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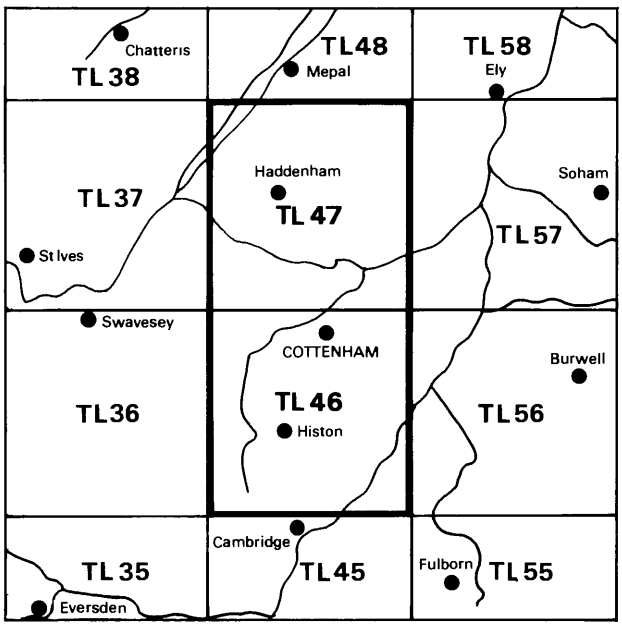

The sand and gravel resources of the country around Cottenham, Cambridgeshire

Description of 1:25 000 resource sheets TL 46 and 47

A. J. Dixon

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

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

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PREFACE

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

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

This report describes 200 km^2 of country around Cottenham, Cambridgeshire, shown on the accompanying 1 : 25 000 resource map. The survey was conducted by A. J. Dixon under the supervision of P. I. Manning, assisted in the drilling and sampling programme by R. W. Gatliff, J. R. A. Giles and J. B. L. Wild. A. J. Dixon compiled the report with some assistance in laboratory work by S. J. Mathers. The work is based on a geological survey at 1 : 10 560 between 1936 and 1953 by S. C. A. Holmes, J. H. Taylor, J. R. Earp, B. C. Worssam, S. E. Hollingworth and E. E. L. Dixon. The northern part of the area is based on a soil survey at 1 : 10 560 by R. S. Seale, which has been interpreted by R. W. Gallois. J. W. Gardner, CBE (Land Agent) has been responsible for negotiating access to land for drilling. The ready cooperation of land owners and tenants in this work is gratefully acknowledged.

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A. J. DIXON

SUMMARY

The geological maps of the Institute of Geological Sciences, maps of the Soil Survey of England and Wales, pre-existing borehole information and 120 boreholes drilled for the Industrial Minerals Assessment Unit, form the basis of the assessment of sand and gravel resources in the Cottenham area, Cambridgeshire.

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 volume. The reliability of the volume estimates is given at the symmetrical 95 per cent probability level.

The 1 : 25 000 map is divided into five resource blocks containing between 11.5 and 16.1 km^2 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 acompanying map.

Bibliographical reference

DIXON, A. J. 1980. The sand and gravel resources of the country around Cottenham, Cambridgeshire. Description of 1 : 25 000 resource sheets TL 46 and TL 47. *Miner. Assess. Rep. Inst. Geol. Sci.*, No. 53.

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INTRODUCTION

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

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

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

The following arbitrary physical criteria have been adopted:

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

A deposit of sand and gravel which 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 geomet-

