	20	11	-	-
			21.2-22.2	6	10	17	16	25	24	2	-
			Mean	14	22	26	11	16	10	1	-

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in +4-16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
15.0-16.0	Sand no pebbles					
16.0-17.0	9	47	18	-	19	7
17.0-17.4	12	59	17	-	7	5
17.4-18.4	2	71	16	-	10	1
18.4-19.4	-	81	12	-	5	2
19.4-20.4	-	80	14	-	5	1
20.4-21.2	-	79	13	-	6	2
21.2-22.2	-	79	12	-	7	2
Mean	2	72	14	-	9	3

Surface level +80.2 m
 Water not struck
 Shell (modified) 152 mm diameter
 February 1976

Waste 12.5 m
 Bedrock 2.0 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness m</i>	<i>Depth m</i>
	Soil	0.2	0.2
Boulder Clay	Clay, silty, chalky, orange brown mottled grey, soft	2.2	2.4
	Clay, chalky, dark grey, firm	2.1	4.5
	Silt, fine sandy, olive brown, soft	0.6	5.1
	Clay, silty, chalky, olive brown becoming grey and brown, stiff	1.1	6.2
Glacial Sand and Gravel	a 'Very clayey' sandy gravel	1.5	7.7
	Sand: medium and fine with some coarse, predominantly flint, and quartz, with chalk, white Gravel: fine with some coarse, angular to well rounded flint, with some rounded chalk and a trace of quartz, quartzite sandstone and fossil debris		
Boulder Clay	Clay, chalky, silty, flinty, pale yellow, firm	1.8	9.5
	Gravel, very silty, clayey, sandy angular flints with rare rounded quartz and chalk	0.2	9.7
	Clays and silts laminated, fine sandy, chalky, olive and grey becoming brown, orange and yellow, firm	1.0	10.7
Glacial Sand and Gravel	b 'Clayey' gravel	1.8	12.5
	Sand: medium and fine with some coarse, predominantly quartz, with angular coarse flint Gravel: fine and coarse with some cobble, angular to subangular flint, with rounded quartz, quartzite, and sandstone		
Woolwich and Reading Beds	Silt, fine sandy, clayey, bioturbated olive grey streaked pale grey, soft	0.7	13.2
	Clay, sandy, orange, with angular and well rounded black flints	0.8	14.0
Upper Chalk	Chalk, white, soft	0.5+	14.5

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
						$-\frac{1}{8}$	$+\frac{1}{8} - \frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
a	32	45	23	6.2-7.2	33	17	15	9	18	8	-
				7.2-7.7	29	17	27	8	13	6	-
				Mean	32	17	19	9	16	7	-
b	10	40	50	10.7-11.7	12	12	17	8	22	16	13
				11.7-12.5	7	18	16	8	21	30	-
				Mean	10	15	17	8	21	22	7

Composition

	Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
		Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
a	6.2-7.2	40	47	6	1	3	3
	7.2-7.7	36	55	5	-	3	1
	Mean	39	49	6	1	3	2
b	10.7-11.7	-	61	30	-	4	5
	11.7-12.5	-	74	11	-	12	3
	Mean	-	67	22	-	7	4

TL 41 NW 12 4239 1856 Moor Place, Much Hadham

Block A

Surface level +68.9 m
Water struck at +64.3 m and +52.4 m
Shell (modified) 152 mm diameter
March 1976

Waste 18.6 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i>	<i>Depth</i>
		m	m
	Soil	0.3	0.3
Boulder Clay	Clay, chalky, silty, flinty, yellow brown, firm	4.3	4.6
	Clay, silty, chalky, firm to stiff, with a chalk sand band at 4.7 m, grey becoming dark grey	11.9	16.5
	'Clayey' sandy gravel, chalky medium and coarse sand and fine chalk gravel, grey	0.2	16.7
	Clay, chalky, silty, grey, stiff	1.9+	18.6

Surface level +78.2 m
 Water not struck
 Shell (modified) 152 mm diameter
 February 1976

Overburden 4.8 m
 Mineral 7.0 m
 Bedrock 2.0 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Boulder Clay	Clay, silty, pebbly, sandy, brown becomes yellow brown, soft	1.9	2.2
	'Very clayey' fine sand; chalky, yellow brown, with some flint pebbles, soft	0.6	2.8
	Clay, chalky, silty, brown, soft	0.3	3.1
	Clay, silty, chalky, grey blue, soft becoming stiff	1.4	4.5
	Clay, silty, chalky, dark brown, with flint pebbles, stiff	0.3	4.8
Glacial Sand and Gravel	Gravel, sand between 10.6 and 10.9 m	7.0	11.8
	Sand: medium with coarse and fine, predominantly rounded quartz with some angular coarse and medium flint, brown to orange brown Gravel: fine and coarse with a trace of cobble, angular to subrounded flint, with some rounded quartz and quartzite, and a trace of sandstone		
Woolwich and Reading Beds	Clay, silty, sandy, brown, firm	0.2	12.0
	Clay, sandy and glauconitic in lenses, mottled red brown and grey becomes grey at base, with some calcareous nodules increasing with depth, stiff	1.3	13.3
	Clay, becomes very clayey, very sandy silt, grey becomes dark purple grey, calcareous nodules in clay, with many red, black and brown well rounded flint pebbles, and a trace of white quartz at base	0.7+	14.0

Grading

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- 1/8	+ 1/8 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16 - 64	+ 64
6	42	52	4.8-5.8	7	14	19	10	31	19	-
			5.8-6.8	5	8	12	12	23	26	14
			6.8-7.8	5	10	21	10	27	27	-
			7.8-8.8	6	14	21	9	26	24	-
			8.8-9.8	7	8	18	15	27	25	-
			9.8-10.6	5	6	21	15	25	28	-
			10.6-11.8	8	5	34	10	25	18	-
			Mean	6	9	21	12	26	24	2

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
4.8-5.8	-	63	29	-	5	3
5.8-6.8	-	67	27	-	5	1
6.8-7.8	-	59	34	-	6	1
7.8-8.8	-	68	29	-	1 1/2	1 1/2
8.8-9.8	-	64	29	-	6	1
9.8-10.6	-	67	27	-	4	2
10.6-11.8	-	70	25	-	3	2
Mean	-	66	29	-	4	1

TL 41 NW 14 4231 1679 Hadham Mill, Much Hadham

Block E

Surface level +51.9 m
 Water struck at +44.9 m
 Shell (modified) 152 mm diameter
 January 1976

Overburden 0.5 m
 Mineral 14.5 m
 Bedrock 0.5 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil and very pebbly subsoil	0.5	0.5
Terrace 1	a Gravel, with some thin clay bands throughout Sand: coarse and medium with some fine, predominantly rounded quartz, with coarse and medium angular flint, yellow brown Gravel: coarse and fine, angular and rounded flint, with some subrounded to rounded quartz, and a trace of sandstone	4.0	4.5
Glacial Sand and Gravel	b Gravel, clayey in upper 3.0 m Sand: medium and coarse with some fine, predominantly angular flint, with some rounded quartz and chalk, becomes angular flint with rounded chalk, and some rounded quartz, pale yellow brown Gravel: fine and coarse, angular to rounded flint, with some rounded chalk, quartz and quartzite, with a trace of sandstone and very rare fossil debris	10.5	15.0
Upper Chalk	Chalk, white, pugged up	0.5+	15.5

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages						
	Fines	Sand	Gravel		Fines		Sand		Gravel		
					- $\frac{1}{8}$	+ $\frac{1}{8}$	- $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16
a	5	33	62	0.5-1.5	6	4	11	13	28	38	
				1.5-2.5	7	9	18	13	30	23	
				2.5-3.5	5	5	12	15	32	31	
				3.5-4.5	3	5	13	13	30	36	
				Mean	5	6	13.5	13.5	30	32	
b	6	35	59	4.5-5.5	15	9	19	14	24	19	
				5.5-6.5	9	8	12	13	25	33	
				6.5-7.5*	12	4	17	14	30	23	
				7.5-8.5*	6	6	22	17	33	16	
				8.5-9.5*	6	6	15	8	32	33	
				9.5-10.5*	3	3	16	15	28	35	
				10.5-11.5*	5	2	9	12	38	34	
				11.5-12.5*	4	3	19	16	34	24	
				12.5-13.5*	3	2	17	16	32	30	
				13.5-15.0*	3	1	11	20	33	32	
				Mean	6	4	16	15	31	28	

Composition

	Depth below surface (m)	Percentages by weight in +4-16 mm Fraction					
		Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
a	0.5-1.5	-	83	14	-	2	1
	1.5-2.5	-	70	19	-	9	2
	2.5-3.5	-	82	5 $\frac{1}{2}$	-	7	5 $\frac{1}{2}$
	3.5-4.5	-	79	11	-	2	8
	Mean	-	79	12	-	5	4
b	4.5-5.5	3	72	17	-	6	2
	5.5-6.5	2 $\frac{1}{2}$	77 $\frac{1}{2}$	9	-	6	5
	6.5-7.5	10	77	7	-	3	3
	7.5-8.5	10	68	14	-	3	5
	8.5-9.5	10	71	11	-	3	5
	9.5-10.5	13	70	13	1	-	3
	10.5-11.5	17	63	10	-	4	6
	11.5-12.5	17	62	10	-	4	7
	12.5-13.5	20	55	15	1	5	4
	13.5-15.0	11	70 $\frac{1}{2}$	9	1	2 $\frac{1}{2}$	6
	Mean	11	69	11	-	4	5

TL 41 NW 15 4281 1531 Marshland Wood, Widford

Block B

Surface level +81.7 m
 Water not struck
 Shell 152 mm diameter
 October 1975

Waste 18.6 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.1	0.1
Boulder Clay	Clay, pebbly, brown, soft, sticky	0.4	0.5
	Clay, chalky, pebbly, silty, brown mottled grey, with flint and quartz, soft	5.3	5.8
	Clay, silty, sandy, chalky, pebbly, olive green, firm	0.9	6.7
	Clay, silty, chalky, blue grey, firm	0.7	7.4
	Clay, very silty, chalky, grey, soft	0.2	7.6
	Clay, chalky, silty, blue grey, becomes black with rare chalk at base, stiff to hard	6.6	14.2
	Silt, clayey, sandy, laminated, olive green, soft	2.0	16.2
	Clay, very chalky, silty, blue black, with a trace of fossil debris, very hard	2.4+	18.6

TL 41 NW 16 4312 1983 The Palace, Much Hadham

Block E

Surface level +55.7 m
 Water struck at +53.7 m
 Shell (modified) 152 mm diameter
 February 1976

Overburden 2.0 m
 Mineral 1.2 m
 Bedrock 0.4 m +

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.2	0.2
Alluvium	Silt, clayey, sandy, pebbly, grey brown becoming darker with depth, with peaty organic material, soft to very soft	1.8	2.0
	Gravel Sand: medium with coarse and some fine, predominantly angular flint, with some rounded fine quartz and quartzite Gravel: fine with coarse, subrounded to rounded flint, with rounded quartz and angular flint, and a trace of subangular sandstone	1.2	3.2
Upper Chalk	Chalk, putty, white to cream, soft	0.4+	3.6

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>					
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>		<i>Gravel</i>	
				- ½	+ ½ - ¼	+ ¼ - 1	+ 1 - 4	+ 4 - 16	+ 16
3	29	68	2.0-3.2*	3	5	14	10	39	29

TL 41 NW 17 4338 1875 Danebridge Lane, Much Hadham

Block A

Surface level +59.4 m
 Water not struck
 Shell (modified) 152 mm diameter
 February 1976

Waste 4.1 m
 Bedrock 0.3 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Peat, pebbly, black, friable	0.5	0.5
Boulder Clay	Clay, silty, sandy, chalky, pebbly, brown, soft	0.4	0.9
	'Very clayey' pebbly sand: medium and fine quartz sand, with fine gravel of angular to well rounded flints	0.2	1.1
	Clay, silty, faintly laminated, yellow brown, with a trace of chalk, soft	2.1	3.2
Glacial Sand and Gravel	'Very clayey' sandy gravel Sand: fine to medium with some coarse, predominantly quartz, with angular coarse flint Gravel: fine with some coarse angular flints, with some well rounded flint and quartzite	0.9	4.1
Upper Chalk	Chalk, very flinty, large cobbles at top, dry	0.3+	4.4

Surface level +87.6 m
 Water not struck
 Shell (modified) 152 mm diameter
 January 1976

Overburden 15.5 m
 Mineral 6.1 m
 Bedrock 1.0 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil and subsoil	0.7	0.7
Boulder Clay	Clay, chalky to very chalky, flinty, brown, soft	2.0	2.7
	Clay, sandy, chalky, yellow brown, soft	0.3	3.0
	Clay, chalky, silty, grey brown, soft becoming stiff	2.0	5.0
	Clay, chalky, grey blue becoming dark grey blue, with rare flint pebbles, and a chalky fine sand lens at 7.8 m, stiff	6.2	11.2
	Clay, silty, small chalk pellets, flinty, quartz pebbles, grey black, very stiff	0.6	11.8
	Clay, chalky, pebbly, brown, black, firm	3.4	15.2
	Clay, chalky, sandy, very pebbly, yellow brown, firm	0.3	15.5
Glacial Sand and Gravel	Sandy gravel, pebbly sand in upper 3.0 m	6.1	21.6
	Sand: medium with some fine and coarse, predominantly quartz, with some angular coarse and medium flint, yellow Gravel: fine with some coarse, angular to subrounded flint, with some rounded quartz and quartzite, and a trace of sandstone, very rare chalk		
Woolwich and Reading Beds	Clay, light blue mottled red, brown, and green, stiff to hard, waxy	1.0+	22.6

Grading

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- 1/8	+ 1/8 - 1/4	+ 1/4 - 1/2	+ 1/2 - 1	+ 1 - 4	+ 4 - 16	+ 16
5	62	33	15.5-16.5	8	36	24	6	17	9	
			16.5-17.5	4	20	61	3	10	2	
			17.5-18.5	3	8	80	2	5	2	
			18.5-19.5	4	9	20	13	31	23	
			19.5-20.5	5	6	22	15	35	17	
			20.5-21.6	5	6	27	16	31	15	
			Mean	5	14	39	9	22	11	

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
15.5-16.5	3	51	20	-	17	9
16.5-17.5	-	52	31	-	8 1/2	8 1/2
17.5-18.5	-	59	31	-	6	4
18.5-19.5	-	51	38	-	9	2
19.5-20.5	-	56	35	-	2	7
20.5-21.6	-	52	43	-	4	1
Mean	1/2	53	33	-	8	5 1/2

Surface level +77.6 m
 Water struck at +74.2 m
 Shell (modified) 152 mm diameter
 January 1976

Overburden 3.4 m
 Mineral 1.2 m
 Waste 4.9 m
 Mineral 4.5 m
 Bedrock 4.0 m+

Log			
<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i>	<i>Depth</i>
		m	m
	Soil	0.3	0.3
Boulder Clay	Clay, pebbly, silty, brown, soft	0.3	0.6
	Clay, pebbly, chalky, silty, brown, soft	1.2	1.8
	Clay, pebbly, silty, sandy, brown, with rare chalk, soft	1.6	3.4
Glacial Sand and Gravel	a 'Clayey' gravel	1.2	4.6
	Sand: medium and coarse with some fine, predominantly quartz, with angular coarse flint brown Gravel: coarse and fine, angular to rounded flint, with some rounded quartz and quartzite, and a trace of sandstone and chalk		
Boulder Clay	Clay, very sandy, very chalky, pebbly, yellow, firm	2.2	6.8
	Clay, chalky, pebbly, silty, blue brown becomes olive brown, firm	2.7	9.5
Glacial Sand and Gravel	b Sandy gravel, pebbly sand between 11.4 and 12.4 m	4.5	14.0
	Sand: medium with fine and some coarse, predominantly quartz, with some angular coarse flint Gravel: fine with coarse and a trace of cobble, angular to rounded flint, and rounded quartz and quartzite, with a trace of sandstone		
London Clay (Basement Bed)	Silt, very clayey, fine sandy, laminated, yellow brown mottled grey, soft	1.5	15.5
	Sand, fine, silty, clayey, olive green, with shell debris, soft	0.3	15.8
	Sand, fine, silty, becomes very clayey and glauconitic, olive grey, with shell debris, and wood fragments, and white, brown and black well rounded flints at base	1.8	17.6
Woolwich and Reading Beds	Clay, blue and brown mottled becomes brown mottled, red, green and blue, very hard, waxy	0.4+	18.0

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages						
	Fines	Sand	Gravel		percentages						
					Fines	Sand		Gravel		Gravel	
			- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16-64	+ 64		
a	12	32	56	3.4-4.6*	12	5	15	12	27	29	-
b	8	50	42	9.5-10.5	10	6	17	17	33	17	-
				10.5-11.4	9	7	23	13	30	18	-
				11.4-12.4	7	48	38	1	3	3	-
				12.4-13.4	5	15	16	8	24	23	9
				13.4-14.0	6	3	23	12	26	28	-
			Mean	8	17	23	10	23	17	2	

Composition

	Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
		Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
a	3.4-4.6	-	73	20	-	6	1
b	9.5-10.5	-	55	34	-	4	7
	10.5-11.4	-	55	38	-	5	2
	11.4-12.4	-	65	29	-	3	3
	12.4-13.4	-	48	38	-	10	4
	13.4-14.0	-	45	43	-	9	3
	Mean	-	54	36	-	6	4

Surface level +81.7 m
 Water not struck
 Shell (modified) 152 mm diameter
 January 1976

Waste 22.7 m
 Bedrock 1.5 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.4	0.4
Boulder Clay	Clay, chalky to very chalky, silty, brown, with some flint pebbles, soft	4.8	5.2
	Clay, silty, chalky, dark grey, with some flints and a trace of vein quartz, black shales and grey limestone, stiff	2.5	7.7
	Clay, very sandy, chalky, grey, firm	0.2	7.9
	Clay, chalky, dark blue grey, with flint, very stiff	3.1	11.0
	Clay, small chalk pellets, dark grey black, hard	1.5	12.5
	Clay, chalky, silty, grey brown, with flint pebbles, stiff	3.1	15.6
	Clay, chalky, grey blue, with flint, quartz and sandstone, stiff	1.4	17.0
	Sand, very chalky, silty and clayey, with flint pebbles, brown	0.6	17.6
	Clay, chalky, pebbly, sandy, brown, firm	1.1	18.7
	Glacial Sand and Gravel	Gravel, clayey at top	4.0
Sand: medium with coarse and some fine, predominantly angular coarse and medium flint, with some medium and fine rounded quartz Gravel: fine with coarse, angular to rounded flint, with some rounded to subrounded quartz and quartzite, and a trace of sandstone			
Woolwich and Reading Beds	Clay, brown mottled red, hard, waxy	0.7	23.4
	Clay, mottled red, blue, and green, hard, waxy	0.8+	24.2

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>					
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>		<i>Gravel</i>	
				$-\frac{1}{8}$	$+\frac{1}{8}$ $-\frac{1}{4}$	$+\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16
7	43	50	18.7-19.7	11	16	20	13	27	13
			19.7-20.7	4	8	14	17	31	26
			20.7-21.7	6	10	20	14	28	22
			21.7-22.7	6	7	16	16	35	20
			Mean	7	10	18	15	30	20

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in + 4-16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
18.7-19.7	-	69	19	-	8	4
19.7-20.7	-	64	25	-	7	4
20.7-21.7	-	71	20	-	6	3
21.7-22.7	-	62	26	-	7	5
Mean	-	66½	22½	-	7	4

Surface level +72.2 m
 Water not struck
 Shell (modified) 152 mm diameter
 January 1976

Overburden 9.3 m
 Mineral 4.8 m
 Bedrock 2.7 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Boulder Clay	Clay, sandy, brown, some flints, soft	0.4	0.7
	Clay, sandy, chalky, brown mottled yellow brown, some flints, firm	2.1	2.8
	Clay, chalky, silty, grey becomes olive grey, with a trace of flint, black shale and fossil debris, stiff	6.4	9.2
	Clay, brown, chalky, sandy, soft	0.1	9.3
Glacial Sand and Gravel	Sandy gravel, very sandy at top, gravel at base	4.8	14.1
	Sand: medium with coarse and fine, predominantly rounded quartz and angular flint, with some sandstone, yellow brown Gravel: fine with coarse, subangular to rounded flint, with some rounded quartz and quartzite, and a trace of sandstone		
London Clay	Clay, very sandy, coarsely laminated, brown, soft	0.4	14.5
	Silt, clayey, laminated, light grey blue, firm	0.1	14.6
	Sand, very clayey, and silty, drab olive green, with glauconite, shell debris and pyrite nodules, soft	2.2+	16.8

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>						
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>		<i>Gravel</i>		
				$-\frac{1}{8}$	$+\frac{1}{8}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
6	48	46	9.3-10.3	7	11	52	7	16	7	
			10.3-11.3	8	12	27	11	29	13	
			11.3-12.3	5	10	21	12	36	16	
			12.3-13.3	6	5	17	16	36	20	
			13.3-14.1	4	5	13	18	29	31	
			Mean	6	9	26	13	29	17	

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in +4-16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
9.3-10.3	-	70	16	-	10	4
10.3-11.3	-	73	14	-	8	5
11.3-12.3	-	66	27	-	4	3
12.3-13.3	-	77	15	-	4	4
13.3-14.1	-	62	19	-	6	13
Mean	-	70	18	-	6	6

Surface level +77.2 m
 Water not struck
 Shell (modified) 152 mm diameter
 February–March 1976

Overburden 2.2 m
 Mineral 9.9 m
 Bedrock 3.4 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.1	0.1
Head	Clay, very pebbly, orange brown, soft	1.4	1.5
	Clay, very sandy, very pebbly, chalky, brown	0.7	2.2
Glacial Sand and Gravel	Gravel, clayey at top, with a band of brown chalky silty clay between 7.1 and 7.4 m	9.9	12.1
	Sand: medium with some coarse and fine, predominantly quartz, with angular coarse and medium flint Gravel: fine and coarse, angular to subrounded flint, with rounded quartz and quartzite, and some rounded chalk and sandstone, with a trace of fossil debris		
Woolwich and Reading Beds	Sand, fine, increasingly clayey, very silty, yellow green, firm	3.2	15.3
	Clay, sandy, pebbly, orange brown, with well rounded black flints	0.1	15.4
Upper Chalk	Chalk, pugged up, white to cream, very soft	0.1+	15.5

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>					
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>		<i>Gravel</i>	
			$-\frac{1}{8}$	$+\frac{1}{8}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
8	41	51	2.2–3.2	11	8	31	14	26	10
			3.2–4.2	9	8	24	12	25	22
			4.2–5.2	10	8	23	14	26	19
			5.2–6.2	12	8	15	13	24	28
			6.2–7.1	8	12	20	9	25	26
			7.4–8.4	6	8	21	9	26	30
			8.4–9.4	4	6	15	15	31	29
			9.4–10.4	6	5	14	16	26	33
			10.4–11.4	6	6	19	14	28	27
			11.4–12.1	5	5	25	16	27	22
Mean			8	7	21	13	26	25	

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in + 4–16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
2.2–3.2	27	51	11	1	7	3
3.2–4.2	28	49	12	1	9	1
4.2–5.2	25	53	12	1	7	2
5.2–6.2	16	59	8	4	3	10
6.2–7.1	3	54	30	1	7	5
7.4–8.4	–	56	25	–	15	4
8.4–9.4	–	67	24	–	6	3
9.4–10.4	–	75	19	–	4	2
10.4–11.4	–	58	27	–	11	4
11.4–12.1	–	49	36	–	13	2
Mean	10	57	20	1	8	4

Surface level +89.8 m
 Water struck at +78.3 m
 Shell (modified) 152 mm diameter
 February 1976

Waste 22.0 m
 Bedrock 2.4 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, very chalky, yellow brown, with a trace of flint and quartz pebbles, soft to very soft	5.7	5.9
	Clay, chalky, silty, grey blue becomes dark grey with depth, with some flint and quartz pebbles, stiff	5.1	11.0
	Clay, chalky, dark brown, with pebbles of flint and quartz, stiff	5.0	16.0
	Clay, chalky, dark grey, rare flints, stiff	1.0	17.0
	Clay, very sandy, very pebbly, brown becomes yellow brown, firm	0.4	17.4
Glacial Sand and Gravel	Gravel, sand band between 19.4 and 19.7 m	4.6	22.0
	Sand: medium with some coarse and fine, predominantly quartz, with coarse and medium angular flint, orange Gravel: fine with coarse, angular to subrounded flint, with subrounded to rounded quartz and quartzite, with a trace of sandstone		
London Clay	Clayey silt, sandy, laminated, brown, soft	1.1	23.1
	Silt, clayey, fine sandy, olive green, very soft	1.3+	24.4

Grading

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- 1/8	+ 1/8 - 1/4	+ 1/4 - 1/2	+ 1/2 - 1	+ 1 - 4	+ 4 - 16	+ 16
8	43	49	17.4-18.4	10	7	23	9	29	22	
			18.4-19.4	8	10	34	9	25	14	
			19.4-19.9	9	13	21	8	33	16	
			19.9-20.9	8	8	23	14	28	19	
			20.9-22.0	4	3	20	14	28	31	
			Mean	8	8	24	11	28	21	

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
17.4-18.4	-	68	24	-	7	1
18.4-19.4	-	59	30	-	10	1
19.4-19.9	-	55	34	-	7	4
19.9-20.9	-	72	21	-	6	1
20.9-22.0	-	69	19	-	7	5
Mean	-	66	25	-	7	2

Surface level +79.4 m
 Water struck at +76.6 m
 Shell (modified) 152 mm diameter
 January 1976

Overburden 15.0 m
 Mineral 6.8 m
 Waste 0.7 m
 Bedrock 0.9 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil and subsoil	0.8	0.8
Boulder Clay	Clay, chalky, rare flints, yellow brown becomes grey, soft	2.0	2.8
	Clay, chalky, sandy, pebbly, yellow, very soft	0.3	3.1
	Clay, chalky, rare pebbles, brown, soft	0.7	3.8
	Clay, chalky, silty, blue grey becoming dark blue grey, with pebbles of flint and quartz, and a trace of black shale and fossil fragments, stiff	3.5	7.3
	Clay, small chalk pellets, blue black, stiff to hard	2.2	9.5
	Clay, chalky, silty, very dark brown, with brown flints, stiff	1.5	11.0
	Silts and clays, laminated, yellow, with some laminae of fine chalky sand becoming more frequent until at base laminated fine sands and silt. Laminae up to 30 cm	4.0	15.0
Glacial Sand and Gravel	'Clayey' sandy gravel, very clayey sand in upper 2.5 m becomes progressively more gravelly until gravel at base Sand: fine and medium with some coarse, predominantly rounded quartz, with some coarse angular flint, and a trace of rounded chalk, pale yellow Gravel: fine with coarse, subangular to rounded flint, with some rounded quartz, and a trace of sandstone	6.8	21.8
Boulder Clay	Clay, chalky, silty, very sandy and pebbly, brown, stiff	0.7	22.5
Woolwich and Reading Beds	Clay, silty, mottled blue, grey, brown and green, very stiff, waxy	0.9+	23.4

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>					
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>		<i>Gravel</i>	
			$-\frac{1}{16}$	$+\frac{1}{16}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
15	56	29	15.0-16.0	42	56	1	1	-	-
			16.0-17.0	32	60	7	1	-	-
			17.0-17.5	18	50	29	1	2	-
			17.5-18.5	5	11	57	9	13	5
			18.5-19.5	3	5	33	18	29	12
			19.5-20.5	4	4	16	17	36	23
			20.5-21.8	4	5	13	16	35	27
			Mean	15	25	21	10	18	11

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in + 4-16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
15.0-16.0	Sand - no sample					
16.0-17.0	Sand - no sample					
17.0-17.5	Sand - very small sample					
17.5-18.5	-	64	27	-	4	5
18.5-19.5	-	69	25	-	5	1
19.5-20.5	-	62	28	-	5	5
20.5-21.8	-	61	31	-	5	3
Mean	-	64	28	-	5	3

Surface level +73.9 m
 Water not struck
 Shell (modified) 152 mm diameter
 February 1976

Overburden 10.5 m
 Mineral 4.1 m
 Waste 0.8 m
 Bedrock 1.5 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, silty, yellow brown, with a trace of flint, stiff	0.6	0.8
	Clay, chalky, silty, yellow brown becoming brown streaked grey, flints, soft	1.7	2.5
	Clay, pebbly, chalky, silty, grey, soft	0.4	2.9
	Clay, chalky, flinty, dark grey blue, stiff to hard	2.5	5.4
	Clay, chalky, grey brown, with flint and quartz, stiff	3.4	8.8
	Clay, chalky, silty, grey blue, with pebbles of flint, quartz sandstone and rare black shale, stiff	0.7	9.5
	Clay, chalky, sandy at base, dark grey brown, with flint and quartz	1.0	10.5
Glacial Sand and Gravel	Sandy gravel, very sandy at top more gravelly with depth Sand: medium with some fine and coarse, predominantly rounded quartz, with coarse and medium angular flint Gravel: fine with some coarse and a trace of cobble, subangular to rounded flint, with some rounded quartz and quartzite, and a trace of sandstone	4.1	14.6
Boulder Clay	Clay, very sandy, silty, brown streaked grey, with a trace of quartz pebbles, firm	0.7	15.3
	Mudstone, rounded grey boulder	0.1	15.4
London Clay	Silt, very clayey, sandy, brown streaked grey, with carbonaceous fragments, firm	0.5	15.9
	Silt, very clayey, sandy, dark olive green, with glauconite and occasional pyrite nodules, firm	1.0+	16.9

Grading

Mean for deposit percentages			Depth below surface (m)	percentages							
Fines	Sand	Gravel		Fines	Sand			Gravel			
				-½	+½	-¼	+¼-1	+1-4	+4-16	+16-64	+64
6	58	36	10.5-11.5	7	18	34	9	22	10	-	
			11.5-12.5	4	12	51	10	17	6	-	
			12.5-13.5	5	8	35	10	23	9	10	
			13.5-14.6	7	9	20	17	28	19	-	
			Mean	6	12	35	11	23	11	2	

Composition

Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
10.5-11.5	-	76	16	-	5	3
11.5-12.5	-	73	23	-	2	2
12.5-13.5	-	76	20	-	2	2
13.5-14.6	-	74	20	-	4	2
Mean	-	76	19	-	3	2

Surface level +76.2 m
 Water struck at +57.6 m
 Shell (modified) 152 mm diameter
 April 1976

Overburden 13.7 m
 Mineral 6.1 m
 Bedrock 2.2 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Boulder Clay	Clay, silty, flinty, brown, stiff	0.7	1.0
	Clay, chalky, silty, yellow brown becomes brown mottled blue grey, soft	2.4	3.4
	Clay, chalky, silty, grey, soft becoming stiff	5.0	8.4
	Clay, chalky, silty, flinty, dark blue grey, stiff	3.9	12.3
	Clay, chalky, silty, very pebbly and chalkless at base, grey brown, firm	1.4	13.7
Glacial Sand and Gravel	Gravel, sandy at top becomes coarse with depth	6.1	19.8
	Sand: medium and coarse with some fine, predominantly rounded quartz, with coarse angular flint, yellow brown Gravel: coarse and fine, angular to rounded flint, with some rounded quartz, quartzite and sandstone		
London Clay	Clay, sandy, pebbly, micaceous, laminated, brown, stiff	0.3	20.1
	Silt, clayey, micaceous, laminated in parts, dark olive grey, stiff	1.9+	22.0

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>						
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>		<i>Gravel</i>		
				$-\frac{1}{2}$	$+\frac{1}{2}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
5	38	57	13.7-14.7	8	12	24	14	28	14	
			14.7-15.7	7	9	18	15	32	19	
			15.7-16.7	7	8	18	17	31	19	
			16.7-17.7	4	6	13	13	23	41	
			17.7-18.6	3	4	12	19	37	25	
			18.6-19.8*	1	4	12	10	21	52	
			Mean	5	7	16	15	28	29	

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in + 4-16 mm Fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
13.7-14.7	-	71	20	-	5	4
14.7-15.7	-	68	21	-	10	1
15.7-16.7	-	73	18	-	5	4
16.7-17.7	-	73	18	-	8	1
17.7-18.6	-	78	12	-	6	4
18.6-19.8	-	70	19	-	9	2
Mean	-	72	18	-	7	3

Surface level +72.2 m
 Water struck at +56.7 m
 Shell (modified) 152 mm diameter
 February 1976

Waste 17.6 m
 Bedrock 1.1 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Boulder Clay	Clay, chalky, silty, rare flint, yellow brown, soft	2.8	3.1
	Clay, chalky, silty, rarely pebbly, brown, soft to stiff	1.3	4.4
	Clay, very chalky, silty, some flints, grey blue, stiff	2.4	6.8
	Clay, silty, chalky, flint and quartz pebbles, dark grey black, hard	2.1	8.9
	Clay, chalky to very chalky, silty, pebbly, light grey, stiff	1.5	10.4
	Clay, chalky, pebbly, very flinty, brown, firm	3.0	13.4
	Clay, very pebbly, very sandy, yellow brown, firm	0.1	13.5
Glacial Sand and Gravel	Gravel	4.1	17.6
	Sand: medium with coarse and some fine, predominantly angular coarse and medium flint, with fine rounded quartz, brown Gravel: fine and coarse, angular to subrounded flint, with rounded quartz and quartzite, and a trace of sandstone		
London Clay	Clay, very silty, sandy, yellow brown, firm	0.2	17.8
	Silt, very clayey, fine sandy, drab olive green, with decalcified shell debris, soft	0.9+	18.7

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>					
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>		<i>Gravel</i>	
				$-\frac{1}{8}$	$+\frac{1}{8}$ $-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
4	44	52	13.5-14.5	7	10	20	15	29	19
			14.5-15.5	7	9	16	16	30	22
			15.5-16.5*	1	7	18	15	25	34
			16.5-17.6*	2	14	22	12	21	29
			Mean	4	10	19	15	26	26

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in + 4-16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
13.5-14.5	-	66	29½	-	3½	1
14.5-15.5	-	76	21	-	2½	½
15.5-16.5	-	65	31	-	3	1
16.5-17.6	-	65	26	-	6	3
Mean	-	68	27	-	4	1

TL 41 NE 13 4570 1976 Jobbers Wood, Much Hadham

Block A

Surface level +93.3 m
Water struck at +85.3 m
Shell (modified) 152 mm diameter
March 1976

Waste 18.6 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.2	0.2
Head	Clay, sandy, silty, yellow brown, with a trace of flint pebbles, soft	0.8	1.0
Boulder Clay	Clay, very chalky, silty, yellow brown, with chalk and flint cobbles, firm	1.8	2.8
	Clay, chalky, silty, grey, with some flints, firm to stiff	5.2	8.0
	Silt and chalk sand, pale grey, with fine chalk gravel, soft	0.9	8.9
	Clay, chalky, silty, grey becoming dark blue grey, with some flints, stiff	9.7+	18.6

Surface level +88.5 m
 Water struck at +82.6 m and +78.5 m
 Shell (modified) 152 mm diameter
 February 1976

Waste 21.0 m
 Bedrock 1.0 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Made ground	1.1	1.1
Boulder Clay	Clay, very chalky, pebbly, brown mottled grey, soft	4.7	5.8
	Sand, very clayey, chalky, pebbly, brown	0.3	6.1
	Clay, very chalky, silty, grey blue, soft becoming stiff	7.9	14.0
	Clay, chalky, silty, dark grey, with oolitic limestone boulder between 14.5 m and 14.8 m, stiff	3.4	17.4
	Clay, silty, many sand sized chalk pellets, dark grey, stiff	0.5	17.9
	Clay, sandy, silty, pebbly, yellow brown, firm	0.2	18.1
Glacial Sand and Gravel	'Clayey' sandy gravel, less 'clayey' with depth	2.7	20.8
	Sand: medium with fine and coarse, predominantly quartz, with some angular coarse flint, orange brown		
	Gravel: fine with coarse, subrounded to angular flint, with sub-rounded to rounded quartz and quartzite, and some rounded sandstone		
	Clay, very sandy, silty, brown, soft	0.2	21.0
Woolwich and Reading Beds	Clay, silty, mottled red and brown streaked green and light blue, with a trace of fine gravel of reddened flints, stiff becoming hard, waxy	1.0+	22.0

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>					
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>		<i>Gravel</i>	
				$-\frac{1}{8}$	$+\frac{1}{8} - \frac{1}{4}$	$+\frac{1}{4} - 1$	$+ 1 - 4$	$+ 4 - 16$	$+ 16$
13	46	41	18.1-19.1	14	12	39	6	16	13
			19.1-20.1	18	9	18	11	21	23
			20.1-20.8	5	10	18	13	36	18
			Mean	13	10	26	10	23	18

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in + 4-16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
18.1-19.1	-	60	30	-	7	3
19.1-20.1	-	67	27½	-	4½	1
20.1-20.8	-	66	29	-	2	3
Mean	-	64	29	-	5	2

Surface level +93.5 m
 Water struck at +85.0 m
 Shell (modified) 152 mm diameter
 April 1976

Waste 19.7 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Boulder Clay	Clay, chalky, flinty, silty, brown, soft	1.1	1.4
	Clay, silty, chalky, brown mottled blue grey, soft	3.8	5.2
	Clay, silty, chalky, dark blue grey, firm	0.5	5.7
	Clay, chalky to very chalky, silty, light brown, soft	0.9	6.6
	Clay, silty, chalky, light blue grey, soft	1.1	7.7
	Clay, fine sandy, silty, chalky to very chalky, yellow brown, very soft	1.9	9.6
	Clay, silty, chalky, dark blue grey, with some flint and grey limestone, firm becoming stiff	8.2	17.8
	Sand, fine and medium, 'clayey', chalky, dark brown, soft	0.2	18.0
	Clay, silty, chalky, brown grey, soft	0.6	18.6
	Sand, fine and medium, 'clayey', chalky, dark brown, soft	0.2	18.8
	Clay, very chalky, sandy, silty, brown, soft	0.2	19.0
	Clay, chalky, silty, brown mottled blue grey, firm	0.7+	19.7

TL 41 NE 16 4539 1795 Sacombs Ash, High Wych

Block A

Surface level +85.4 m
 Water struck at +63.8 m
 Shell 152 mm diameter
 November 1975

Waste 18.6 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, chalky, pebbly, silty, yellow brown becomes mottled pale blue, with angular flint, rounded quartz and fossil fragments, soft	4.7	4.9
	Clay, chalky, silty, with flint, grey blue, soft	6.7	11.6
	Silt, fine, sandy, chalky, laminated with black silt bands, pale grey, soft	1.4	13.0
Glacial Sand and Gravel	Gravel	1.0	14.0
	Sand: fine and coarse with medium, predominantly rounded quartz and flint, with some rounded chalk and angular coarse flint		
	Gravel: coarse with fine and cobble, angular flint and rounded chalk, with some rounded limestone and sandstone, and a trace of quartz, quartzite and fossil debris		
Boulder Clay	Clay, silty, chalky, dark blue grey, with some flint and quartz pebbles, firm	4.6+	18.6

Grading

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- 1/8	+ 1/8 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16 - 64	+ 64
12	38	50	13.0-14.0	12	16	9	13	14	26	10

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
13.0-14.0	35	32	3	2	5	23*

* Including limestone.