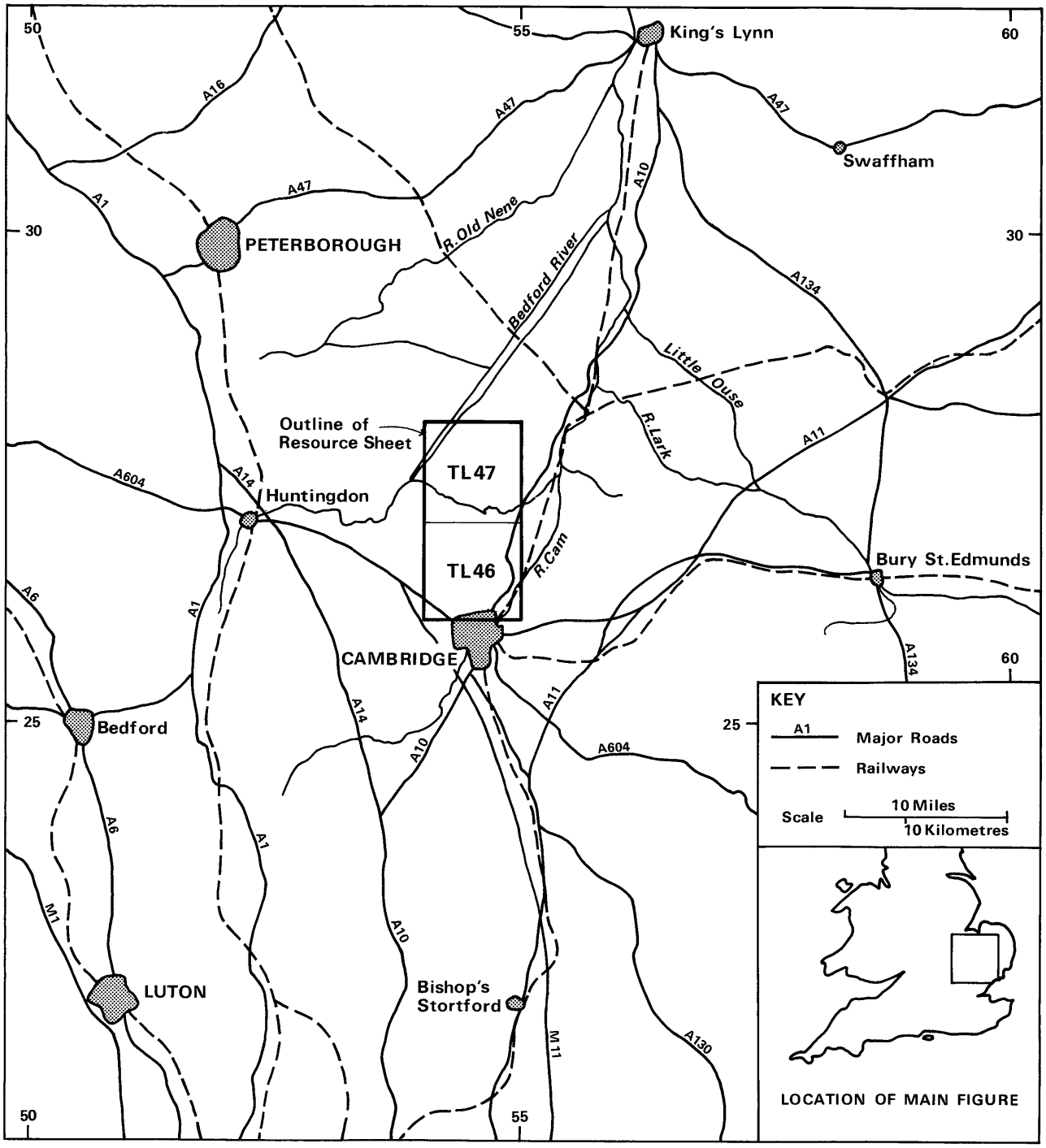


Figure 1 Map showing the location of Ordnance Survey 1 : 25 000 sheets TL 46 and TL 47, which comprise the resource sheet

ric scale $\frac{1}{16}$ mm, $\frac{1}{4}$ mm, 1 mm, 4 mm, 16 mm has been adopted. The boundaries between fines (that is, the clay and silt fractions) and sand, and between sand and gravel grade material, are placed at $\frac{1}{16}$ mm and 4 mm respectively (see Appendix C).

The volume and other characteristics are assessed within resource blocks, each of which, ideally, contains approximately 10 km^2 of sand and gravel. No account is taken of any factors, for example, roads, villages and high agricultural or landscape value, which might stand in the way of sand and gravel being exploited, although towns are excluded. The estimated total volume therefore bears no simple relationship to the amount that could be extracted in practice.

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

DESCRIPTION OF THE RESOURCE SHEET

GENERAL

The area includes the built-up northern parts of Cambridge and the surrounding villages of Girton, Histon and Milton (Figures 1 and 2). Outside this urban area the land is mostly given over to agriculture with the fenlands in the north providing some of the richest arable land in England. The extraction of phosphatic nodules (coprolites) was important during the nineteenth century in the district lying to the south and east of Horningsea [493 627] (Grove, 1976). Today however, only sand and gravel is extracted from an area lying north of Landbeach [480 680].