Surface level +77.5 m
 Water struck at +74.4 m
 Shell (modified) 152 mm diameter
 April 1976

Waste 20.6 m+

Log

Geological classification	Lithology	Thickness	Depth
		m	m
	Soil	0.2	0.2
Boulder Clay	Clay, silty, sandy, brown, soft	0.7	0.9
	Clay, silty, chalky, brown, soft	2.2	3.1
	Clay, sandy, silty, yellow brown, very stoney at base, soft	1.9	5.0
	Clay, chalky, silty, grey, firm becoming stiff	7.5	12.5
	Mudstone boulder, dark grey, very hard	0.2	12.7
	Clay, chalky, silty, dark grey, stiff	0.9	13.6
	Clay, chalky, silty, dark brown, stiff becoming firm	6.4	20.0
	Clay, pebbly, silty, sandy, brown, firm	0.1	20.1
Glacial Sand and Gravel	Gravel	0.5+	20.6
	Sand: medium with coarse and some fine, predominantly rounded quartz, with some angular coarse flint, brown Gravel: fine with coarse, subangular to rounded flint, with rounded to subrounded quartz, quartzite and sandstone		

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16-64
7	40	53	20.1-20.6	7	6	22	12	35	18

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
20.1-20.6	-	69	18	-	7	6

Surface level +88.3 m
 Water struck at +76.6 m
 Shell (modified) 152 mm diameter
 March 1976

Overburden 16.3 m
 Mineral 6.7 m
 Bedrock 1.5 m+

Log				
Geological classification	Lithology	Thickness	Depth	
		m	m	
	Soil	0.2	0.2	
Boulder Clay	Clay, silty, sandy, chalky, orange brown, soft	0.8	1.0	
	Clay, chalky, silty, fawn, soft	3.7	4.7	
	Clay, chalky, silty, grey becoming blue grey, with some flint and quartz pebbles, firm to stiff	6.9	11.6	
	Clay, chalky, silty, gritty, light grey, soft	0.2	11.8	
	Clay, chalky, silty, blue grey, firm	3.7	15.5	
	Clay, chalky, silty, pebbly, dark brown, stiff	0.5	16.0	
	Clay, sandy, silty, very pebbly, yellow brown, soft to firm	0.3	16.3	
	Glacial Sand and Gravel	'Clayey' sandy gravel, 'very clayey' pebbly sand at top, grading to gravel Sand: medium with some fine and coarse, predominantly rounded quartz, with a trace of angular coarse flint, yellow Gravel: fine with coarse, angular to subrounded flint, with rounded quartz and quartzite, and some rounded sandstone	6.7	23.0
Woolwich and Reading Beds	Clay, brown mottled grey, waxy, with well developed laminae of light brown fine silt, firm to stiff	0.6	23.6	
	Clay and sands, laminated, light brown and dark grey, waxy, soft	0.2	23.8	
	Sand, fine, clayey, laminated, yellow brown, firm	0.2	24.0	
	Sand, fine, laminated, white, with pellets of light grey waxy clay, firm	0.5+	24.5	

Grading

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- 1/8	+ 1/8 - 1/4	+ 1/4 - 1/2	+ 1/2 - 1	+ 1 - 4	+ 4 - 16	+ 16
10	50	40	16.3-17.3	30	23	25	4	11	7	
			17.3-18.3	13	13	21	10	27	16	
			18.3-19.3	5	34	29	6	16	10	
			19.3-20.3	6	5	25	15	27	22	
			20.3-21.3	4	8	30	10	28	20	
			21.3-22.3	4	5	32	13	25	21	
			22.3-23.0	4	4	23	14	35	20	
			Mean	10	13	27	10	24	16	

Composition

Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
16.3-17.3	-	59	30	-	4	7
17.3-18.3	-	54	29	-	13	4
18.3-19.3	-	52	31	-	11	6
19.3-20.3	-	48	28	-	21	3
20.3-21.3	-	53	27	-	16	4
21.3-22.3	-	40	35	-	19	6
22.3-23.0	-	37	41	-	16	6
Mean	-	50	31	-	14	5

TL 41 NE 19 4678 1835 Shingle Hall, High Wych

Block D

Surface level +83.7 m
Water not struck
Shell 152 mm diameter
November 1975

Waste 18.6 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.1	0.1
	Made ground, concrete fill	0.8	0.9
Boulder Clay	Clay, chalky, brown, stiff	4.3	5.2
	Clay, silty, chalky, grey becoming blue grey, with some flint pebbles, stiff	13.4+	18.6

TL 41 NE 20 4684 1747 Shingle Hall, High Wych

Block D

Surface level +85.0 m
Water not struck
Shell 152 mm diameter
November 1975

Waste 18.6 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.2	0.2
Boulder Clay	Clay, chalky, silty, brown, stiff	2.9	3.1
	Clay, silty, chalky, grey becoming blue grey, with some flint pebbles, stiff	15.5+	18.6

Surface level +78.9 m
 Water struck at +68.0 m and +56.4 m
 Shell (modified) 152 mm diameter
 April–May 1976

Overburden 18.0 m
 Mineral 6.3 m
 Bedrock 0.7 m+

Log Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, silty, sandy, chalky, orange brown, soft	0.6	0.8
	Clay, silty, chalky, mottled grey and brown, soft	2.4	3.2
	Clay, chalky, silty, light grey, soft	4.0	7.2
	Clay, chalky, silty, dark blue grey, stiff	2.8	10.0
	Clay, chalky, silty, light grey, soft	0.6	10.6
	'Very clayey' sand, fine and medium, chalky, grey brown	0.3	10.9
	Clay, chalky, silty, sandy, brown, soft	0.4	11.3
	Clay, chalky, silty, blue grey, stiff	6.6	17.9
	Clay, pebbly, sandy, silty, brown, firm	0.1	18.0
Glacial Sand and Gravel	Gravel, becomes coarser and less 'clayey' with depth	6.3	24.3
	Sand: medium and coarse with some fine, predominantly quartz, with coarse angular flint, yellow brown Gravel: fine with coarse and a trace of cobble, subrounded to angular flint, with some subrounded to rounded quartz, quartzite and sandstone		
Woolwich and Reading Beds	Clay, silty, brown, stiff, waxy	0.3	24.6
	Clay, silty, brown mottled red, green and light blue becomes grey mottled red brown and blue, stiff, waxy	0.4+	25.0

Grading

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
4	35	61	18.0-19.0	9	6	15	15	29	26	-
			19.0-20.0	8	9	19	15	31	18	-
			20.0-21.0	4	6	20	7	32	31	-
			21.0-22.0	2	5	15	11	32	25	10
			22.0-23.0	3	6	15	16	40	20	-
			23.0-24.3	1	3	12	13	36	35	-
			Mean	4	6	16	13	33	26	2

Composition

Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
18.0-19.0	-	69	22	-	8	1
19.0-20.0	-	71	19	-	6	4
20.0-21.0	-	75	19	-	2	4
21.0-22.0	-	72	16	-	10	2
22.0-23.0	-	79	14	-	7	-
23.0-24.3	-	59	30	-	9	2
Mean	-	70	21	-	7	2

TL 41 NE 22 4663 1660 Shingle Hall, High Wych

Block D

Surface level +83.9 m
Water not struck
Shell 152 mm diameter
November 1975

Waste 18.6 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.1	0.1
Boulder Clay	Clay, silty, pebbly, brown, soft	0.5	0.6
	Clay, chalky, silty, yellow brown becoming brown, with pockets of sandy clay, and flint pebbles, stiff	7.3	7.9
	Clay, silty, chalky, pebbly, blue grey becoming blue black, stiff becoming hard	10.7+	18.6

TL 41 NE 23 4627 1552 Gangies Hill, High Wych

Block C

Surface level +79.1 m
Water struck at 71.9 m and 71.3 m
Shell (modified) 152 mm diameter
April 1976

Waste 23.8 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.2	0.2
Boulder Clay	Clay, chalky, silty, ochre brown, soft	0.7	0.9
	Clay, very chalky, silty, light brown, firm	1.1	2.0
	Clay, chalky, silty, brown, soft	2.3	4.3
	Clay, chalky, silty, dark brown, soft	1.6	5.9
	Silt, clayey, laminated, grey, soft	1.0	6.9
	Silt, clayey, very chalky, grey, very soft	0.3	7.2
	Clay, silty, sandy, chalky, blue grey, stiff	0.9	8.1
	Chalk boulder, with bedded angular blue and black flints, white, hard	1.7	9.8
	Clay, chalky, silty, dark blue, with some flints, very stiff	9.0	18.8
	Clay, chalky, silty, mid-brown, soft	3.3	22.1
	Clay, chalky, pebbly, silty, dark blue grey, hard	1.7+	23.8

TL 41 NE 24 4768 1961 Thorley Place, Bishops Stortford

Block D

Surface level + 87.6 m
Water not struck
Shell (modified) 152 mm diameter
March 1976

Waste 18.6 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.2	0.2
Boulder Clay	Clay, very chalky, silty, yellow grey, with some flint pebbles, friable	3.6	3.8
	Silt, clayey, yellow grey, soft	0.1	3.9
	Clay, silty, chalky, dark grey, stiff	8.8	12.7
	Clay, sandy, silty, chalky, grey, soft	0.1	12.8
	Clay, chalky, dark blue grey, with some flint and black shaley mudstone, hard	5.8+	18.6

Surface level +79.0 m
 Water struck at +67.7 m
 Shell (modified) 152 mm diameter
 March 1976

Overburden 13.9 m
 Mineral 9.8 m
 Bedrock 1.5 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, silty, chalky, light brown, soft	3.5	3.7
	Clay, chalky, silty, dark grey, firm to stiff	6.6	10.3
	Clay, very silty, sandy, chalky, grey, with many wet silty, chalky, sand seams between 10.5 m and 12.0 m, soft	1.7	12.0
	Clay, chalky, silty, grey, firm becoming stiff	0.8	12.8
	Clay, chalky, brown, stiff	0.6	13.4
	Clay, very sandy, pebbly, brown, firm	0.5	13.9
Glacial Sand and Gravel	Gravel, sandy in top metre	9.8	23.7
	Sand: medium and coarse with some fine, predominantly quartz, with some angular medium and coarse flint, yellow brown Gravel: fine with coarse, well rounded to angular flint, with rounded quartz and quartzite, and some rounded sandstone, rare chalk		
Woolwich and Reading Beds	Clay, very fine sandy, silty, green mottled red and orange, firm becoming stiff	1.5+	25.2

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines		Sand		Gravel	
				- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16-64
6	43	51	13.9-14.9	4	7	34	15	29	11
			14.9-15.9	12	9	17	13	29	20
			15.9-16.9	6	7	23	16	27	21
			16.9-17.9	8	10	27	12	30	13
			17.9-18.9	3	7	17	22	37	14
			18.9-19.9	7	8	15	19	41	10
			19.9-20.9	5	8	15	16	38	18
			20.9-21.9	4	7	15	18	35	21
			21.9-22.9	6	6	12	19	34	23
			22.9-23.7	5	6	11	16	40	22
			Mean	6	7	19	17	34	17

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
13.9-14.9	-	59	29	-	8	4
14.9-15.9	-	61	21	-	13	5
15.9-16.9	1	72	18	-	6	3
16.9-17.9	1	60	20	-	13	6
17.9-18.9	3	58	24	-	10	5
18.9-19.9	3	65	14	-	14	3
19.9-20.9	2	63	18	-	11	6
20.9-21.9	2	60	22	-	12	4
21.9-22.9	-	63	21	-	9	7
22.9-23.7	-	64	21	-	9	6
Mean	1	62	21	-	11	5

Surface level +72.3 m
 Water struck at +55.3 m
 Shell 152 mm diameter
 October–November 1975

Overburden 11.4 m
 Mineral 9.4 m
 Bedrock 1.2 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Boulder Clay	Clay, chalky, silty, yellow brown, with some flints, soft	2.8	3.1
	Clay, chalky, light grey, very stiff	0.8	3.9
	Clay, chalky, blue grey, with some flint, quartz and quartzite pebbles, stiff	7.3	11.2
	Clay, pebbly, brown, stiff	0.2	11.4
Glacial Sand and Gravel	'Clayey' sandy gravel, fine with some medium sand in lower 1.6 m	9.4	20.8
	Sand: fine with medium and coarse, predominantly rounded quartz, with some medium and coarse angular flint, yellow, brown at base Gravel: fine with coarse, angular to rounded flint, with well rounded quartz and quartzite, and some rounded sandstone		
London Clay	Silt, fine sandy, clayey, grey to grey green, with bands of comminuted shell debris, soft	1.2+	22.0

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>					
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>		<i>Gravel</i>	
			$-\frac{1}{8}$	$+\frac{1}{8}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
10	51	39							
			11.4–12.4	14	9	14	15	29	19
			12.4–13.4	13	11	20	15	24	17
			13.4–14.4	13	16	15	15	24	17
			14.4–15.4	17	12	18	13	26	14
			15.4–16.4	11	10	18	14	30	17
			16.4–17.4*	5	8	15	17	32	23
			17.4–19.2*	4	8	16	16	29	27
			19.2–20.8*	7	81	11	1	–	–
			Mean	10	22	16	13	23	16

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in + 4–16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
11.4–12.4	–	67	21	–	4½	7½
12.4–13.4	–	66	20	–	10	4
13.4–14.4	–	65	20	–	9	6
14.4–15.4	–	70	21	–	7	2
15.4–16.4	–	69	24	–	3	4
16.4–17.4	–	64	24	–	9	3
17.4–19.2	–	67	23	–	5	5
19.2–20.8	Sand, no pebbles					
Mean	–	67	22	–	7	4

TL 41 NE 27 4769 1625 Tharbies Farm, High Wych

Block D

Surface level +74.6 m
 Water not struck
 Shell 152 mm diameter
 October 1975

Waste 18.5 m
 Bedrock 2.6 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.1	0.1
Boulder Clay	Clay, chalky, brown, stiff	0.6	0.7
	Clay, silty, chalky, cream brown, with some flint pebbles, firm	2.8	3.5
	Clay, chalky, silty, dark brown, stiff	1.6	5.1
	Clay, chalky, silty, grey blue becoming dark grey, stiff becoming hard	11.5	16.6
	Clay, sandy, pebbly, brown, soft	0.2	16.8
Glacial Sand and Gravel	'Very clayey' sandy gravel	1.7	18.5
	Sand: medium with fine and coarse, angular flint and rounded quartz, pale brown Gravel: fine with coarse, mainly well rounded to angular flint, with well rounded quartz and quartzite, and some sandstone		
London Clay (Basement Bed)	Clay, silty, sandy, brown, with poorly developed laminations, soft	0.9	19.4
	Sand, fine, silty, clayey, olive grey to dark blue, with some white shell debris, firm	1.7+	21.1

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>						
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>	<i>Sand</i>		<i>Gravel</i>			
				$-\frac{1}{8}$	$+\frac{1}{8}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
27	46	27	16.8-18.5	27	11	25	10	18	9	

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in +4-16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
16.8-18.5	-	68	23	-	5	4

Surface level +72.9 m
 Water struck at +62.1 m
 Shell (modified) 152 mm diameter
 April 1976

Waste 17.8 m
 Bedrock 1.0 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.2	0.2
Boulder Clay	Clay, silty, sandy, chalky, light brown, with a trace of flint pebbles, soft	6.8	7.0
	Clay, silty, chalky, light brown, firm	1.6	8.6
	Clay, chalky, silty, olive grey, stiff	2.2	10.8
	'Clayey' sand, chalky, brown, soft	0.1	10.9
	Clay, chalky, silty, olive grey, with flint and quartz pebbles, stiff becoming hard	4.7	15.6
	Clay, pebbly, brown, firm	0.2	15.8
Glacial Sand and Gravel	'Very clayey' sandy gravel	0.1	15.9
	Clay, silty, very sandy, faintly laminated, brown, soft	0.2	16.1
	Gravel Sand: medium with some coarse and fine, predominantly quartz, with some angular coarse flint, yellow Gravel: fine and coarse, subangular to rounded flint, with quartz and quartzite, and some sandstone	1.7	17.8
London Clay	Clay, silty, sandy, brown, firm	0.4	18.2
	Clay, silty, sandy becoming very sandy, olive grey, with comminuted shell debris and pyrite nodules	0.6+	18.8

Grading

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{8}$	+	- $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16
7	46	47	16.1-17.1	7	7	34	10	22	20	
			17.1-17.8	8	9	14	14	32	23	
			Mean	7	8	26	12	26	21	

Composition

Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
16.1-17.1	-	69	20	-	7	4
17.1-17.8	-	53	30	-	11	6
Mean	-	62	24	-	9	5

Surface level +68.2 m
 Water not struck
 Shell 152 mm diameter
 October 1975

Overburden 11.4 m
 Mineral 4.2 m
 Waste 0.3 m
 Bedrock 6.5 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, very silty, chalky, pebbly, yellow brown, soft	3.6	3.9
	Clay, chalky, silty, blue grey becoming dark grey, with some flint and quartz pebbles, firm becoming stiff	7.0	10.9
	Clay, silty, sandy, very pebbly, dark brown, firm	0.5	11.4
Glacial Sand and Gravel	'Clayey' gravel Sand: medium and coarse with fine, predominantly quartz, with some coarse angular flints, yellow brown Gravel: fine and coarse, subrounded to angular flint, with some rounded quartz and quartzite, and a trace of sandstone	4.2	15.6
	Clay, sandy, pebbly, yellow brown, soft	0.3	15.9
London Clay (Basement Bed)	Sand, very silty, clayey, fine with some medium, lamination in parts, some shell debris, poorly developed horizon of rounded brown and black flint pebbles at base, drab olive green	5.9	21.8
Woolwich and Reading Beds	Clay, mottled blue, red and brown, stiff becoming hard, waxy	0.6+	22.4

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand		Gravel		
				- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16
11	40	49	11.4-12.4	10	7	19	12	29	23
			12.4-13.4	9	7	20	12	22	30
			13.4-14.4	11	9	19	12	25	24
			14.4-15.6	12	10	19	14	28	17
			Mean	11	8	19	13	26	23

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
11.4-12.4	-	79	14	-	4	3
12.4-13.4	-	75	14	-	7	4
13.4-14.4	-	71	18	-	7	4
14.4-15.6	-	68	21	-	7	4
Mean	-	73	17	-	6	4

Surface level +80.0 m
 Water struck at +73.7 m, +73.4 m and +73.3 m
 Shell (modified) 152 mm diameter
 March 1976

Overburden 10.8 m
 Mineral 7.8 m
 Bedrock 3.4 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.2	0.2
Boulder Clay	Clay, chalky, silty, brown, soft	3.3	3.5
	Clay, chalky, silty, blue grey, firm becoming stiff	2.8	6.3
	Clay, silty, grey, with chalky fine sand bands at 6.3 m, 6.6 m and 6.7 m, soft	0.4	6.7
Glacial Sand and Gravel	a Sandy gravel	2.0	8.7
	Sand: medium with a trace of fine and coarse, predominantly quartz, with some flint and chalk, white Gravel: coarse and fine, subangular to angular flint, with chalk, and some rounded quartz, quartzite and sandstone, and a trace of fossil debris		
Boulder Clay	Clay, chalky, silty, blue grey, sand bands to 9.3 m, firm	1.8	10.5
	Clay, chalky, silty, pebbly, brown, firm	0.3	10.8
Glacial Sand and Gravel	b Sandy gravel, 'clayey' at top becomes coarser with depth. Brown sandy silty clay band between 15.8 m and 16.0 m	7.8	18.6
	Sand: medium with some coarse and fine, predominantly quartz, with some angular coarse flint, yellow brown Gravel: fine with coarse, subangular to rounded flint, with rounded quartz and quartzite, and some rounded sandstone		
London Clay (Basement Bed)	Clay, pebbly, sandy, brown	0.1	18.7
	Clay, sandy, silty, laminated, ochre brown, soft	0.4	19.1
	Sand, fine, very clayey, silty, olive green, with some wood fragments, soft	1.0	20.1
Woolwich and Reading Beds	Silt, sandy becoming very sandy, lime green, with claystone bands and nodules, firm	0.9	21.0
	Clay, blue and brown mottled becomes brown, with calcareous nodules, very stiff, waxy	1.0+	22.0

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages					
	Fines	Sand	Gravel		Fines		Sand		Gravel	
					$-\frac{1}{8}$	$+\frac{1}{8}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$
a	5	53	42	6.7-8.0*	6	10	37	6	17	24
				8.0-8.7*	4	6	34	12	27	17
				Mean	5	9	36	8	20	22
b	6	53	41	10.8-11.8	11	11	21	10	32	15
				11.8-12.8	5	8	28	11	31	17
				12.8-13.8	7	8	30	13	31	11
				13.8-14.8	4	5	37	13	24	17
				14.8-15.8	8	9	43	16	22	2
				16.0-17.0	5	10	54	12	15	4
				17.0-18.0	4	4	21	16	31	24
				18.0-18.6	6	6	19	18	31	20
				Mean	6	8	32	13	27	14

Composition

	Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
		Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
a	6.7-8.0	18	40	24	1	6	11
	8.0-8.7	18	50	20	1	4	7
	Mean	18	43	23	1	5	10
b	10.8-11.8	-	51	34	-	9	6
	11.8-12.8	-	53	39	-	7	1
	12.8-13.8	-	58	26	-	10	6
	13.8-14.8	-	63	21	-	12	4
	14.8-15.8	-	63	23	-	9	5
	16.0-17.0	-	65	24	-	8	3
	17.0-18.0	-	79	15	-	4	2
	18.0-18.6	-	62	21	-	12	5
	Mean	-	62	26	-	9	3

Surface level +64.4 m
 Water struck at +59.6 m
 Shell (modified) 152 mm diameter
 March 1976

Overburden 2.3 m
 Mineral 3.6 m
 Bedrock 5.1 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Head	Clay, silty, fine sandy, brown, soft	1.5	1.8
	Clay, sandy, silty, grey, with carbonaceous partings, soft	0.5	2.3
Glacial Sand and Gravel	'Clayey' sand, coarse gravel in lower 0.1 m Sand: fine with some medium and a trace of coarse, predominantly rounded quartz, fawn Gravel: fine and coarse with a trace of cobble, subangular to subrounded flint, with subrounded to rounded quartz and quartzite, with some rounded sandstone	3.6	5.9
Woolwich and Reading Beds	Clay, very sandy at base, brown mottled blue, stiff, waxy	2.7	8.6
	Sand, fine and medium, silty, clayey, dark red, soft	1.0	9.6
	Clay, very sandy, red, mottled orange, green and dark grey, with pebble beds of black and brown well rounded flints up to 3 cm in diameter, firm	0.9	10.5
Thanet Beds (Thanet Sand)	Sand, fine, clayey, silty, olive green streaked red at top, finely laminated, firm	0.5+	11.0

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>							
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>			<i>Gravel</i>		
				$-\frac{1}{8}$	$+\frac{1}{8}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	$+64$
18	80	2	2.3-3.3	17	73	10	-	-	-	-	-
			3.3-4.3	15	82	3	-	-	-	-	-
			4.3-4.8	13	80	7	-	-	-	-	-
			4.8-5.8*	25	70	3	1	1	-	-	-
			5.8-5.9*	5	10	12	18	22	25	8	8
			Mean	18	74	5	1	1	1	1	8

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in + 4-16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
2.3-3.3	No pebbles, sand					
3.3-4.3	No pebbles, sand					
4.3-4.8	No pebbles, sand					
4.8-5.8	-	30	30	-	26	14
5.8-5.9	-	61	20	-	12	7
Mean	-	33	29	-	25	13

TL 41 NE 32 4848 1760 Spellbrook Farm, Sawbridgeworth

Block D

Surface level +58.1 m
 Water struck at +41.2 m
 Shell (modified) 152 mm diameter
 March 1976

Waste 16.0 m
 Bedrock 1.0 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Boulder Clay	Clay, brown, with angular flints and some well rounded quartz, firm	0.7	1.0
	Clay, silty, flinty, chalky, yellow brown, very sandy in parts, soft	1.0	2.0
	Clay, chalky, flinty, silty, brown mottled grey with depth, firm	1.7	3.7
	Clay, chalky, silty, blue grey, stiff	12.3	16.0
Upper Chalk	Chalk, pugged up, white, with blue and black angular flints	1.0+	17.0

TL 41 NE 33 4856 1676 $\frac{1}{2}$ km West of Tednambury, Sawbridgeworth

Block D

Surface level +59.6 m
 Water struck at +42.5 m
 Shell (modified) 152 mm diameter
 March 1976

Waste 24.8 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.2	0.2
Boulder Clay	Clay, chalky, silty, mottled blue and orange, soft	0.7	0.9
	Clay, chalky, silty, brown mottled grey, soft	3.3	4.2
	Clay, silty, chalky, flinty, grey blue, stiff	5.4	9.6
Lacustrine Deposits	Clays and silts, laminated, light grey, becomes very silty and sandy from 22.0 m. Noticeably chalky from 23.2 m. Laminae range from 0.1 mm to 1 mm with coarser banding of clay and silt up to 25 mm	15.2+	24.8

Surface level +67.1 m
 Water struck at +57.6 m, +46.6 m and +46.3 m
 Shell (modified) 152 mm diameter
 June 1976

Overburden 3.9 m
 Mineral 9.4 m
 Waste 7.7 m+

Log	Lithology	Thickness	Depth
Geological classification		m	m
	Soil	0.3	0.3
Head	Clay, pebbly, sandy, brown, soft	0.5	0.8
	Clay, very sandy, very pebbly, orange brown, firm	0.8	1.6
	Clay, sandy, silty, chalky, mottled red and brown, and grey blue, stiff	0.4	2.0
	Clay, very sandy, pebbly, orange brown, firm	0.8	2.8
	Clay, silty, mottled brown and grey, with carbonaceous debris, very stiff	1.1	3.9
Glacial Sand and Gravel	Sandy gravel, becomes more sandy and chalky with depth	9.4	13.3
	Sand: medium with fine and coarse, predominantly rounded quartz, with angular medium and coarse flint, brown Gravel: fine with coarse, subangular to subrounded flint, with some rounded chalk, and a trace of fossil debris, rounded quartz, quartzite and sandstone		
Boulder Clay	Clay, chalky, silty, brown, stiff	0.4	13.7
	Clay, chalky, silty, dark blue grey, with some flint pebbles, stiff	0.5	14.2
	Clay, very chalky and silty, light grey, with silt bands throughout and medium to fine chalk sand bands in last metre	6.8+	21.0

Grading

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/8	-1/4	+1/4-1	+1-4	+4-16	+16
9	57	34	3.9-5.2	10	19	33	9	19	10	
			5.2-6.2	13	20	28	8	16	15	
			6.2-7.5	9	20	24	9	17	21	
			7.5-8.5	9	7	23	10	20	31	
			8.5-9.6	11	6	26	14	28	15	
			9.6-11.0*	6	8	39	18	21	8	
			11.0-12.0*	3	6	35	18	31	7	
			12.0-13.3*	10	11	44	13	13	9	
			Mean	9	12	32	13	20	14	

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
3.9-5.2	-	82	7	-	7	4
5.2-6.2	-	91	3	-	2	4
6.2-7.5	-	87	4	1	2	6
7.5-8.5	-	82	7	2	1	8
8.5-9.6	14	74	1	5	4	2
9.6-11.0	12	86	1/2	-	1/2	1
11.0-12.0	14	73	3	1	5	4
12.0-13.3	10	78	3	2	2	5
Mean	6	83	3	1	3	4

Surface level +52.5 m
 Water struck at +50.4 m
 Shell (modified) 152 mm diameter
 March 1976

Overburden 2.1 m
 Mineral 8.2 m
 Waste 2.9 m
 Bedrock 0.8 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.1	0.1
Alluvium	Clay, sandy, silty, brown, soft, sticky	0.2	0.3
	Peat, very clayey, silty, black, with some fine and medium sand, becomes less clayey with depth	1.8	2.1
Glacial Sand and Gravel (Buried Channel Deposits)	'Clayey' sandy gravel, gravel at top becomes very clayey pebbly sand from 6.0 m. Pebbly, silty, sandy, brown, soft clay bands between 3.2 and 3.7 m and 4.1-4.5 m, and a band of reconstituted chalk paste between 5.8 and 6.0 m Sand: coarse and medium with a trace of fine at top, fine with medium and some coarse at base, predominantly quartz, with some angular coarse and medium flint and rounded chalk Gravel: fine and coarse, finer with depth, angular to subrounded flint, with rounded chalk, and some rounded quartz, quartzite and sandstone, and a trace of fossil debris	8.2	10.3
Boulder Clay	Clay, silty, pebbly, laminated, brown and black, soft	0.1	10.4
	Clay, silty, blue grey, soft	0.4	10.8
	Clay, chalky, grey, soft	2.4	13.2
Upper Chalk	Chalk, angular fragments of chalk and flint in chalk slurry	0.8+	14.0

Grading

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$	- $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16
15	58	27	2.1-3.2*	3	2	12	14	31	38	
			3.7-4.1*	2	2	10	17	31	38	
			4.5-4.8*	4	2	10	18	40	26	
			4.9-5.8*	5	4	14	27	43	7	
			6.0-9.0*	26	61	12	1	-	-	
			9.0-10.3*	13	35	29	8	10	5	
			Mean	15	34	15	9	16	11	

Composition

Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
2.1-3.2	7	76	9	-	5	3
3.7-4.1	11	74	5	$\frac{1}{2}$	6	3 $\frac{1}{2}$
4.5-4.8	21	50	10	3	7	9
4.9-5.8	32	43	9	2	11	3
6.0-9.0	No pebbles, sand					
9.0-10.3	40	41	6	4	3	6
Mean	25	55	8	2	6	4

Surface level +67.1 m
 Water struck at +56.1 m
 Shell (modified) 152 mm diameter
 May 1976

Overburden 1.0 m
 Mineral 6.3 m
 Waste 8.0 m
 Bedrock 1.7 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.4	0.4
	Subsoil, brown pebbly clay with rootlets	0.6	1.0
Head Gravel	'Very clayey' sandy gravel, very sandy between 2.9 m and 4.5 m, alternating bands of hoggin, sands, and silts from 4.5 m to 5.5 m Sand: medium and fine with coarse, predominantly rounded quartz, orange brown Gravel: fine with coarse, angular to subrounded flint, with some quartz, quartzite and sandstone, and a trace of chalk in lower 2.8 m	6.3	7.3
Boulder Clay	Clay, sandy, pebbly, chalky, brown becoming blue grey, firm	3.7	11.0
	Sand, very clayey, silty, grey, soft	0.2	11.2
	Clay, chalky, silty, flinty, brown becoming dark blue grey, stiff	4.1	15.3
Woolwich and Reading Beds	Clay, dark blue black mottled red brown and light blue, becomes brown mottled red and light blue, stiff, waxy	1.5	16.8
	Clay, brown mottled red and light blue, with race nodules, stiff, waxy	0.2+	17.0

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16
26	44	30	1.0-2.0	19	5	19	11	21	25
			2.0-2.9	17	6	17	7	19	34
			2.9-4.0	20	29	36	6	8	1
			4.0-4.5	36	44	15	2	2	1
			4.5-5.5	53	18	11	5	9	4
			5.5-6.5	16	9	16	16	30	13
			6.5-7.3	22	13	18	10	27	10
			Mean	26	16	19	9	17	13

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
1.0-2.0	-	82	9	-	7	2
2.0-2.9	-	77	13	-	8	2
2.9-4.0	-	85	5	-	7	3
4.0-4.5	-	89	8	-	3	-
4.5-5.5	2	86	6	-	2	4
5.5-6.5	2	79	7	-	7	5
6.5-7.3	7	70	7	-	8	8
Mean	1	81	8	-	6	4

TL 41 NE 37 4939 1732 Millhide Common, Little Hallingbury

Block D

Surface level +54.3 m
 Water struck at +50.0 m
 Shell (modified) 152 mm diameter
 June 1976

Waste 2.6 m
 Bedrock 5.9 m+

Log		Thickness	Depth
<i>Geological classification</i>	<i>Lithology</i>	m	m
Made Ground	Clay, pebbly, friable, brown, with brick rubble	1.1	1.1
Glacial Sand and Gravel	'Very clayey' sandy gravel, medium sand, with fine and coarse flint gravel	0.7	1.8
Boulder Clay	Clay, silty, chalky, flinty, brown, soft	0.8	2.6
Woolwich and Reading Beds	Clay, brown mottled green and grey, stiff, waxy	1.7	4.3
	Sand, fine, silty, yellow brown, with some white, brown and black well rounded flints, firm	0.6	4.9
Thanet Beds (Thanet Sand)	Sand, fine, silty, grey with a pink tinge mottled red, brown and green, with hard pyritic sand nodules, firm	0.5	5.4
	Sand, fine, silty, grey green mottled red and rarely brown, soft	3.1+	8.5

Surface level +54.0 m
 Water struck at +48.4 m and +45.5 m
 Shell (modified) 152 mm diameter
 June 1976

Overburden 0.8 m
 Mineral 5.7 m
 Bedrock 2.2 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Head	Clay, pebbly becomes very pebbly, orange brown, firm	0.5	0.8
Glacial Sand and Gravel	'Clayey' gravel Sand: medium with some coarse and fine, predominantly rounded quartz Gravel: fine with coarse, subangular to rounded flint, with some rounded quartz, quartzite and sandstone	5.7	6.5
London Clay (Basement Bed)	Clay, silty, fine sandy, laminated, brown, firm	0.3	6.8
	Silt, clayey, fine sandy, drab olive green, with wood fragments and glauconite, well rounded black fine gravel flints in lower 0.1 m	0.3	7.1
Woolwich and Reading Beds	Clay, very silty, laminated with fine sand, pale blue green mottled green and brown, stiff	0.7	7.8
	Sand fine, with coarse silt, clayey, yellow brown mottled pale green and light brown, stiff	0.9+	8.7

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand		Gravel		
				- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16
10	43	47	0.8-1.8	8	5	14	10	27	36
			1.8-2.6	11	8	26	11	28	16
			2.6-3.8	27	16	23	6	13	15
			3.8-4.8	5	7	22	14	35	17
			4.8-5.6	3	6	29	10	35	17
			5.6-6.5*	3	11	32	9	28	17
			Mean	10	9	24	10	27	20

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
0.8-1.8	-	71	20	-	4	5
1.8-2.6	Sample missing					
2.6-3.8	-	63	22	-	11	4
3.8-4.8	-	67	21	-	5	7
4.8-5.6	-	74	15	-	6	5
5.6-6.5	-	77	11	-	9	3
Mean	-	70	18	-	7	5

TL 41 NE 39 4917 1505 Railway Inn, Sawbridgeworth

Block E

Surface level +49.0 m
 Water struck at +47.0 m and +39.5 m
 Shell (modified) 152 mm diameter
 May 1976

Waste 2.3 m
 Bedrock 7.8 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Made ground	0.3	0.3
Alluvium	Clay, very sandy, pebbly, silty, brown black, soft	1.4	1.7
Glacial Sand and Gravel	Sand, pebbly, brown and black flints in a sandy, very clayey matrix	0.6	2.3
London Clay	Silt, clayey, fine sandy, dark blue grey, some green mottling with depth; more clayey with depth, band of shell debris and mudstone at 3.7 m	1.6	3.9
	Clay, silty, fine sandy, laminated, grey green, shell debris, wood fragments and claystones at base	1.9	5.8
London Clay (Basement Bed)	Clay, laminated, grey green, bioturbated	3.1	8.9
Woolwich and Reading Beds	Clay, dark blue grey, with many well preserved cemented bivalve shells, small well rounded flints, glauconitic shell band at top	0.6	9.5
	Clay, mottled red, brown, blue, green and white, stiff, waxy	0.6+	10.1

Surface level +72.2 m
 Water struck at +69.5 m
 Shell and Auger 152 mm diameter
 October 1975

Overburden 3.4 m
 Mineral 1.2 m
 Waste 4.9 m
 Mineral 1.8 m
 Bedrock 1.7 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness m</i>	<i>Depth m</i>
	Soil	0.4	0.4
Boulder Clay	Clay, pebbly, yellow brown, soft	0.7	1.1
	Clay, silty, pebbly, chalky, mottled yellow brown and light blue, soft	1.6	2.7
	Silt, clayey, sandy, yellow, laminated	0.7	3.4
Glacial Sand and Gravel	a 'Clayey' gravel	1.2	4.6
	Sand: medium with fine and coarse, predominantly rounded quartz, with coarse angular flints, yellow brown Gravel: coarse and fine with cobbles at base, angular to rounded flint, with rounded quartz and quartzite, and a trace of rounded sandstone and chalk		
Boulder Clay	Clay, silty, chalky, with some flint pebbles, blue grey, stiff	4.7	9.3
	Clay, silty, sandy, brown, very pebbly at base	0.2	9.5
Glacial Sand and Gravel	b 'Very clayey' gravel, clay bands throughout	1.8	11.3
	Sand: coarse, medium and fine quartz, with some angular coarse flint, yellow brown Gravel: coarse and fine, angular to subrounded flint, with rounded quartz and quartzite, and a trace of sandstone		
London Clay	Clay, sandy, silty, yellow brown, soft, laminated	0.3	11.6
	Clay, silty, fine, sandy, olive grey, soft	0.4	12.0
	Clay, silty, olive grey, firm	1.0+	13.0

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages						
	Fines	Sand	Gravel								
					Fines	Sand		Gravel			
					- $\frac{1}{8}$	+ $\frac{1}{8}$	- $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16-64
a	11	21	68	3.4-4.4*	13	4	11	6	31	35	-
				4.4-4.6*	5	4	12	7	29	39	4
				Mean	11	4	11	6	31	36	1
b	20	32	48	9.5-10.5	14	7	11	11	26	31	-
				10.5-11.3	27	11	14	11	22	15	-
				Mean	20	9	12	11	24	24	-

Composition

	Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
		Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
a	3.4-4.4	2	68	24	-	4	2
	4.4-4.6	-	69	25	-	3	3
	Mean	2	68	24	-	4	2
b	9.5-10.5	-	73	20	-	7	-
	10.5-11.3	-	72	19	-	8	1
	Mean	-	73	20	-	7	-

Surface level +69.0 m
 Water not struck
 Shell (modified) 152 mm diameter
 July 1972

Overburden 3.5 m
 Mineral 1.8 m
 Waste 11.8 m
 Mineral 8.6 m
 Bedrock 0.4 m+

Log		Thickness	Depth
Geological classification	Lithology	m	m
	Soil	0.4	0.4
Boulder Clay	Clay, sandy, flinty at base, brown, soft	3.1	3.5
Glacial Sand and Gravel	a Gravel Sand: medium and coarse with a trace of fine, predominantly quartz, with some angular coarse flint, yellow brown Gravel: coarse with fine, subrounded to rounded flint, with some rounded quartz and quartzite	1.8	5.3
Boulder Clay	Clay, silty, chalky, brown, soft	2.3	7.6
	Clay, very sandy, very pebbly, brown, firm	0.7	8.3
	Clay, silty, chalky, grey becoming brown, firm becoming soft	3.9	12.2
Glacial Sand and Gravel	b 'Very clayey' pebbly sand Sand: medium with a trace of fine and coarse, predominantly rounded quartz, orange Gravel: coarse and fine, well rounded to rounded flint	2.2	14.4
Boulder Clay	Clay, silty, chalky, with bands of fine chalky sand, grey, soft	1.2	15.6
	Clay, chalky, brown, soft	1.5	17.1
Glacial Sand and Gravel	c 'Very clayey' gravel, pebbly, very clayey medium and fine sand between 20.1 and 22.1 m Sand: medium with coarse and some fine, predominantly quartz, with angular coarse flint, brown Gravel: fine with coarse, angular to well rounded flint, with some subrounded quartz and quartzite	8.6	25.7
Woolwich and Reading Beds	Sand, fine, silty, clayey, mottled red and grey, firm	0.4+	26.1

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages					
	Fines	Sand	Gravel							
					Fines	Sand		Gravel		
			- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16		
a	6	26	68	3.5-4.5	Sample missing					
				4.5-5.3	6	2	13	11	28	40
				Mean	6	2	13	11	28	40
b	30	59	11	12.2-13.2	41	9	44	1	2	3
				13.2-14.4	21	6	51	6	7	9
				Mean	30	7	48	4	5	6
c	21	36	43	17.1-18.1	15	4	20	11	25	25
				18.1-19.1	Sample missing					
				19.1-20.1	21	3	17	13	28	18
				20.1-21.1	15	5	22	12	33	13
				21.1-22.1	39	23	33	3	2	-
				22.1-23.1	Sample missing					
				23.1-24.1	23	-	9	10	28	30
				24.1-25.1	12	2	14	14	34	24
				25.1-25.7	Not sampled					
Mean	21	6	19	11	25	18				

Surface level +69.8 m
 Water struck at +63.0 m and +55.0 m
 Shell (modified) 152 mm diameter
 June 1972