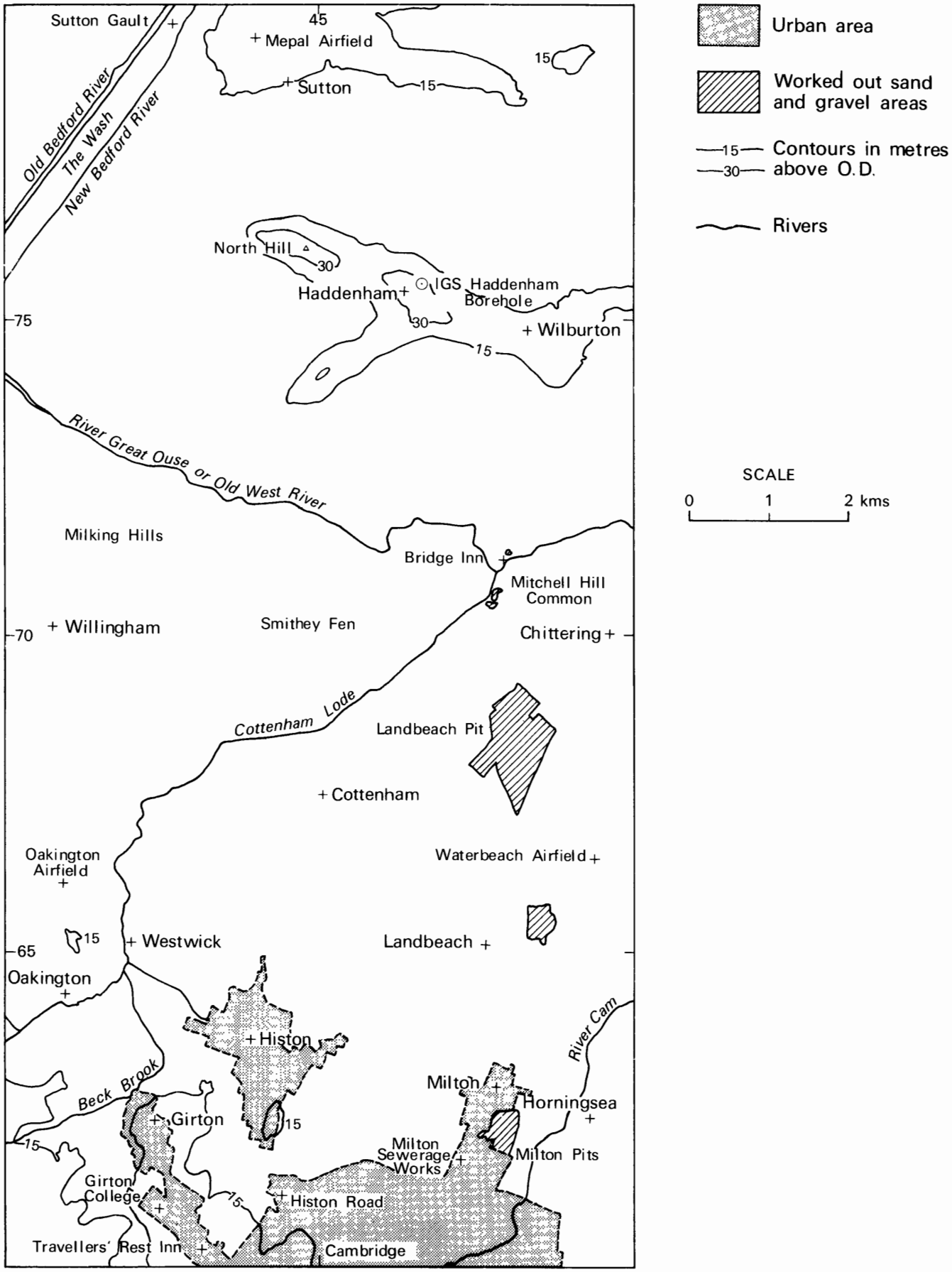


Figure 2 Locality map

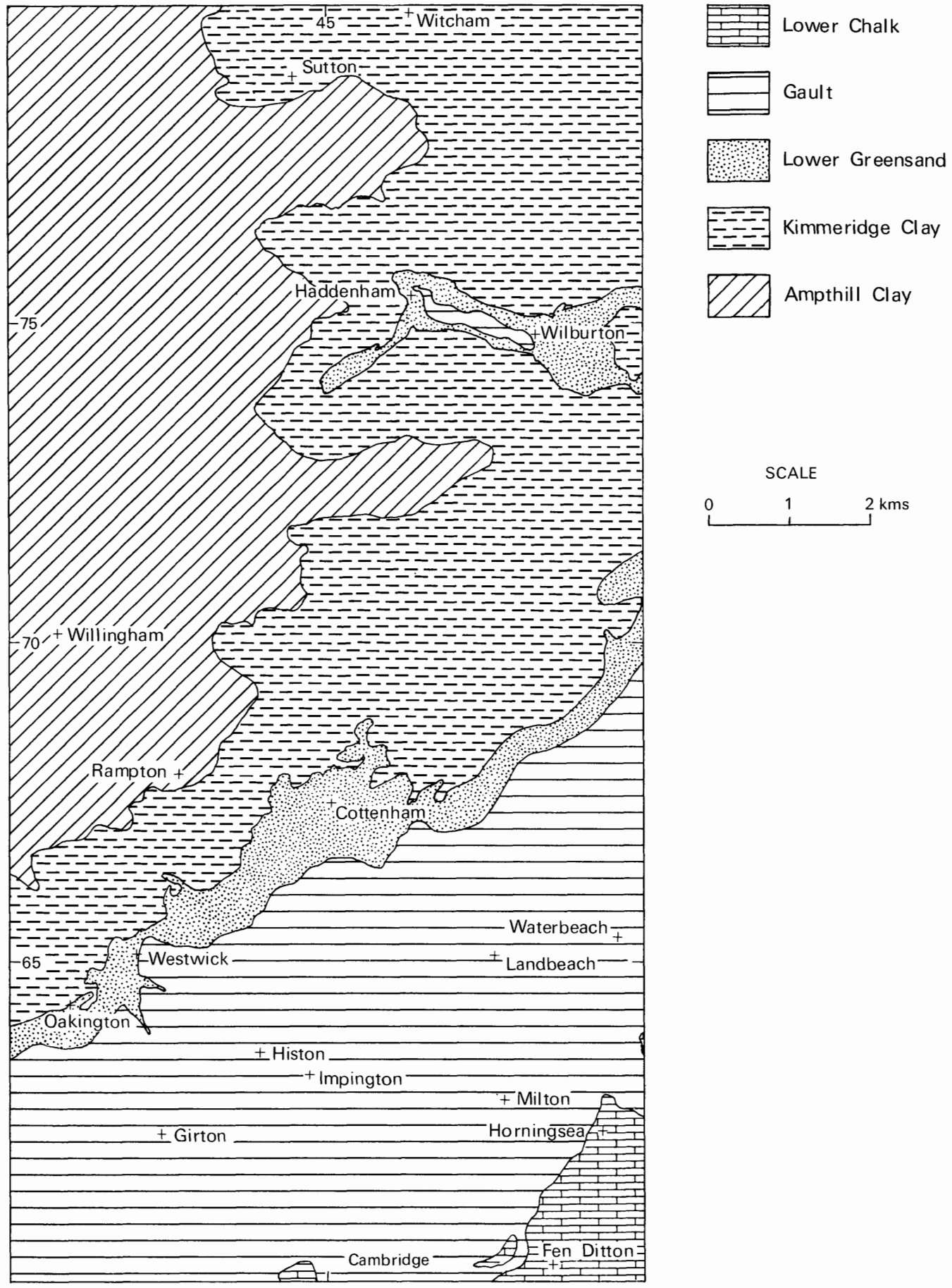


Figure 3 Solid geology

TOPOGRAPHY

The north of the area is almost flat fenland, lying slightly above sea level, from which rise two east–west trending fen islands, one of which forms the highest ground of the area (North Hill [449 761] at + 36.6 m Ordnance Datum). To the south, the land rises gently towards the south-west reaching over 30 m east of Madingley [400 600].

The drainage mainly consists of an artificial network of dykes. The Bedford Level, lying between the Old Bedford River and the New Bedford River in the vicinity of Sutton Gault [427 797], diverts the floodwater of the Great Ouse on a more direct route towards 'The Wash'. The artificial Cottenham Lode takes the water of Beck Brook to the Old West River [478 710]. The courses of the eastward-flowing Great Ouse or Old West River and the north-eastward-flowing River Cam have been stabilised.