Overburden 4.8 m
 Mineral 5.1 m
 Waste 4.9 m
 Mineral 9.5 m
 Waste 2.8 m
 Bedrock 1.4 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.1	0.1
Boulder Clay	Clay, chalky, light brown, soft	0.4	0.5
	Clay, chalky, grey, soft	2.9	3.4
	Clay, chalky, brown, soft	1.4	4.8
Glacial Sand and Gravel	a 'Clayey' gravel	5.1	9.9
	Sand: medium with some coarse and a trace of fine, predominantly quartz, with some angular coarse flint, yellow brown Gravel: fine with some coarse, subangular to well rounded flint, with rounded quartz and quartzite		
Boulder Clay	Clay, sandy, chalky, brown becoming grey, firm	4.9	14.8
Glacial Sand and Gravel	b 'Clayey gravel'	9.5	24.3
	Sand: coarse with medium and a trace of fine, predominantly angular coarse flint, with rounded quartz, yellow Gravel: coarse with some fine, angular to subrounded flint, with some quartz, quartzite and sandstone, and a trace of chalk and fossil debris		
Boulder Clay	Clay, chalky, grey, soft	2.8	27.1
Woolwich and Reading Beds	Clay, sandy, mottled red and green, firm	1.0	28.1
	Sand, medium, clayey, green, soft	0.4+	28.5

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages						
	Fines	Sand	Gravel		Fines		Sand			Gravel	
					- $\frac{1}{8}$	+ $\frac{1}{8}$	- $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16
a	13	35	52	4.8-5.8	17	2	17	14	29	21	
				5.8-6.8	10	3	16	14	38	19	
				6.8-7.8*	10	3	28	9	30	20	
				7.8-8.8*	Sample missing						
				8.8-9.9*	Sample missing						
				Mean	13	3	20	12	32	20	
b	14	41	45	14.8-15.8*	18	2	17	20	22	21	
				15.8-16.8*	7	2	15	20	16	40	
				16.8-18.8*	Sample missing						
				18.8-20.8*	16	2	13	28	13	28	
				20.8-21.8*	25	2	16	29	12	16	
				21.8-22.8*	Sample missing						
				22.8-23.8*	8	2	15	22	19	34	
				23.8-24.3*	7	4	19	19	17	34	
				Mean	14	2	16	23	17	28	

Surface level +68.0 m
 Water struck at +60.4 m
 Shell (modified) 152 mm diameter
 March 1976

Waste 18.0 m
 Bedrock 1.0 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Boulder Clay	Clay, silty, flinty, brown, soft	0.2	0.5
	Clay, silty, chalky, brown becoming dark brown, stiff	4.3	4.8
	Clay, silty, chalky, blue grey, stiff	2.8	7.6
	'Clayey' sand, silty, chalky, pale grey, soft	0.1	7.7
	Clay, chalky, dark blue grey, very hard, shaley	2.1	9.8
	Clay, chalky, dark blue grey becoming dark brown, stiff	3.8	13.6
	Clay, silty, chalky, flinty, brown, soft	0.4	14.0
	Glacial Sand and Gravel	'Clayey' gravel, sandy at top becoming coarser with depth Sand: medium with coarse and fine, predominantly rounded quartz, with some chalk, pale yellow Gravel: fine with coarse, rounded to angular flint, with some rounded quartz and quartzite, and a trace of rounded chalk and sandstone	4.0
London Clay	Clay, silty, sandy, mottled brown, orange and grey, firm	0.4	18.4
	Clay, silty, fine sandy, drab olive green, with pyrite nodules and decalcified shell debris, firm	0.6+	19.0

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>					
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>		<i>Gravel</i>	
			$-\frac{1}{8}$	$+\frac{1}{8}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
11	42	47	14.0-15.0	11	23	22	11	22	11
			15.0-16.0	12	8	19	16	29	16
			16.0-17.0	4	5	17	17	32	25
			17.0-18.0	18	5	12	14	31	20
			Mean	11	10	18	14	29	18

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in +4-16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
14.0-15.0	5	70	14	-	6	5
15.0-16.0	3	57	16	-	16	8
16.0-17.0	3	69	14	-	9	5
17.0-18.0	2	75	13	-	5	5
Mean	3	68	14	-	9	6

Surface level +59.9 m
 Water not struck
 Shell (modified) 152 mm diameter
 October 1972

Overburden 8.3 m
 Mineral 3.7 m
 Bedrock 3.0 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil and subsoil	0.6	0.6
Boulder Clay	Clay, chalky, brown, sand band at 1.8 m, soft	1.4	2.0
	Clay, chalky, grey, soft	5.8	7.8
	Clay, chalky, brown, soft	0.5	8.3
Glacial Sand and Gravel	Sandy gravel	3.7	12.0
	Sand: medium with a trace of coarse and fine, predominantly quartz, brown Gravel: fine and coarse, subangular to rounded flint, with some quartz and quartzite		
London Clay	Clay, sandy, silty, brown, stiff	0.6	12.6
	Clay, silty, grey to blue grey, stiff	2.4+	15.0

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>						
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>		<i>Gravel</i>		
				$-\frac{1}{8}$	$+\frac{1}{8}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
6	59	35	8.3-9.3	Sample missing						
			9.3-10.3	8	13		61	4	8	6
			10.3-11.3	Sample missing						
			11.3-12.0	3	4		13	16	31	33
			Mean	6	9		41	9	18	17

Surface level +31.3 m
 Water struck at +27.1 m
 Shell 152 mm diameter
 September 1975

Overburden 2.2 m
 Mineral 5.9 m
 Bedrock 1.4 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil, black, silty	0.2	0.2
Alluvium	Clay, silty, sandy, grey brown, very soft	1.4	1.6
	Peat, clayey to very clayey, silty, fine sandy, black, many wood fragments, soft	0.6	2.2
	Gravel, becomes coarser with depth Sand: medium and coarse with some fine, quartz with flint, yellow Gravel: fine and coarse, angular to rounded flint, with quartz, and a trace of sandstone, chalk, and ironstone	5.9	8.1
Thanet Beds (Thanet Sand)	'Very clayey' sand, fine with a trace of medium and coarse, drab olive green, glauconitic	0.5	8.6
(Bullhead Bed)	Sand, fine with a trace of medium, with angular black and brown flints in a pale green calcite concretionary cement at base	0.5	9.1
Upper Chalk	Chalk, pugged up, white streaked brown	0.4+	9.5

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines		Sand		Gravel	
				- $\frac{1}{8}$	+\mathbf{\frac{1}{8}} - $\frac{1}{4}$	+\mathbf{\frac{1}{4}} -1	+1-4	+4-16	+16
6	35	59	2.2-3.2	16	10	24	9	24	17
			3.2-4.2	15	8	20	16	29	12
			4.2-5.4*	2	4	22	16	34	22
			5.4-6.2*	1	3	14	15	37	30
			6.2-7.2*	1	2	10	11	41	35
			7.2-8.1*	1	2	9	13	41	35
			Mean	6	5	17	13	34	25
			Bedrock analyses						
21	79	—	8.1-8.6*	21	73	3	3	-	-

Composition

Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
2.2-3.2	1	81	12	-	2	4
3.2-4.2	3	72	15	-	3	7
4.2-5.4	4	73	12	-	6	5
5.4-6.2	2	75	17	-	3	3
6.2-7.2	2	72	16	-	6	4
7.2-8.1	3	63	25	-	4	5
Mean	3	73	16	-	4	4

Surface level +73.3 m
 Water not struck
 Shell 152 mm diameter
 October 1975

Overburden 15.0 m
 Mineral 5.2 m
 Bedrock 1.3 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Boulder Clay	Clay, chalky, silty, pebbly, brown, soft	3.9	4.2
	'Very clayey' gravel	1.0	5.2
	Sand: fine, medium and coarse, predominantly quartz, with some flint, brown		
	Gravel: fine and coarse, angular flint, with rounded quartz, and a trace of sandstone, chalk and fossil debris		
	Clay, very chalky and flinty, grey blue becoming blue black with depth, stiff	9.8	15.0
Glacial Sand and Gravel	'Clayey' pebbly sand; 'very clayey' at top, becomes sandy gravel at base	5.2	20.2
	Sand: medium and fine, with a trace of angular coarse flint, yellow brown mottled grey		
	Gravel: fine and coarse, angular to rounded flint, with a trace of rounded quartz, quartzite and sandstone		
London Clay	Clay, silty, sandy in parts with black carbonaceous partings, olive grey	1.3+	21.5

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand		Gravel		
				- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16
26	22	52	4.2-5.2	26	8	7	7	25	27
19	66	15	15.0-16.0	58	25	13	1	1	2
			16.0-17.0	16	17	48	4	9	5
			17.0-18.0	10	18	58	7	5	2
			18.0-19.0	5	38	32	4	12	9
			19.0-20.2	6	44	13	6	14	17
			Mean	19	29	32	5	8	7

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
4.2-5.2	4	64	25	1	4	3
15.0-16.0	1	86	9	-	3	1
16.0-17.0	-	80	11	-	8	1
17.0-18.0	-	81	9	-	9	1
18.0-19.0	-	77	19	-	3	1
19.0-20.2	-	80	10	-	1	3
Mean	-	81	13	-	5	1

Surface level +67.6 m
 Water struck at +64.0 m and 61.3 m
 Auger and extending Kelly 203 mm diameter
 December 1975

Overburden 2.5 m
 Mineral 2.0 m
 Waste 8.7 m
 Mineral 2.9 m+

Log		Thickness	Depth
Geological classification	Lithology	m	m
	Soil	0.2	0.2
Boulder Clay	Clay, chalky, pebbly, yellow brown, soft	1.6	1.8
	Clay, chalky, light grey, soft	0.7	2.5
Glacial Sand and Gravel	a 'Very clayey' gravel	2.0	4.5
	Sand: medium, fine and coarse, predominantly quartz, with coarse angular flint, brown Gravel: fine and coarse, rounded with some angular flint and rounded chalk, with some rounded quartz and sandstone, and a trace of fossil debris		
Boulder Clay	Clay, silty, sandy, chalky, brown, soft	0.9	5.4
	Clay, chalky, dark blue, stiff	0.9	6.3
	Clay, very chalky, silty and sandy, light blue, very soft	1.3	7.6
	Clay, silty, chalky, blue grey, firm to stiff	5.1	12.7
	Clay, chalky, sandy, pebbly, brown, soft	0.5	13.2
Glacial Sand and Gravel	b 'Clayey' pebbly sand, becoming more pebbly with depth	2.9+	16.1
	Sand: fine and medium with a trace of coarse, yellow brown Gravel: fine and coarse, angular flint, with rounded chalk and quartz, and a trace of sandstone and fossil debris		

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages					
	Fines	Sand	Gravel		Fines		Sand		Gravel	
					- $\frac{1}{8}$	+ $\frac{1}{8}$	- $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16
a	23	29	48	2.5-3.5	21	9	11	8	27	24
				3.5-4.5*	25	9	11	9	25	21
				Mean	23	9	11	9	26	22
b	15	78	7	13.2-14.9	15	46	35	2	1	1
				14.9-16.1	14	32	35	4	8	7
				Mean	15	40	35	3	4	3

Composition

	Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
		Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
a	2.5-3.5	19	55	12	2	7	5
	3.5-4.5	34	47	6	1	7	5
	Mean	26 $\frac{1}{2}$	51	9	1 $\frac{1}{2}$	7	5
b	13.2-14.9	Small sample - all flint					
	14.9-16.1	10	65	12	1	6	6

Surface level +67.6 m
 Water struck at +63.8 m and +61.3 m
 Shell 152 mm diameter
 December 1975

Overburden 2.4 m
 Mineral 1.5 m
 Waste 8.1 m
 Mineral 4.4 m
 Waste 1.4 m
 Mineral 3.2 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.4	0.4
Boulder Clay	Clay, chalky, pebbly, yellow brown, soft	1.4	1.8
	Clay, chalky, very sandy, brown, soft	0.6	2.4
Glacial Sand and Gravel	a 'Very clayey' gravel Sand: medium and coarse with fine, predominantly quartz, with coarse angular flint, brown Gravel: coarse and fine, well rounded to angular flint, with rounded chalk and quartz, with a trace of sandstone and fossil debris	1.5	3.9
Boulder Clay	Clay, sandy, silty, chalky, brown, soft	1.0	4.9
	Clay, silty, chalky, grey, firm to stiff	1.4	6.3
	Clay, very silty and chalky, pebbly, grey, very soft	1.3	7.6
	Clay, chalky, silty, blue grey, stiff	1.9	9.5
	Clay, sandy, silty, brown, soft	0.3	9.8
	Clay, chalky, silty, blue to blue grey, stiff	1.8	11.6
	Clay, sandy, silty, pebbly, brown, firm	0.4	12.0
Glacial Sand and Gravel	b 'Clayey' sand Sand: fine with medium and a trace of coarse, yellow Gravel: fine and coarse, angular flint and rounded chalk, with a trace of quartz and sandstone	4.4	16.4
Boulder Clay	Clay, chalky, pebbly, sandy, silty, brown, firm	0.6	17.0
	Clay, pebbly, chalky, dark blue, stiff	0.5	17.5
	Clay, very sandy, pebbly, brown, firm	0.3	17.8
Glacial Sand and Gravel	c Pebbly sand, more pebbly with depth Sand: medium with some fine and coarse, yellow brown Gravel: fine and coarse, angular to subangular flint, with rounded quartz, and a trace of sandstone and chalk	3.2+	21.0

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages					
	Fines	Sand	Gravel		Fines		Sand		Gravel	
					- $\frac{1}{8}$	+ $\frac{1}{8}$	- $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16
a	22	32	46	2.4-3.9	22	7	15	10	22	24
b	10	84	4	12.0-13.0	12	76	11	1	-	-
				13.0-14.0	12	57	28	2	1	-
				14.0-14.7	11	44	39	2	3	1
				14.7-15.7	7	40	34	5	7	7
				15.7-16.4	8	50	39	2	1	-
				Mean	10	54	29	3	2	2
c	4	72	24	17.8-18.8	6	17	65	5	6	1
				18.8-19.8	3	6	51	7	16	17
				19.8-20.8	2	10	50	7	17	14
				20.8-21.0	Not sampled					
				Mean	4	11	55	6	13	11

Composition

	Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
		Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
a	2.4-3.9	25	51	11	2	6	5
b	12.0-13.0	Small sample - all flint					
	13.0-14.0	13	67	10	-	-	10
	14.0-14.7	10	58	13	3	9	7
	14.7-15.7	11	64	11	1	7	6
	15.7-16.4	Small sample - all flint					
	Mean	11	64	11	1	5	8
c	17.8-18.8	2	84	7	1	2	3
	18.8-19.8	2	79	13	-	2	4
	19.8-20.8	-	71	17	-	5	7
	Mean	1	78	12	1	3	5

Surface level +55.5 m
 Water not struck
 Shell 152 mm diameter
 September 1975

Overburden 1.2 m
 Mineral 2.0 m
 Waste 2.3 m
 Mineral 2.9 m
 Bedrock 0.3 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, chalky, flinty, brown mottled yellow, soft	1.0	1.2
Glacial Sand and Gravel	a Sand Sand: fine and medium with a trace of coarse, yellow brown Gravel: coarse and fine, angular flint, with rounded chalk and quartz, with a trace of sandstone	2.0	3.2
	Silt, chalky, fine sandy, yellow, hard	1.0	4.2
	'Very clayey' sand, trace of pebbles Sand: fine and medium with a trace of coarse, yellow brown Gravel: fine and coarse, angular flint, with a trace of chalk, quartz and sandstone	0.6	4.8
Boulder Clay	Clay, chalky, flinty, olive grey becoming blue grey, firm	0.7	5.5
Glacial Sand and Gravel	b 'Clayey' sandy gravel, 'very clayey' pebbly sand becoming 'clayey' gravel Sand: medium, fine and coarse, brown to yellow brown Gravel: fine with coarse, angular flint, with rounded quartz, with a trace of chalk, sandstone and fossil debris	2.9	8.4
London Clay	Clay, silty, becoming sandy, mottled brown, mauve and blue at top, becoming blue grey, stiff	0.3+	8.7

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages						
	Fines	Sand	Gravel								
					Fines	Sand			Gravel		
					$-\frac{1}{16}$	$+\frac{1}{16}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
a	7	90	3	1.2-2.2	5	68	22	1	-	4	
				2.2-3.2	8	27	60	2	2	1	
				Mean	7	47	41	2	1	2	
	35	62	3	4.2-4.8	35	32	28	2	2	1	
b	18	46	36	5.5-6.5	34	29	23	5	6	3	
				6.5-7.5	6	12	17	11	38	16	
				7.5-8.4	16	8	18	18	24	26	
				Mean	18	16	19	11	22	14	

Composition

	Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
		Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
a	1.2-2.2	29	43	14	-	-	14
	2.2-3.2	7	66	13	-	10	4
	Mean	18	54½	13½	-	5	9
	4.2-4.8	13	61	13	-	8	5
b	5.5-6.5	1	66	21	2	4	6
	6.5-7.5	Sample missing					
	7.5-8.4	½	67	21½	-	5	6
	Mean	1	67	21	1	4	6

Surface level +33.0 m
 Water struck at +31.5 m and +30.3 m
 Shell 152 mm diameter
 September 1975

Overburden 1.7 m
 Mineral 4.8 m
 Bedrock 7.0 m+

Log			Thickness	Depth
Geological classification	Lithology		m	m
	Soil		0.2	0.2
Alluvium	Clay, silty, sandy, brown, with flint pebbles, soft		1.5	1.7
	a Gravel, clayey and peaty at top		4.8	6.5
	Sand: medium and coarse with some fine, chalky, brown			
	Gravel: fine and coarse, angular flint, with rounded quartz and quartzite, and a trace of rounded chalk and sandstone			
Thanet Beds (Thanet Sand)	b 'Very clayey' sand, a trace of flint pebbles at top		6.3	12.8
	Sand: fine with a trace of medium and coarse, glauconitic, drab olive green mottled grey, brown and red in parts			
(Bullhead Bed)	Sand, silty, predominantly fine with some medium, clayey with depth, many flint pebbles. Cemented black and brown angular flints in pale green calcitic matrix at base		0.5	13.3
Upper Chalk	Chalk, gritty, white to grey, with black and blue angular flints, soft		0.2+	13.5

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages						
	Fines	Sand	Gravel		Fines		Sand			Gravel	
					- $\frac{1}{16}$	+ $\frac{1}{16}$	- $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16
a	4	29	67	1.7-2.7*	14	4	17	10	29	26	
				2.7-3.7*	1	1	8	11	40	39	
				3.7-4.7*	1	2	11	14	39	33	
				4.7-5.7*	1	1	14	14	43	27	
				5.7-6.5*	5	6	21	14	27	27	
				Mean	4	3	14	12	36	31	
				Bedrock analyses							
b	32	67	1	6.5-7.5*	48	44	4	1	2	1	
				7.5-8.5*	32	66	2	-	-	-	
				8.5-9.5*	39	55	2	2	2	-	
				9.5-10.5*	26	70	2	2	-	-	
				10.5-11.5*	27	70	2	1	-	-	
				11.5-12.8*	25	73	2	1	-	-	
				Mean	32	64	2	1	1	-	

Composition

	Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
		Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
a	1.7-2.7	1	73	16	-	9	1
	2.7-3.7	-	76	18	-	4	2
	3.7-4.7	2	80	11	-	4	3
	4.7-5.7	2	81	11	-	3	3
	5.7-6.5	1	79	16	-	3	1
	Mean	1	78	14	-	5	2

Surface level +78.3 m
 Water struck at +73.5 m
 Shell 152 mm diameter
 October 1975

Waste 18.7 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.4	0.4
Boulder Clay	Clay, silty, chalky, mottled blue-grey and brown, soft	4.4	4.8
Glacial Sand and Gravel	Clay, silty, very sandy and gravelly, fine and coarse chalk and angular black flint gravel, with fine, medium and coarse chalk sand, with a trace of quartz, fossil debris and sandstone	1.0	5.8
Boulder Clay	Silt, laminated with fine chalky sand bands, some chalk pellets, grey to olive grey with green mottling, soft	2.3	8.1
	Clay, silty, chalky, some flint and quartz pebbles, blue grey, stiff	10.6+	18.7

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>						
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>		<i>Gravel</i>		
				$-\frac{1}{8}$	$+\frac{1}{8}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
41	27	32	4.8-5.8*	41	7	11	9	17	15	

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in +4-16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
4.8-5.8	68	14	10	3	5	-

Surface level +69.9 m
 Water struck at +53.7 m
 Shell 152 mm diameter
 November 1975

Waste 18.3 m
 Bedrock 1.1 m+

Log Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Head	Subsoil	0.4	0.6
	Clay, silty, sandy, very pebbly, yellow, soft	0.4	1.0
	Clay, very sandy, pebbly, yellow brown, soft	0.5	1.5
Boulder Clay	Clay, chalky, silty, yellow brown, soft	0.5	2.0
	Sand, fine, with chalky medium, brown, soft	0.5	2.5
	Clay, chalky, silty, flinty, grey, firm	1.2	3.7
	Clay, pebbly, chalky, silty, sandy, dark grey becoming blue grey and black, stiff	10.7	14.4
	Clay, sandy, chalky, brown, soft	0.2	14.6
Glacial Sand and Gravel	Gravel	3.3	17.9
	Sand: coarse and medium with some fine, predominantly quartz, with angular coarse flint		
	Gravel: fine with coarse, angular to subrounded flint, with some rounded quartz, and a trace of rounded sandstone		
London Clay	Clay, laminated, brown mottled dark grey, soft	0.3	18.6
	Clay, silty, sandy, olive grey, with pyrite nodules and decalcified shell debris, firm	0.8+	19.4

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand		Gravel		
				- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16
2	41	57	14.6-15.6	2	6	16	18	29	29
			15.6-16.6*	2	4	13	23	42	16
			16.6-17.9*	2	4	23	17	31	23
			Mean	2	4	18	19	34	23

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
14.6-15.6	-	84	10	-	4	2
15.6-16.6	-	71	19	-	8	2
16.6-17.9	-	72	22	-	4	2
Mean	-	75	18	-	5	2

TL 41 SW 25 4272 1236 $\frac{1}{2}$ km N.E. of Brickhouse Farm, Eastwick

Block B

Surface level +64.9 m
 Water not struck
 Shell 152 mm diameter
 September 1975

Waste 18.6 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.1	0.1
Boulder Clay	Clay, silty, flinty, brown, stiff	0.2	0.3
	Clay, silty, very chalky, some flints, brown becoming yellow, stiff	3.8	4.1
	Clay, silty, very chalky, rare flints, mottled grey and brown, stiff	0.9	5.0
	Clay, silty, chalky, dark blue grey, with flint and quartz pebbles, stiff	6.5	11.5
	Clay, silty, sandy, olive grey, soft	0.3	11.8
	Clay, silty, laminated coarsely below 13.3 m with bands of chalky grey shaley clay, olive grey, firm	4.2	16.0
	Clay, shaley, many small chalk pellets, grey, stiff	0.3	16.3
	Clay, silty, many small chalk pellets, fossil fragments, blue black, stiff	2.3+	18.6

TL 41 SW 26 4245 1118 Eastwick Mead, Eastwick

Block E

Surface level +35.7 m
 Water struck at +33.9 m
 Shell 152 mm diameter
 September 1975

Overburden 1.4 m
 Mineral 2.3 m
 Waste 0.9 m
 Bedrock 1.3 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
Alluvium	Soil	0.3	0.3
	Clay, sandy, brown, soft	0.4	0.7
	Clay, sandy, pebbly, yellow brown, soft	0.7	1.4
	Gravel	2.3	3.7
	Sand: medium with coarse and some fine, predominantly quartz, yellow brown Gravel: fine with coarse, subangular to rounded flint, with a trace of rounded quartz and quartzite, and rare chalk and sandstone		
	Silt, laminated with carbonaceous partings, grey, soft	0.3	4.0
	'Very clayey' sandy, silty gravel, dark grey, with a trace of chalk	0.6	4.6
Woolwich and Reading Beds	Clay, silty, mottled brown, blue, green, grey and red, firm to stiff, waxy	1.3+	5.9

Grading

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- 1/8	+ 1/8 - 1/4	+ 1/4 - 1/2	+ 1/2 - 1	+ 1 - 4	+ 4 - 16	+ 16
6	37	57	1.4-2.4	12	7	20	13	27	21	
			2.4-3.7	2	3	19	13	36	27	
			Mean	6	5	19	13	32	25	

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
1.4-2.4	2	76	12	-	1	9
2.4-3.7	2	89	7	-	-	2
Mean	2	83	9	-	1	5

Surface level +57.5 m
 Water not struck
 Shell 152 mm diameter
 September 1975

Waste 7.1 m
 Bedrock 0.4 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Head Gravel	Clay, sandy, pebbly, brown, soft	0.2	0.5
	'Clayey' sandy gravel Sand: medium with some fine and coarse, predominantly rounded quartz, with some angular flint, yellow brown Gravel: fine with some coarse, angular to subrounded flint, with some rounded chalk	0.9	1.4
Boulder Clay	Clay, sandy, chalky, pebbly, brown, firm	2.1	3.5
	Clay, chalky, pebbly, grey blue, stiff	2.2	5.7
	Clay, sandy, silty, pebbly, dark grey, firm	1.4	7.1
London Clay	Clay, silty, dark blue grey, stiff	0.4+	7.5

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand		Gravel		
				$-\frac{1}{8}$	$+\frac{1}{8}$ $-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
19	56	25	0.5-1.4	19	13	32	11	18	7

Surface level +74.6 m
 Water struck at +51.8 m
 Shell 152 mm diameter
 November–December 1975

Overburden 15.0 m
 Mineral 8.5 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.1	0.1
Boulder Clay	Clay, chalky, silty, pebbly, brown, soft	3.9	4.0
	Clay, very silty, chalky, grey becoming blue grey, hard	10.8	14.8
	Clay, silty, sandy, pebbly, brown, firm	0.2	15.0
Glacial Sand and Gravel	'Clayey' sandy gravel, chalky in upper 5.0 m Sand: medium with fine and coarse, predominantly rounded quartz, with coarse angular flint Gravel: fine with coarse, angular to subrounded white, brown and black flint, with some rounded quartz and quartzite, with a trace of sandstone, chalk, and rare fossil debris	8.5+	23.5

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines		Sand		Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16
15	51	34	15.0-16.0	16	13	28	9	20	14
			16.0-17.0	13	12	38	10	20	7
			17.0-18.0	11	13	36	10	21	9
			18.0-19.0	14	17	38	8	16	7
			19.0-20.0	25	19	21	11	19	5
			20.0-21.0	18	15	22	10	21	14
			21.0-22.0	15	11	22	13	29	10
			22.0-23.0	10	10	19	15	29	17
			23.0-23.5*	2	7	18	11	23	39
			Mean	15	13	27	11	22	12

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
15.0-16.0	11	60	16	1	9	3
16.0-17.0	8	63	14	1	11	3
17.0-18.0	6	68	16	1	6	3
18.0-19.0	10	59	21	1	6	3
19.0-20.0	3	74	13	-	5	5
20.0-21.0	-	79	16	-	4	1
21.0-22.0	-	83	13	-	4	-
22.0-23.0	-	80	12	-	6	2
23.0-23.5	-	78	13	-	4	5
Mean	4	71	15	1	6	3

Surface level +67.5 m
 Water struck at +62.5 m
 Shell 152 mm diameter
 November 1975

Overburden 10.1 m
 Mineral 4.6 m
 Bedrock 0.7 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Boulder Clay	Clay, silty, chalky, brown, soft to firm	4.7	5.0
	'Very clayey' sandy gravel Sand: fine to coarse, yellow Gravel: fine with coarse, angular flint and rounded chalk, with a trace of quartz, quartzite, sandstone and fossil debris	0.6	5.6
	Clay, silty, chalky, sandy in parts, flinty, blue, firm	3.7	9.3
	Clay, silty, pebbly, sandy, chalky, brown, firm	0.8	10.1
Glacial Sand and Gravel	'Clayey' sandy gravel Sand: medium with fine and coarse, predominantly quartz, with some angular coarse flint, yellow brown Gravel: fine with coarse, subangular to subrounded flint, with some rounded quartz and quartzite, and a trace of sandstone	4.6	14.7
London Clay	Clay, silty, sandy, brown mottled yellow brown, soft	0.2	14.9
	Clay, silty, drab olive grey, firm	0.5+	15.4

Grading

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- $\frac{1}{8}$	+ $\frac{1}{8}$	- $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16
13	56	31	10.1-11.1	12	14	30	12	24	8	
			11.1-12.1	10	20	44	9	14	3	
			12.1-13.1	15	13	20	14	26	12	
			13.1-14.1	11	14	25	15	26	9	
			14.1-14.7	17	13	18	16	25	9	
			Mean	13	15	28	13	23	8	

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
10.1-11.1	-	78	12	-	8	2
11.1-12.1	-	80	12	-	6	2
12.1-13.1	-	78	14	-	5	3
13.1-14.1	-	78	14	-	6	2
14.1-14.7	-	80	13	-	4	3
Mean	-	79	13	-	6	2

TL 41 SW 30 4385 1240 Gilston Park, Gilston

Block C

Surface level +61.4 m
 Water not struck
 Shell 152 mm diameter
 November 1975

Overburden 8.2 m
 Mineral 2.3 m
 Waste 1.3 m
 Mineral 5.4 m
 Bedrock 1.8 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.2	0.2
Boulder Clay	Clay, chalky, pebbly, brown to light grey, soft	3.7	3.9
	Clay, chalky, silty, pebbly, grey blue, firm	0.7	4.6
	Sand, clayey, firm	0.2	4.8
	Clay, silty, chalky, flinty, grey blue, firm	3.2	8.0
	Clay, chalky, pebbly, sandy, silty, brown, firm	0.2	8.2
Glacial Sand and Gravel	a Sand, clayey and pebbly at base	2.3	10.5
	Sand: medium with some fine and a trace of coarse, predominantly quartz, yellow brown Gravel: fine and coarse, angular to subrounded flint, with rounded chalk and some quartz, quartzite and sandstone		
Boulder Clay	Clay, sandy, silty, chalky, pebbly, brown, firm	0.4	10.9
	Clay, chalky, pebbly, silty, blue grey, firm	0.6	11.5
	Clay, silty, pebbly, sandy and chalky in parts, brown, firm	0.3	11.8
Glacial Sand and Gravel	b Gravel, clayey at top becoming coarser with depth	5.4	17.2
	Sand: medium with coarse and fine, predominantly quartz, with some angular coarse flint, brown Gravel: fine and coarse with a trace of cobble, angular to subrounded flint, with some quartz and quartzite, and a trace of sandstone		
London Clay (Basement Bed)	Clay, sandy, silty, olive grey to blue grey, with selenite crystals, pyrite nodules, glauconite, wood fragments and decalcified shell debris, firm	1.8+	19.0

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages						
	Fines	Sand	Gravel		Fines		Sand			Gravel	
					- $\frac{1}{8}$	+ $\frac{1}{8}$	- $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64
a	8	89	3	8.2-9.2	7	27	63	1	1	1	-
				9.2-10.2	8	18	71	2	1	-	-
				10.2-10.5	14	29	36	5	9	7	-
				Mean	8	24	63	2	2	1	-
b	7	38	55	11.8-12.8	11	12	25	10	24	18	-
				12.8-13.8	11	11	22	11	23	22	-
				13.8-14.8	11	12	14	10	26	23	4
				14.8-15.8	3	8	15	14	33	27	-
				15.8-17.2	2	4	11	14	32	37	-
				Mean	7	9	17	12	28	26	1

Composition

	Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
		Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
a	8.2-9.2	30	37	12	-	12	9
	9.2-10.2	29	38	8	-	10	15
	10.2-10.5	16	59	11	2	6	6
	Mean	28	40	10	-	10	12
b	11.8-12.8	-	87	9	-	3	1
	12.8-13.8	-	73	19	-	5	3
	13.8-14.8	-	76	18	-	4	2
	14.8-15.8	Sample missing					
	15.8-17.2	-	77	17	-	2	4
	Mean	-	78	16	-	3	3

TL 41 SW 31 4371 1143 $\frac{1}{2}$ km SE of St. Bolophs, Harlow

Block E

Surface level +36.4 m
 Water struck at +35.1 m
 Shell 152 mm diameter
 September 1975

Overburden 1.5 m
 Mineral 1.9 m
 Bedrock 2.6 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.4	0.4
Alluvium	Clay, silty, fragments of flint, chalk and gastropod debris, brown, soft	0.6	1.0
	Clay, silty, sandy and pebbly at base, grey and brown, soft	0.5	1.5
	Gravel Sand: medium and coarse with a trace of fine, yellow Gravel: fine and coarse, angular to subangular with rare rounded flint, some rounded quartz and quartzite, and a trace of chalk and sandstone	1.9	3.4
London Clay (Basement Bed)	Sand, fine, silty, grey black, becoming brown black, with decalcified shell debris, soft	1.7	5.1
	Clay, silty, blue grey, with carbonaceous partings and shell debris, stiff	0.9+	6.0

Grading

Mean for deposit percentages			Depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand		Gravel			
				$-\frac{1}{8}$	$+\frac{1}{8}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
3	32	65	1.5-2.5*	3	2	11	12	38	34	
			2.5-3.4*	2	3	23	15	29	28	
			Mean	3	2	17	13	34	31	

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
1.5-2.5	4	86	9	-	-	1
2.5-3.4	5	76	11	-	3	5
Mean	5	81	10	-	1	3

TL 41 SW 32 4411 1496 Actons Farm, High Wych

Block C

Surface level +72.1 m
 Water struck at +63.6 m
 Shell (modified) 152 mm diameter
 April 1976

Waste 18.6 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.2	0.2
Boulder Clay	Clay, chalky, brown, soft to firm	4.1	4.3
	Clay, chalky, pebbly, dark grey, firm	4.2	8.5
	Clay, silty, very sandy, dark grey, soft	0.7	9.2
	Clay, chalky, silty, blue grey, stiff	9.4+	18.6

TL 41 SW 33 4464 1404 Golden Grove, Gilston

Block C

Surface level +69.6 m
 Water struck at +63.0 m
 Shell 152 mm diameter
 November 1975

Overburden 2.6 m
 Mineral 4.2 m
 Bedrock 1.8 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.2	0.2
Boulder Clay	Clay, sandy, silty, pebbly, brown, soft	2.4	2.6
Glacial Sand and Gravel	'Clayey' sandy gravel, with chalky clay band between 5.1 and 5.3 m Sand: medium with some fine and coarse, predominantly quartz, with angular coarse flint, yellow brown Gravel: fine and coarse, angular to subrounded flint, with some quartz, quartzite and sandstone, and a trace of rounded chalk	4.2	6.8
London Clay	Clay, silty, sandy, brown, soft	0.2	7.0
	Clay, sandy, silty, drab olive green, with a trace of glauconite, pyritic wood fragments and selenite crystals, firm	1.6+	8.6

Grading

Mean for deposit <i>percentages</i>	Depth below surface (m)	<i>percentages</i>							
		Fines	Sand	Gravel	Fines	Sand	Gravel		
					-½	+½ -¼	+¼-1	+1-4	+4-16
13	53	34	2.6-3.6	28	9	20	6	18	19
			3.6-5.1	8	12	51	6	11	11
			5.3-6.3	8	10	30	11	27	14
			6.3-6.8	11	10	18	14	29	18
			Mean	13	11	34	8	19	15

Composition

Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
2.6-3.6	2	80	12	-	4	2
3.6-5.1	1	80	10	-	7	2
5.3-6.3	2	75	13	-	8	2
6.3-6.8	-	74	17	-	7	2
Mean	1	78	12	-	7	2

TL 41 SW 34 4421 1353 Overhall Farm, Gilston

Block C

Surface level +50.1 m
Water not struck
Shell 152 mm diameter
December 1975

Waste 1.5 m
Bedrock 2.4 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.1	0.1
Head	Clay, silty, sandy, rarely pebbly, brown, soft	0.8	0.9
	Clay, silty, pebbly, yellow brown mottled red, soft	0.6	1.5
London Clay	Clay, silty, sandy in parts, blue grey, with glauconite, carbonaceous fragments and rare pyrite nodules, soft	2.4+	3.9

Surface level +49.8 m
 Water struck at +47.5 m and +26.8 m
 Shell (modified) 152 mm diameter
 May 1976

Waste 2.5 m
 Bedrock 25.7 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil and subsoil, clay, pebbly, mid-brown	0.6	0.6
Head	Clay, silty, sandy, flint and chalk pebbles, brown, soft	0.5	1.1
	Clay, silty, very sandy, gravelly at base, brown and grey, soft	1.4	2.5
London Clay	Clay, silty, sandy, dark grey mottled brown at top, with pockets of green glauconitic fine sand, soft	0.7	3.2
	Clay, very sandy, becomes very clayey fine sand, grey green with patches of green glauconitic sand, laminated with bands of decalcified shell debris, firm	2.6	5.8
London Clay (Basement Bed)	Silt and fine sand, grey green, very hard	0.1	5.9
	Sand, fine, clayey, silty, dark grey green, with comminuted shells and race nodules, pyritic and glauconitic in pockets, firm	4.6	10.5
Woolwich and Reading Beds	Clay, silty, pebbly, mottled green grey and red, packed with broken shells and flint pebbles	0.3	10.8
	Clay, silty, mottled grey green, red and pale cream, with some fine flint pebbles	0.4	11.2
	Clay, pale grey blue streaked green and brown, with large race nodules up to 2 cm diameter	0.6	11.8
	Sand, clayey, pale grey blue	0.5	12.3
	Clay, silty, becomes sandy, grey mottled red and green becomes red brown mottled grey and light blue	2.3	14.6
	Clay, silty, fine sandy, brown streaked grey green, waxy	1.7	16.3
	Clay, silty, brown mottled grey blue, with abundant race nodules up to 1 cm diameter, waxy	0.5	16.8
	Clay, red brown mottled blue grey, stiff, waxy	0.2	17.0
	Sand, fine, clayey, dark brown, micaceous	0.2	17.2
	Sand, fine, dark brown, micaceous	1.0	18.2
	Sand, fine, clayey, dark brown mottled grey green and red, micaceous	0.7	18.9
	Sand, fine, clayey, brown mottled red, micaceous	0.3	19.2
	Sand, fine, dark brown mottled red and grey green, with many fine gravel sized pebbles of rounded black flint and a trace of rounded white quartz	0.1	19.3
	Sand, fine, increasingly clayey, dark brown mottled blue, micaceous	0.3	19.6
	Sand, fine, and clay, olive green mottled brown and red, with rounded fine black flints	0.9	20.5
Thanet Beds (Thanet Sand)	Sand, clayey, blue green, micaceous	1.0	21.5
	Sand, fine to medium, clayey, blue green mottled grey green, grey and orange brown, glauconitic	3.2	24.7
	Sand, fine, clayey, pellets of clay. Grey green becomes purple grey and green from 27.0 m, dark brown and green glauconitic burrows, laminated, micaceous	3.0	27.7
(Bullhead Bed)	Clay, silty, bright olive green, with large angular to subrounded black flints, glauconitic, firm	0.1	27.8
	Sand, fine, bright olive green, laminated, glauconitic with chalk putty and well rounded black flints	0.1	27.9
Upper Chalk	Chalk, soft puggy, white, with angular black and blue flints	0.3+	28.2

[Summary of this log published in IGS Boreholes 1976. *Rep. Inst. Geol. Sci.*, 77/10, p. 9.]