GEOLOGY

The geological sequence represented is described briefly below; further details of lithologies, palaeontology, etc., may be found in the Cambridge Memoir (Worssam and Taylor, 1969). The exposed solid rocks range in age from the Ampthill Clay to the Lower Chalk (Figure 3). The beds are not known to be faulted and dip gently in mainly a south-easterly direction, so that the older formations tend to outcrop successively towards the north-west. The beds are concealed in places by Drift deposits (Figure 4), which are mainly River Terrace Deposits and Alluvium related to the Cam-Ouse river system. The geological sequence is summarised in Table 1 where deposits are listed as far as possible in order of increasing age.

Table 1 Geological sequence

DRIFT		
Recent and Pleistocene	Shell Marl	
	Alluvium	
	Peat	
	Barroway Drove Beds	
	River Terrace Deposits	Undifferentiated Terrace
		First Terrace
		Alluvium on Second Terrace
		Second Terrace
		Third Terrace
		Fourth Terrace
	Observatory Gravels	
	Glacial Sand and Gravel	
	Boulder Clay	
SOLID		
Cretaceous	Lower Chalk	
	Gault	
	Lower Greensand	
Jurassic	Kimmeridge Clay	
	Ampthill Clay	

SOLID

Ampthill Clay

The Ampthill Clay has a maximum estimated thickness of 52 m (Worssam and Taylor, 1969) in the north-west of the area, thinning to the south-east to 33 m in the Haddenham Borehole [4661 7555]. It consists of medium to dark grey clay with layers of pale grey argillaceous limestone or calcareous mudstone as described by Gallois and Cox (1977). Bivalve shells and ammonites are locally abundant, as are crystals of selenite and calcium carbonate. Towards the top of the formation phosphatic nodules are common.

Kimmeridge Clay

The Kimmeridge Clay attains an estimated thickness of 33.5 m (Worssam and Taylor, 1969) with 21.8 m present in the Haddenham Borehole. It consists of clay and shale with some calcareous concretions. There is a disconformity between the Kimmeridge Clay and the underlying Ampthill Clay (Gallois and Cox, 1977) and the two formations are lithologically similar.

Lower Greensand

The Lower Greensand is 5.8 m and 6.7 m thick in boreholes TL 46 SW 137 and 188/112 (see Hydrogeology Unit records) and thickens towards the south-east. It forms the prominent ridge or 'fen island' between Haddenham [464 755] and Wilburton [484 749] although the outcrop from Oakington [410 645] to Chittering [500 700] is not defined by such a feature. The Lower Greensand generally rests unconformably on the Kimmeridge Clay and consists of fine to medium olive-grey sand with some pebbles and beds of sandstone. Layers of dark grey to black silty clay are common, as are phosphatic nodules.

Gault

The Gault attains a maximum thickness of 32 m near Fen Ditton [482 608] in the south-east of the area where it is overlain by the Lower Chalk. It rests conformably on the Lower Greensand. It is a grey clay that is paler and more calcareous than the Kimmeridge Clay though beds of argillaceous limestone are absent.

Lower Chalk

The Lower Chalk is represented only by the Chalk Marl which outcrops in the south-east of the area (Worssam and Taylor, 1969). It is a soft greyish white marl with occasional phosphatic nodules. The glauconitic Cambridge Greensand occurs towards the base.

DRIFT

Boulder Clay

Boulder Clay, which represents the oldest Drift deposit of the area, is found capping the two fen island ridges of North Hill and more extensively, at Mepal Airfield [440 795]. Its base lies between + 5.2 m Ordnance Datum (proved in borehole 47 NE 7) and + 29.7 m Ordnance Datum (proved in borehole 47 NW 37) and overlies Kimmeridge Clay. Lithologically it consists of dark grey pebbly sandy clay which weathers to an olive-brown colour. A particle-size analysis is given in Table 2. The sand fraction comprises fine to coarse quartz with chalk and limestone. The pebbles consist mainly of rounded chalk with subordinate limestone, flint, sandstone and shell debris (histogram for 47 NW 37 in Figure 6).

Table 2 Particle-size distribution of a bulk sample of boulder clay from borehole 47 NW 37

Percentages					
Fines	Sand			Gravel	
$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+ 1–4	+ 4–16	+ 16 mm
78	5	7	5	5	trace

Boulder Clay was encountered as channel infilling in borehole 46 SW 138, where at least 10.7 m of silt and dark grey pebbly sandy clay were proved beneath 6.0 m of

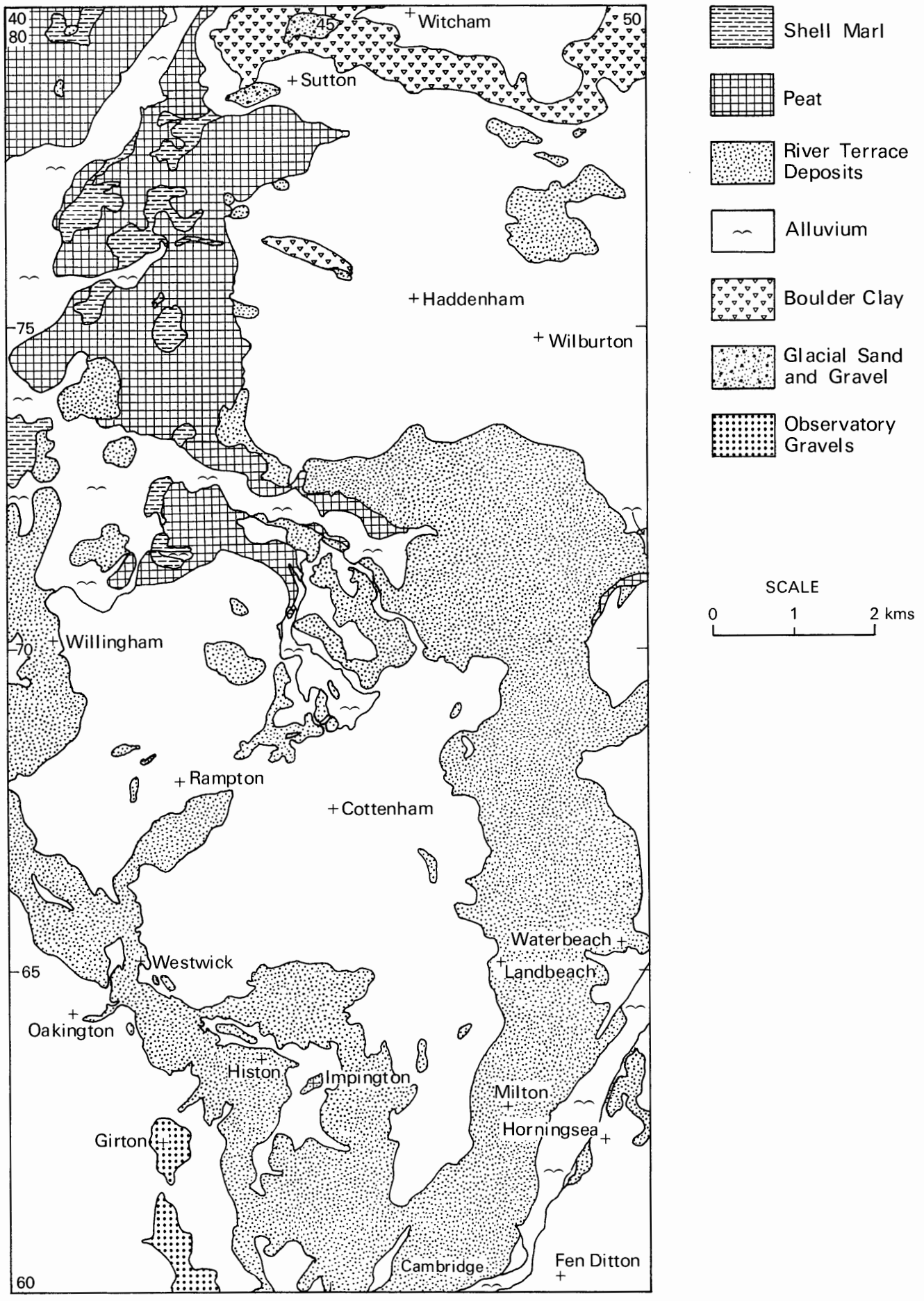
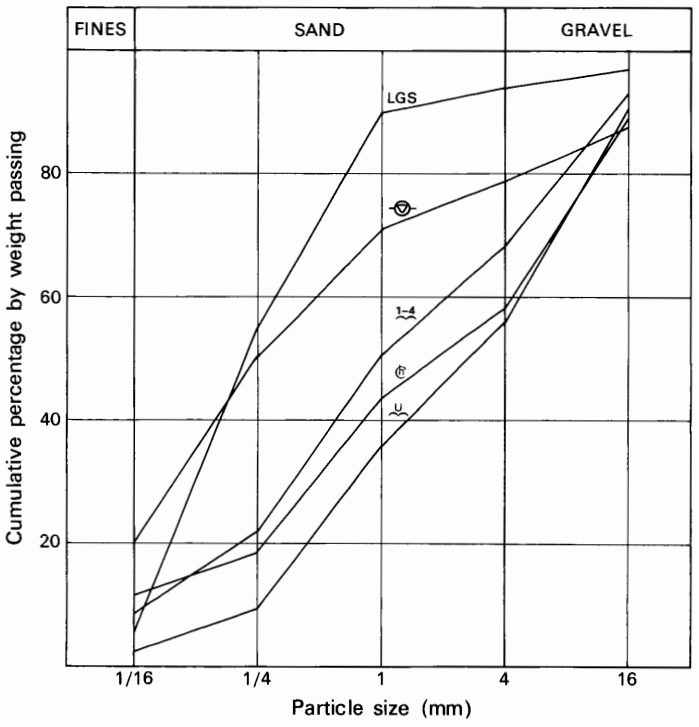