TL 41 SW 36 4472 1238 Pye Corner, Eastwick

Block C

Surface level +42.7 m
Water struck at +40.0 m
Shell 152 mm diameter
November 1975

Waste 4.6 m
Bedrock 1.2 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.5	0.5
	Subsoil	0.2	0.7
Head	Clay, silty, chalky, yellow brown mottled grey, soft	3.0	3.7
	Peat, clayey, black, soft	0.2	3.9
	'Clayey' sandy gravel	0.7	4.6
	Sand: coarse, predominantly quartz, with some angular flint, dark brown		
	Gravel: fine to coarse, rounded to well rounded flint and quartz, with a trace of quartzite and sandstone		
London Clay	Clay, silty, very sandy, olive grey, with glauconite, comminuted shells, pyrite nodules and pyritised wood	1.2+	5.8

Surface level +46.0 m
 Water not struck
 Shell 152 mm diameter
 November 1975

Overburden 1.1 m
 Mineral 3.3 m
 Bedrock 1.5 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Head	Clay, silty, sandy, pebbly at base, yellow brown, soft	0.9	1.1
Glacial Sand and Gravel	Gravel, 'clayey' at top becomes coarser with depth Sand: medium and coarse with some fine, predominantly quartz, with some angular coarse flint, ochre brown Gravel: coarse and fine, angular to well rounded flint, with some rounded to subrounded quartz, quartzite and sandstone, and a trace of ironstone	3.3	4.4
London Clay	Clay, silty, drab olive grey, broken shells, pyrite nodules and glauconite, soft becoming stiff	1.5+	5.9

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16
6	32	62	1.1-2.1	14	6	14	11	28	27
			2.1-3.1	3	4	14	15	30	34
			3.1-4.4	2	4	14	14	25	41
			Mean	6	5	14	13	27	35

Composition

Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
1.1-2.1	-	80	12	-	4	4
2.1-3.1	-	73	15	-	4	8
3.1-4.4	-	69	16	-	7	8
Mean	-	74	14	-	5	7

Surface level +68.5 m
 Water struck at +57.7 m and +52.8 m
 Shell (modified) 152 mm diameter
 April 1976

Waste 16.6 m
 Bedrock 0.8 m+

Log	Lithology	Thickness	Depth
Geological classification		m	m
	Soil	0.2	0.2
Boulder Clay	Clay, chalky, silty, brown to grey, soft to firm	4.1	4.3
	Clay, silty, chalky, blue grey, stiff	4.2	8.5
	Clay, silty, chalky, dark blue grey, stiff	1.1	9.6
	Clay, chalky, silty, pebbly, brown, firm	0.2	9.8
	Clay, very chalky, silty, sandy, brown, firm	0.9	10.7
Glacial Sand and Gravel	a Pebbly sand	1.5	12.2
	Sand: medium with some fine and coarse, predominantly quartz Gravel: fine with some coarse, subangular to rounded flint, with quartz and quartzite, and some chalk and sandstone		
Boulder Clay	Clay, chalky, silty, pebbly, blue grey, firm to stiff	1.9	14.1
	Clay, chalky, pebbly, silty, sandy, brown, firm	0.1	14.2
Glacial Sand and Gravel	b Gravel, becomes coarse with depth	2.4	16.6
	Sand: medium with coarse and some fine, predominantly rounded quartz Gravel: fine with coarse, angular to subrounded flint, with some rounded quartz and quartzite, and a trace of sandstone		
London Clay	Clay, silty, fine sandy, brown, faintly laminated, firm	0.3	16.9
	Clay, silty, becomes clayey, silty fine sand, drab olive green with glauconite, wood fragments, pyrite nodules and shell debris, stiff	0.5+	17.4

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages					
	Fines	Sand	Gravel		Fines		Sand		Gravel	
					- 1/2	+ 1/2	- 1/4	+ 1/4-1	+ 1-4	+ 4-16
a	6	71	23	10.7-11.7*	4	8	54	11	17	6
				11.7-12.2*	10	20	40	7	17	6
				Mean	6	12	49	10	17	6
b	4	38	58	14.2-15.2	5	6	17	15	37	20
				15.2-16.2*	4	4	21	13	32	26
				16.2-16.6*	2	4	24	9	21	40
				Mean	4	5	20	13	32	26

Composition

	Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
		Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
a	10.7-11.7	3	63	17	-	9	8
	11.7-12.2	15	65	14	-	5	1
	Mean	7	64	16	-	8	5
b	14.2-15.2	-	75	18	-	3	4
	15.2-16.2	-	71	22	-	4	3
	16.2-16.6	-	62	23	-	8	7
	Mean	-	71	21	-	4	4

TL 41 SE 35 4553 1361 Sayes Park Farm, High Wych

Block C

Surface level +54.3 m
 Water struck at +48.3 m
 Shell 152 mm diameter
 November 1975

Overburden 2.9 m
 Mineral 6.9 m
 Bedrock 3.8 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.2	0.2
Boulder Clay	Clay, silty, brown, stiff	1.5	1.7
	Clay, silty, chalky, flinty, yellow brown, firm	1.2	2.9
Glacial Sand and Gravel	Sandy gravel, sand between 4.4 and 5.6 m Sand: medium with coarse and some fine, predominantly rounded quartz, with some angular coarse flint, ochre brown and yellow Gravel: fine and coarse, angular to subrounded flint, with rounded quartz, quartzite and some sandstone, with a trace of chalk and ironstone	6.9	9.8
London Clay	Clay, sandy, silty, brown mottled ochre brown, firm	0.3	10.1
	Clay, silty, rarely sandy, olive green to blue, with many selenite crystals and pyrite nodules, and glauconite in patches, firm	3.5+	13.6

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines		Sand		Gravel	
				-½	+½ -¼	+¼-1	+1-4	+4-16	+16
5	49	46	2.9-3.9	10	7	17	12	32	22
			3.9-5.0	6	15	49	7	13	10
			5.0-6.0	7	9	33	9	22	20
			6.0-7.0*	3	6	28	15	31	17
			7.0-8.0*	2	5	30	18	27	18
			8.0-9.0*	3	3	11	19	35	29
			9.0-9.8*	2	6	16	21	30	25
			Mean	5	7	27	15	26	20

Composition

Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
2.9-3.9	Sample missing					
3.9-5.0	-	80	11	-	6	3
5.0-6.0	-	70	14	-	9	7
6.0-7.0	1	76	14	-	4	5
7.0-8.0	1½	80	11	-	6	11½
8.0-9.0	-	82	10	-	4	4
9.0-9.8	-	73	18	-	5	4
Mean	1	77	13	-	5	4

Surface level +38.8 m
 Water struck at +37.3 m
 Shell 152 mm diameter
 November 1975

Overburden 1.5 m
 Mineral 4.5 m
 Bedrock 3.6 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.4	0.4
Alluvium	Clay, silty, peaty, brown, soft	0.5	0.9
	Clay, silty, brown, soft	0.6	1.5
	Gravel Sand: medium and coarse with some fine, predominantly rounded quartz, with some angular coarse flint Gravel: fine and coarse, angular to subrounded black flints, with some rounded quartz, quartzite, and sandstone, with a trace of chalk	4.5	6.0
London Clay	Clay, silty, grey, with carbonaceous partings and shell debris, soft	3.2	9.2
	Clay, sandy, silty, mottled grey and dark grey, firm	0.4+	9.6

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand		Gravel		
				- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16
6	37	57	1.5-2.5	9	5	11	11	34	30
			2.5-3.5	4	5	18	14	33	26
			3.5-6.0*	6	5	19	16	29	25
			Mean	6	5	17	15	31	26

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
1.5-2.5	9	70	7	1	9	4
2.5-3.5	4	79	8	-	6	3
3.5-6.0	5	80	8	-	5	2
Mean	6	78	8	-	6	2

TL 41 SE 37 4667 1431 A. 414, High Wych

Block D

Surface level +78.6 m
 Water not struck
 Shell 152 mm diameter
 October 1975

Waste 20.0 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.1	0.1
Boulder Clay	Clay, chalky, silty, sandy, very flinty, yellow brown, firm	1.3	1.4
	Clay, silty, chalky, brown mottled grey, with some flint pebbles, soft	1.5	2.9
	Clay, silty, chalky, flinty, blue grey, stiff	2.6	5.5
	Clay, sandy, silty, blue, very soft	2.5	8.0
	Clay, silty, chalky, dark blue, stiff to hard	10.0	18.0
	Clay, silty, chalky, blue grey, very hard, shaley	2.0+	20.0

TL 41 SE 38 4660 1338 Rederick Lane, Sawbridgeworth

Block D

Surface level +62.4 m
 Water struck at +52.3 m
 Shell 152 mm diameter
 April 1976

Waste 18.4 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Boulder Clay	Clay, silty, chalky, flinty, brown, with silt bands, soft	3.7	4.0
	Clay, chalky, silty, dark grey, soft becoming hard	2.9	6.9
	Clay, chalky, silty, olive-grey, stiff	3.2	10.1
	Clay, sandy, chalky, grey, very soft	1.3	11.4
	Clay, very chalky, silty, olive grey, soft becoming stiff	7.0+	18.4

Surface level +64.9 m
 Water struck at +56.9 m and +47.4 m
 Shell 152 mm diameter
 March 1976

Overburden 1.0 m
 Mineral 8.0 m
 Waste 10.4 m
 Bedrock 0.3 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.4	0.4
Boulder Clay	Clay, sandy, silty, chalky, pale orange, firm	0.6	1.0
Glacial Sand and Gravel	a 'Clayey' pebbly sand, clayey sand grading to gravel Sand: medium and fine with a trace of coarse, predominantly rounded quartz, with a trace of angular coarse flint Gravel: fine and coarse, angular to rounded flint, with some chalk, and a trace of rounded quartz, quartzite and sandstone	8.0	9.0
Boulder Clay	Clay, silty, sandy, chalky, light brown, firm to stiff	0.9	9.9
	Clay, silty, chalky, grey becoming dark grey, stiff	7.5	17.4
	Clay, pebbly, very sandy, orange brown, firm	0.1	17.5
Glacial Sand and Gravel	b Sandy gravel Sand: medium with coarse and a trace of fine, predominantly quartz, with angular coarse flint Gravel: fine with coarse, subrounded to angular flint, with some rounded quartz and quartzite, with a trace of rounded sandstone and chalk	1.9	19.4
London Clay	Clay, silty, brown, firm	0.1	19.5
	Clay, silty, olive grey, firm	0.2+	19.7

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages					
	Fines	Sand	Gravel		Fines	Sand		Gravel		
						+ $\frac{1}{2}$	- $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16
a	16	69	15	1.0-2.0	24	29	32	9	6	-
				2.0-6.0	14	40	40	4	2	-
				6.0-7.0	30	29	29	3	7	2
				7.0-8.0	16	10	26	9	24	15
				8.0-9.0*	4	4	28	10	20	34
				Mean	16	29	34	6	8	7
b	4	53	43	17.5-19.4*	4	6	29	18	25	18

Composition

	Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
		Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
a	1.0-2.0	28	63	2	$\frac{1}{2}$	6	$\frac{1}{2}$
	2.0-6.0	28	63	3 $\frac{1}{2}$	-	3 $\frac{1}{2}$	2
	6.0-7.0	6	70	19	-	3	2
	7.0-8.0	1	76	17	-	2	4
	8.0-9.0	9	47	21	1	12	10
	Mean	19	64	9	-	5	3
b	17.5-19.4	1	74	15	-	8	2

TL 41 SE 40 4790 1302 ‡ km N. of Harlowbury, Harlow

Block E

Surface level +41.8 m
 Water struck at +40.3 m
 Shell 152 mm diameter
 March–April 1976

Overburden 1.5 m
 Mineral 5.9 m
 Waste 7.8 m
 Mineral 9.2 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.2	0.2
Alluvium	Clay, sandy, silty, mottled orange and brown, soft	0.4	0.6
	Peat, dark brown, soft	0.5	1.1
	Clay, olive grey, soft	0.4	1.5
Buried Channel Deposits (Glacial Sand and Gravel)	a Sandy gravel, clayey at top and base, pebbly, medium sand between 4.0 and 6.0 m Sand: medium with some coarse and a trace of fine, pale brown Gravel: fine with coarse, angular flint, with rounded chalk, with some rounded sandstone, quartz and quartzite, and a trace of fossil debris	5.9	7.4
	Silt, medium to coarse, sandy, olive grey to grey, soft	7.8	15.2
	b Sandy gravel, very sandy at top Sand: medium and coarse with a trace of fine, yellow brown Gravel: fine and some coarse, angular to subrounded flint, with some rounded quartz, quartzite, chalk and sandstone, and a trace of fossil debris	9.2+	24.4

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages					
	Fines	Sand	Gravel		Fines		Sand		Gravel	
					- $\frac{1}{8}$	+ $\frac{1}{8}$	- $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16
a	7	62	31	1.5-2.5*	11	5	16	11	27	30
				2.5-4.0*	2	4	16	18	33	27
				4.0-5.0*	6	11	61	14	7	1
				5.0-6.0*	4	10	62	16	7	1
				6.0-7.4*	10	8	47	18	13	4
				Mean	7	7	39	16	18	13
b	4	59	37	15.2-16.2*	9	22	35	15	16	3
				16.2-17.2*	4	8	15	26	36	11
				17.2-18.2*	3	10	33	19	17	18
				18.2-19.2*	3	7	30	26	19	15
				19.2-20.2*	1	3	28	26	19	23
				20.2-21.2*	1	4	16	16	15	48
				21.2-22.2*	7	9	46	15	14	9
				22.2-23.2*	2	6	32	25	27	8
				23.2-24.4*	2	6	32	25	27	8
				Mean	4	8	30	21	21	16

Composition

	Depth below surface (m)	Percentages by weight in +4-16 mm fraction					
		Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
a	1.5-2.5	2	84	8	-	2	4
	2.5-4.0	9	65	12	1	4	9
	4.0-5.0	45	45	1	1	6	2
	5.0-6.0	46	40	1	1	11	1
	6.0-7.4	39	38	3	3	11	6
	Mean	27	54	6	1	7	5
b	15.2-16.2	7	83	6	1	1	2
	16.2-17.2	5	81	10	-	4	-
	17.2-18.2	6	80	9	-	3	2
	18.2-19.2	8	67	10	3	9	3
	19.2-20.2	5	84	8	1	2	-
	20.2-21.2	1	89	5	1	4	-
	21.2-22.2	11	56	14	2	8	9
	22.2-23.2	7	79	9	-	4	1
	23.2-24.4	5	81	8	1	5	-
	Mean	6	78	9	1	4	2

TL 41 SE 41 4770 1061 Gravel Pit Farm, Matching

Block D

Surface level +66.3 m
Water not struck
Shell 152 mm diameter
April 1976

Waste 18.3 m+

Log

Geological classification

Lithology

Thickness

Depth

		m	m
	Soil	0.3	0.3
Boulder Clay	Clay, sandy, flinty, light olive grey, mottled, soft	0.5	0.8
	Clay, chalky, silty, flinty, yellow brown, soft	2.2	3.0
	Clay silty, chalky, mid to dark grey, with some pebbles of flint, and a trace of mudstone, limestone and sandstone, soft becoming stiff	7.3	10.3
	Clay, chalky, silty, olive grey, stiff	8.0+	18.3

Surface level +55.3 m
 Water struck at +48.0 m
 Shell 152 mm diameter
 April 1976

Overburden 2.2 m
 Mineral 1.3 m
 Waste 1.8 m
 Mineral 7.3 m
 Waste 8.9 m+

Log	Lithology	Thickness	Depth
Geological classification		m	m
	Soil	0.5	0.5
Head	Clay, very sandy, pebbly, yellow brown, soft	1.7	2.2
Terrace 2	a 'Clayey' gravel Sand: medium with coarse and some fine, predominantly rounded quartz Gravel: fine and coarse, angular flint, with a trace of rounded quartz and sandstone	1.3	3.5
Buried Channel Deposits (Glacial Sand and Gravel)	Silt, laminated, cream becoming olive grey, soft	1.8	5.3
	b Pebbly sand, with a band of dark grey, chalky silty clay between 11.2 and 11.6 m Sand: medium with some fine and coarse, predominantly rounded quartz, with a trace of chalk, pale yellow Gravel: fine with some coarse, angular to rounded flint and rounded chalk, with a trace of rounded sandstone, quartz, quartzite and fossil debris	7.3	12.6
Boulder Clay	Clay, silty, chalky, brown to grey, soft becoming stiff	8.9+	21.5

Grading

	Mean for deposit percentages			Depth below surface (m)	percentages					
	Fines	Sand	Gravel		Fines		Sand		Gravel	
					- $\frac{1}{8}$	+ $\frac{1}{8}$	- $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16
a	12	41	47	2.2-3.5	12	6	22	13	27	20
b	7	72	21	5.3-6.3*	11	8	31	14	27	9
				6.3-7.3*	8	13	52	8	16	3
				7.3-8.3*	9	17	58	7	8	1
				8.3-9.3*	6	12	53	16	12	1
				9.3-10.3*	2	9	42	16	25	6
				10.3-11.2*	5	9	36	19	25	6
				11.6-12.6*	9	51	31	4	3	2
			Mean	7	17	43	12	17	4	

Composition

	Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
		Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
a	2.2-3.5	-	94	4	-	1	1
b	5.3-6.3	36	47	4	3	6	4
	6.3-7.3	35	50	3	2	6	4
	7.3-8.3	46	39	2	3	8	2
	8.3-9.3	39	50	3	2	6	4
	9.3-10.3	44	40	5	3	5	3
	10.3-11.2	44	33	3	3	9	8
	11.6-12.6	35	41	3	3	10	8
	Mean	40	43	3	3	7	4

Surface level +57.3 m
 Water struck at +56.7 m and +49.0 m
 Shell 152 mm diameter
 March 1973

Overburden 8.3 m
 Mineral 5.2 m
 Waste 3.7 m
 Bedrock 0.3 m+

Log

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Boulder Clay	Clay, sandy, silty, chalky, yellow brown, soft to firm	4.7	5.0
	Clay, silty, chalky, grey becoming dark grey, stiff	2.6	7.6
	Clay, silty, sandy, chalky, brown, firm	0.7	8.3
Glacial Sand and Gravel	'Clayey' sandy gravel, 'very clayey' at top	5.2	13.5
	Sand: medium with fine and coarse, quartz, with some angular coarse flint Gravel: coarse and fine, angular to subrounded flint, with rounded chalk, and some rounded quartz, quartzite, sandstone and fossil debris		
Boulder Clay	Clay, silty, sandy, chalky, olive grey, firm becoming stiff	3.7	17.2
London Clay	Clay, silty, micaceous, olive grey, with pyrite nodules, firm	0.3+	17.5

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines		Sand		Gravel	
				- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16
11	58	31	8.3-11.4 *	10	15	27	15	14	19
			11.4-12.6 *	20	22	24	12	12	10
			12.6-13.5 *	5	10	29	18	19	19
			Mean	11	16	27	15	14	17

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
8.3-11.4	31	49	7	4	7	3
11.4-12.6	14	75	5	1	3	2
12.6-13.5	3	80	12	-	1	4
Mean	22	60	7	3	5	3

Surface level +61.1 m
 Water not struck
 Shell 152 mm diameter
 April 1976

Waste 18.6 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil and Made Ground	1.0	1.0
Boulder Clay	Clay, sandy, chalky, brown, with thin sand seams, soft	1.6	2.6
	'Clayey' sandy gravel	0.9	3.5
	Sand: medium with fine and coarse, yellow		
	Gravel: coarse and fine, subangular to subrounded flint, with chalk, quartz and quartzite, and some sandstone		
	Clay, sandy, silty, chalky, yellow brown, firm	4.4	7.9
	Silt, clayey, laminated, yellow brown, with bands of fine chalk sand, soft	3.9	11.8
	Clay, silty, chalky, flinty, grey becoming blue grey, stiff	6.8+	18.6

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>						
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>		<i>Gravel</i>		
				$-\frac{1}{8}$	$+\frac{1}{8}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
15	48	37	2.6-3.5	15	18	23	7	17	20	

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in + 4-16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
2.6-3.5	29	41	14	2	12	2

TL 41 SE 45	4876 1109	Feltimeores, Matching	Block D	
Surface level +66.6 m			Waste 0.2 m	
Water not struck			Bedrock 4.8 m+	
Shell 152 mm diameter				
April 1976				
Log				
<i>Geological classification</i>	<i>Lithology</i>		<i>Thickness</i>	<i>Depth</i>
	Soil		m	m
			0.2	0.2
London Clay	Clay, mid-brown to red brown, with race nodules up to cobble size, some mica flakes, selenite crystals and poorly preserved bivalves, waxy, stiff		4.8+	5.0

TL 41 SE 46	4837 1030	Hubbards Hall, Matching	Block D	
Surface level +73.9 m			Waste 0.3 m	
Water not struck			Bedrock 3.0 m+	
Shell 152 mm diameter				
April 1976				
Log				
<i>Geological classification</i>	<i>Lithology</i>		<i>Thickness</i>	<i>Depth</i>
	Soil		m	m
			0.3	0.3
London Clay	Clay, brown to red brown, with race nodules, and selenite crystals, waxy, stiff		3.0+	3,3

Surface level +65.7 m
 Water struck at +51.6 m and +48.1 m
 Shell 152 mm diameter
 February–March 1976