Figure 4 Drift geology



	Deposit	Weighted mean grading percentages of drift deposits					
		$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16 mm
	River Terrace Deposits						
U	Undifferentiated	3	7	26	20	36	8
1	First Terrace	8	13	27	17	29	6
2	Second Terrace	8	13	29	17	25	8
3	Third Terrace	10	15	30	17	21	7
4	Fourth Terrace	8	11	35	21	20	5
	Observatory Gravels	12	7	25	14	31	11
	Glacial Sand and Gravel	20	30	21	8	9	12
		Weighted mean grading percentages of solid deposits					
LGS	Lower Greensand	6	48	36	4	3	3

Figure 5 Mean particle-size distribution for the sand and gravel deposits of the resource sheet area

Third Terrace sandy gravel of the River Cam. Similarly borehole 46 SW 134 proved 10.3 m of Boulder Clay infilling a channel.

Glacial Sand and Gravel

Glacial Sand and Gravel deposits are classified elsewhere as High Level Sands and Gravels (Seale, 1974). They occur in three small patches: at Mepal Airfield where pebbly sand overlies Boulder Clay, and at Sutton [439 786] and Haddenham [453 758] where clayey sandy gravel lies adjacent to Boulder Clay. The base of the Glacial Sand and Gravel ranges from +8.4 m Ordnance Datum at borehole 47 NW 34 to +24.3 m Ordnance Datum at borehole 47 NE 3. Its thickness averages 1.7 m.

Observatory Gravels

Observatory Gravels cap the ridge on which lie Girton [424 623] and Girton College [424 601]. The base of the deposit declines gently northwards, from +21.2 m Ordnance Datum at borehole 46 SW 135 to +17.8 m Ordnance Datum at borehole 46 SW 136. The deposit consists of mainly sandy gravel and has a mean thickness of 2.1 m. Marr (1917, 1920, 1926) regarded these deposits either as representing river gravels of a tributary of an early River Cam or as glacial outwash. He considered them to be younger than the lower lying Third Terrace of the River Cam. Paterson (1940) observed cryoturbation structures in the Travellers' Rest Pit [431 599]. Worssam and Taylor (1969) suggested that these gravels date from the end of the 'Gipping Glaciation' and pre-date the terraces of the River Cam in the area.

River Terrace Deposits

Worssam and Taylor (1969) recognised four terraces related to the Cam-Ouse river system, the deposits of which are similar, consisting mainly of sand and gravel with variable amounts of clay and silt in the matrix (Figure 5). Sections often exhibit interbedded sand and gravel with accompanying silt and clay lenses. Cross bedding is common and in places involutions and ice-wedge casts show evidence of previous periglacial activity. Sand and gravel deposits, underlying younger Holocene deposits of the buried channel of the River Cam (Figure 5) and of the fenland in the north-west of the area, are classified in this report as Undifferentiated River Terrace Deposits.

In places, the mapped areas of River Terrace Deposits have been shown to contain no gravelly material. These areas are thought to represent 'terrace benches' cut into the bedrock (for example, as shown by boreholes 47 NE 4, 5, 6, 8 and 46 NW 12)

In the main spreads of River Terrace Deposits, borehole evidence indicates that the base of the sand and gravel is uneven. Thus in some boreholes (for example, boreholes 46 NE 5, 9, 10 and 17) the mapped bedrock has been locally eroded to reveal older beds.