Waste 22.8 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.5	0.5
Boulder Clay	Clay, silty, sandy, chalky, yellow brown, soft	3.9	4.4
	Clay, silty, chalky, grey, firm	4.6	9.0
	Clay, silty, chalky, flinty, dark grey, stiff	3.5	12.5
	Clay, silty, chalky, grey brown, with a sandy clay band at 14.1 m, stiff	5.1	17.6
Glacial Sand and Gravel	Gravel, becoming more sandy with depth Sand: medium with some coarse and a trace of fine, predominantly rounded quartz, with some angular coarse flint, brown Gravel: coarse and fine, angular to subrounded flint, with some rounded quartz and quartzite, and a trace of rounded sandstone, chalk and fossil debris	5.2+	22.8

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines		Sand		Gravel	
				– $\frac{1}{8}$	+\mathbf{\frac{1}{8}} – $\frac{1}{4}$	+\mathbf{\frac{1}{4}} –1	+1–4	+4–16	+16
2	39	59	17.6–19.0*	3	4	15	12	34	32
			19.0–20.3*	2	3	21	13	29	32
			20.3–22.8*	1	5	26	14	23	31
			Mean	2	4	22	13	27	32

Composition

Depth below surface (m)	Percentages by weight in +4–16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
17.6–19.0	–	80	18	–	2	–
19.0–20.3	1	65	19	1	10	4
20.3–22.8	–	82	16	–	1	1
Mean	–	77	17	–	4	2

Surface level +60.7 m
 Water struck at +47.6 m
 Shell 152 mm diameter
 March 1976

Overburden 13.1 m
 Mineral 5.7 m
 Bedrock 0.5 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.4	0.4
Boulder Clay	Clay, sandy, silty, chalky, light grey brown, firm	2.6	3.0
	Clay, silty, chalky, blue grey, with a silty brown medium sand band at 5.9 m, firm to stiff	10.1	13.1
Glacial Sand and Gravel	Sandy gravel	5.7	18.8
	Sand: medium with coarse and a trace of fine, predominantly rounded quartz, with a trace of angular coarse flint, yellow brown Gravel: fine with coarse, subangular to subrounded flint, with some rounded quartz and quartzite, and a trace of rounded sandstone, rare chalk and fossil debris		
London Clay	Clay, micaceous, olive grey, firm	0.5+	19.3

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				- $\frac{1}{8}$	+ $\frac{1}{8}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16
2	61	37	13.1-14.1*	3	6	35	20	23	13
			14.1-15.1*	2	7	29	21	19	22
			15.1-16.1*	1	9	20	20	38	12
			16.1-17.1*	1	8	28	24	25	14
			17.1-18.8*	2	9	47	15	17	10
			Mean	2	8	34	19	23	14

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
13.1-14.1	1	67	16	1	9	6
14.1-15.1	3	65	17	-	9	6
15.1-16.1	-	87	11	-	1	1
16.1-17.1	2½	72½	15	2	4	4
17.1-18.8	1½	67	17	1	7	6½
Mean	2	71	15	1	6	5

TL 41 SE 49 4963 1351 $\frac{1}{2}$ km S.E. of Newhouse, Sheering

Block D

Surface level +72.8 m
Water struck at +62.8 m
Shell 152 mm diameter
March 1976

Waste 23.5 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.3	0.3
Boulder Clay	Clay, silty, chalky, slightly sandy, orange brown becoming brown, with two silty, chalky fine sand bands at 8.8 and 9.0 m, firm becoming stiff	9.7	10.0
Glacial Sand and Gravel	'Clayey' sandy gravel Sand: medium with fine and coarse, becoming coarser with depth, predominantly rounded quartz, with some angular coarse flint, orange brown Gravel: fine with coarse, subangular to subrounded flint, with rounded quartz, and some rounded sandstone, with a trace of chalk and fossil debris	1.8	11.8
Boulder Clay	Clay, silty, chalky, grey, with faint laminations, firm	1.2	13.0
	Clay, silty, chalky, dark grey becoming olive grey, stiff	9.8	22.8
	Sand, clayey, chalky to very chalky, olive grey, soft	0.7+	23.5

Grading

Mean for deposit percentages			Depth below surface (m)	percentages					
Fines	Sand	Gravel		Fines	Sand		Gravel		
				$-\frac{1}{8}$	$+\frac{1}{8}$ $-\frac{1}{4}$	$+\frac{1}{4}$ -1	+ 1-4	+ 4-16	+ 16
18	42	40	10.0-11.8*	18	12	18	12	25	15

Composition

Depth below surface (m)	Percentages by weight in + 4-16 mm fraction					
	Chalk	Flint	Quartz and Quartzite	Fossil debris	Sandstone	Others
10.0-11.8	1	67	17	1	7	7

TL 41 SE 50 4922 1285 Durrington Hall, Sheering

Block D

Surface level +63.3 m
Water not struck
Shell 152 mm diameter
April 1976

Waste 16.0 m
Bedrock 1.3 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil	0.2	0.2
Boulder Clay	Clay, chalky, silty, flinty, brown mottled grey, soft	4.3	4.5
	Clay, chalky, silty, olive grey, soft	5.5	10.0
	Clay, chalky, silty, dark blue grey, with some flints, and rare black shale, stiff	5.3	15.3
	Clay, silty, very sandy and flinty at base, trace of chalk, olive grey, firm	0.7	16.0
London Clay	Clay, silty, micaceous, olive green, stiff	1.3+	17.3

Surface level +87.0 m
 Water struck at +80.5 m and +74.7 m
 Shell 152 mm diameter
 April 1976

Waste 15.7 m
 Bedrock 0.7 m+

Log

<i>Geological classification</i>	<i>Lithology</i>	<i>Thickness</i> m	<i>Depth</i> m
	Soil and Made Ground	1.1	1.1
Boulder Clay	Clay, silty, chalky, trace of angular flints, pale orange, firm	5.4	6.5
	Sand, silty, clayey, orange, with chalk and flint, soft	0.2	6.7
	Clay, silty, chalky, blue grey, stiff	3.5	10.2
	Clay, chalky, silty, yellow brown, with orange medium to coarse sand bands at 10.2 m and 11.0 m	1.1	11.3
Glacial Sand and Gravel	'Clayey' sandy gravel, very sandy in last 1.2 m Sand: medium with fine and a trace of coarse, predominantly quartz, yellow brown Gravel: fine with coarse, angular to subrounded flint, with rounded quartz, quartzite and some sandstone	2.2	13.5
	Sands and clays, bonded, silty, pale olive, blue and yellow, soft	2.2	15.7
London Clay	Clay, silty, sandy, micaceous, brown becoming olive grey, firm	0.7+	16.4

Grading

<i>Mean for deposit percentages</i>			<i>Depth below surface (m)</i>	<i>percentages</i>						
<i>Fines</i>	<i>Sand</i>	<i>Gravel</i>		<i>Fines</i>		<i>Sand</i>		<i>Gravel</i>		
				$-\frac{1}{8}$	$+\frac{1}{8}$	$-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16$
16	60	24	11.3-12.3*	13	9	29	10	23	16	
			12.3-13.5*	19	30	34	5	7	5	
			Mean	16	21	32	7	14	10	

Composition

<i>Depth below surface (m)</i>	<i>Percentages by weight in +4-16 mm fraction</i>					
	<i>Chalk</i>	<i>Flint</i>	<i>Quartz and Quartzite</i>	<i>Fossil debris</i>	<i>Sandstone</i>	<i>Others</i>
11.3-12.3	-	59	26	-	11	4
12.3-13.5	-	62	30	-	4	4
Mean	-	61	28	-	7	4

APPENDIX G

LIST OF WORKINGS

This list includes only the principal workings. Many smaller old workings are shown as worked-out or made ground on the resource map accompanying this report.

OPERATIONAL	<i>Grid reference</i>	<i>Deposit</i>
Gaston Green	495 163	Glacial Sand and Gravel
Roydon Lea	400 105	River Terrace Deposits
ABANDONED		
Hadham Towers	430 170	Glacial Sand and Gravel
Dane Bridge	442 197	Glacial Sand and Gravel
Gravel Pit Farm	478 103	Head Gravel
RECLAIMED (by backfilling)		
Twyford Bury	495 195	First Terrace
Hobbs Cross	490 104	Head Gravel
Pole Hill 1	452 123	Glacial Sand and Gravel
Pole Hill 2	458 128	Glacial Sand and Gravel

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

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

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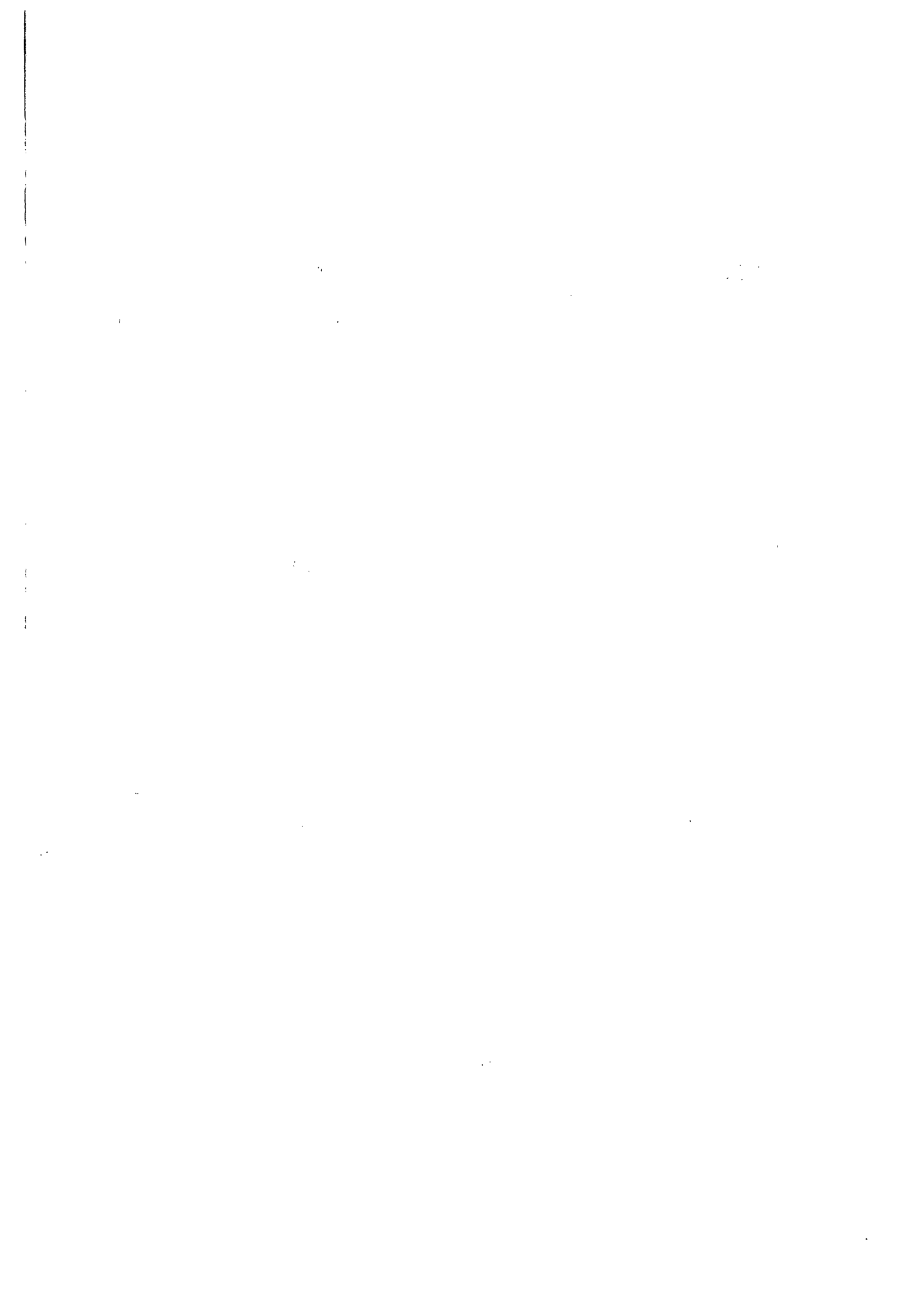
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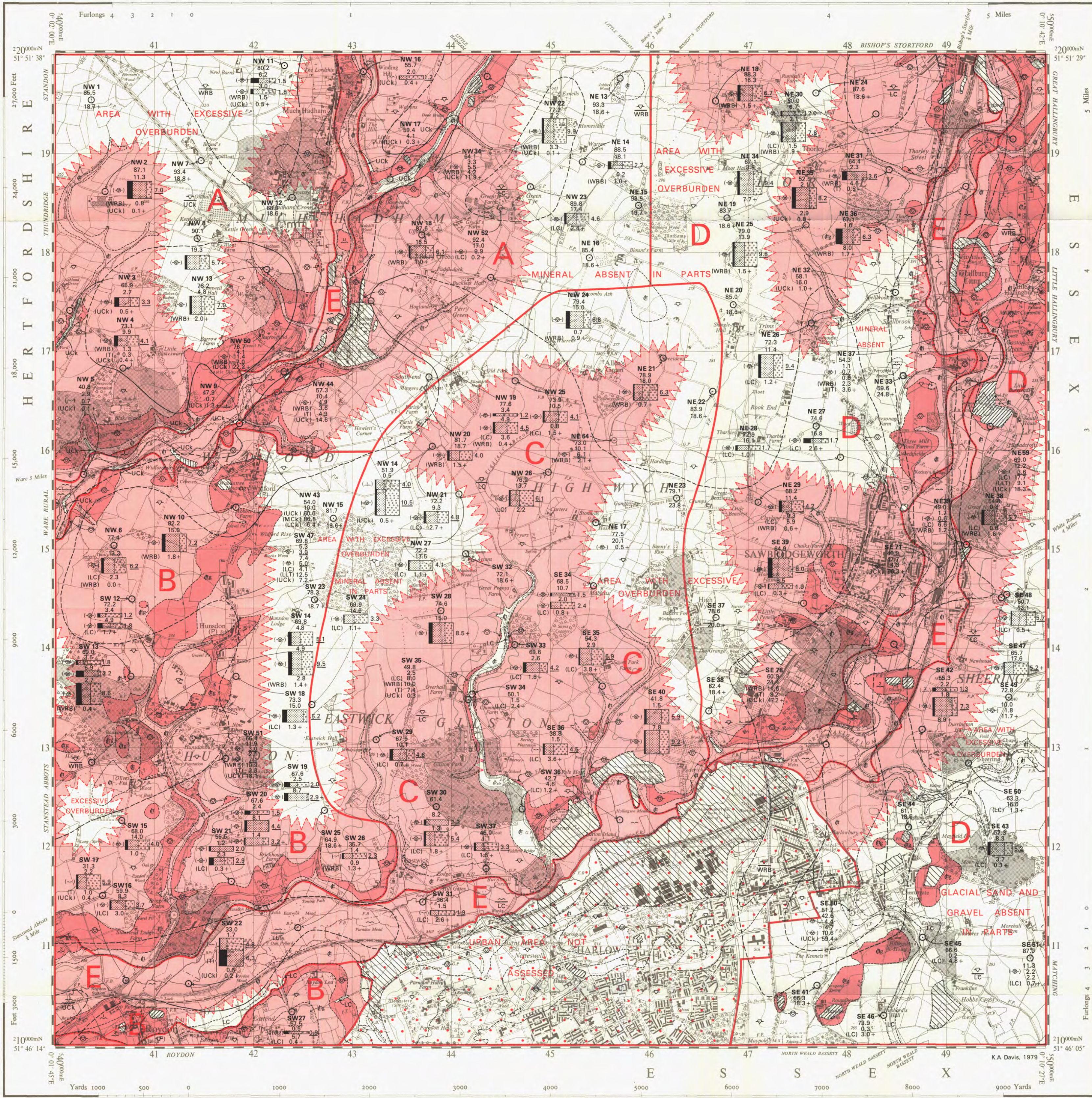


THE SAND AND GRAVEL RESOURCES OF SHEET TL41 (NORTH OF HARLOW, ESSEX)

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

ORDNANCE SURVEY
SHEET TL41
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

LANDSLIP L-1 46

DRIFT

- Alluvium (including underlying terrace gravels)-sandy clay, silt and peat overlying sand and gravel in places. A-31 ✓
- First Terrace 1T-18
- Second Terrace 2T-13
- Undifferentiated Terrace UT-4 ✓
- Head-sandy silt to silty clay. H-20 ✓
- Head Gravel-very clayey sandy gravel, generally poorly sorted. H-21 ✓

RECENT AND PLEISTOCENE

- Lacustrine Deposits-silty laminated clay and fine sand. LA-2
- Boulder Clay-stiff chalky clay with silt, rarely sandy. BC-18
- Glacial Sand and Gravel-flint and quartz gravel and sandy gravel often 'clayey' or 'very clayey'. AS-29

SOLID

- LC London Clay-grey silty clay, weathering brown.
- WRB Woolwich and Reading Beds-multi-coloured stiff waxy clays with micaceous sands, silts and clays below. Lower London Tertiaries (LLT)
- T Thanet Beds-greyish green glauconitic fine to medium sand.
- UCK Upper Chalk-soft white limestone with nodular and tabular flint bands Middle Chalk (MCK) and Lower Chalk (LCK) noted in boreholes only.

ECENE CRETACEOUS UPPER

- Made Ground MG-2
- Worked-out-Ground WO-1

BOUNDARY LINES

- Geological boundary, Drift.
- Geological boundary, Solid.
- Inferred boundary between recognised categories of deposits.
- Resource Block boundary.

Broken line denotes uncertainty.

BOREHOLE DATA

SITE LOCATIONS

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

I.M.A.U. BOREHOLES

Borehole Registration Number → SW 21

Borehole Site → 55.5 → Surface level in metres above O.D. (Newlyn)

Waste → 1.2 → Overburden

Geological Classification → (L)C 0.3+ → Mineral (sand and gravel) / (L)C 0.3+ → Bedrock

Grading Diagram

Thicknesses in metres

Note:

- Figures underlined denote thicknesses used in the assessment of resources.
- The + sign indicates that the base of the deposit was not reached.
- The Geological Classification is given only for mineral and bedrock.

Borehole Registration Number

Each I.M.A.U. borehole is identified by a Registration Number, e.g. SW21 The letters refer to the quarter sheet and the figures to the I.G.S. serial numbers for that quarter. All fall within the 1:25000 sheet TL 41

Grading Diagrams

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

Sand (+116-4mm)

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

The height of the diagram is proportional to the mineral thickness. The widths of the divisions show the proportions of Fines Sand and Gravel but small amounts of gravel may be omitted or exaggerated.

OTHER BOREHOLES

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

CATEGORIES OF DEPOSITS

- Exposed mineral. CAT-E6
- Continuous or almost continuous spreads of mineral beneath overburden. CAT-C1
- Sand and gravel not assessed (exposed and beneath overburden). CAT-N3
- Sand and gravel absent or not potentially workable. CAT-A2

RESOURCE BLOCKS

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

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

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

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

Compiled from 6" sheets last fully revised 1915-22. Other partial systematic revision 1938-55 has been incorporated. Major roads revised 1962.

Made and published by the Director General of the Ordnance Survey, Chesting, Surrey, 1958. Reprinted with the addition of new major roads 1965.

Original geological survey on the One - Inch scale by W. Whitaker, W.H. Penning, W.H. Dalton and F.J. Bennett in 1876; published on the Old Series One - Inch Geological Sheet 47 in 1881 (solid) and 1894 (solid and drift). Primary survey on the Six - Inch scale by B. Moorlock and M. Heath in 1975/76; solid lines based on I.M.A.U. boreholes, by P.M. Hopson in 1976.

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.

Sand and gravel survey by P.M. Hopson, R.J. Marks and J. Merritt in 1975/76. R.G. Thurrell, Head, Industrial Minerals Assessment Unit.

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1:25,000 Sand and Gravel Resource Sheet published 1979; Austin W. Woodland, C.B.E., Director, Institute of Geological Sciences. 1100/79

TL 32	TL 42	TL 52
221	222	
TL 31	TL 41	TL 51
239	240	
TL 30	TL 40	TL 50

Diagram showing the relationship of the National Grid 1:25000 sheets with the One-Inch Series Geological Sheets 221, 222, 239 and 240.

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