The configuration of the river terraces indicates that there has been a progressive change from a north-westerly to the present north-easterly course taken by the River Cam, resulting in a deferred junction with the River Ouse. The present course of the River Ouse as the Old West River was regarded by Fowler (1933) as post-Roman. Worssam and Taylor (1969) point to the absence of alluvium in the vicinity of the eastern part of this reach, which supports Fowler's hypothesis.

Fourth Terrace: Remnants of the Fourth Terrace lie between Cambridge [448 603] and Oakington Airfield [405 667]. The base of the deposit declines towards the north-west, falling from +16.9 m Ordnance Datum at borehole 46 SW 144 to +2.4 m at borehole 46 NW 5, with an average gradient of 2.05 m/km. Consisting of clayey sand and gravel with some interbedded layers of silt, the deposit has a recorded maximum thickness of 6.8 m.

Third Terrace: The Third Terrace (Barnwell Terrace of Marr, 1917) extends from Cambridge to Willingham [408 698]. Borehole evidence indicates a buried channel running north-westwards from borehole 46 SW 143 to borehole 46 NW 8, where bedrock was proved at +5.0 m Ordnance Datum and +2.0 m Ordnance Datum respectively. The channel declines to the north-west at an average gradient of 6.80 m/km. The deposit averages 3.6 m in thickness; it ranges from 7.8 m at borehole 46 SW 142 to 0.1 m further east at borehole 46 SE 94. It consists mainly of interbedded sand and gravel with some layers of silt and clay. Hollingworth and others (1950) dated the calcareous muds of the now classic site at Histon Road [444 610] as Ipswichian. Walker (1953) and Sparks and West (1959) investigated the same site and reached the same conclusion.

Second Terrace: Second Terrace (Intermediate Terrace of Penning and Jukes-Browne, 1881) deposits extend northwards from Cambridge to near the Old West River. They also occur in the vicinity of Willingham [407 702] and bordering the Beck Brook around Westwick [420 650]. The base of the deposit is undulatory, ranging from +5.4 m Ordnance Datum at borehole 46 SE 35 to −1.8 m Ordnance Datum at borehole 46 SE 11. Its thickness is variable, averaging 1.8 m, with a range of 0.2 m at borehole 47 SE 3 to 5.3 m at borehole 47 SW 5. The composition of the deposit is similar to that of the Third Terrace. Temporary sections at Milton Sewerage Works [475 614] and Landbeach Pit [481 691] showed up to 2 m of trough cross-bedded sand and gravel with silt lenses. Lambert and others (1963) considered interbedded organic deposits at Sidgwick Avenue, Cambridge [442 579], to be late Ipswichian to early Devensian in age.

First Terrace: First Terrace deposits are found bordering the River Cam and the Old West River. Borehole evidence indicates an average thickness of 1.5 m. Consisting mainly of sand and gravel, the base of the terrace ranges from +2.5 m Ordnance Datum at borehole 46 SE 108 to −2.2 m Ordnance Datum at borehole 47 SE 8 with a mean of −0.4 m Ordnance Datum. Available borehole records do not permit the satisfactory determination of magnitude and direction of slope for the base of this deposit. The terrace is commonly referred to as the Barnwell Station Terrace after a site at Cambridge [470 596] (Chandler, 1921). Material from these deposits has been radiocarbon dated at 19 500 ± 650 years BP (Godwin and Willis, 1964).

Undifferentiated River Terrace Deposits: Undifferentiated River Terrace Deposits occur in the buried channels associated with the rivers Ouse and Cam. They consist of gravel and sandy gravel and are coarser than the higher and older river terrace deposits. They range up to 4.0 m in thickness with a mean of 2.2 m. They are concealed by younger Holocene deposits and lie on the bedrock surface at a recorded maximum depth of −7.5 m Ordnance Datum (at borehole 47 NW 21). Borehole evidence indicates that these deposits lie at a distinctly lower level than the First Terrace deposits.

Barroway Drove Beds

Grey, green and blue soft clay and silt commonly overlies undifferentiated terrace deposits in the north-west corner of the area. R. W. Gallois (personal communication) has proposed the name Barroway Drove Beds for these deposits. They are otherwise referred to as Fen Clay or Buttery Clay. The clays and silts occur with varying amounts of sand, pebbles and organic matter. The base of the formation averages −1.3 m Ordnance Datum with a maximum recorded depth of −3.3 m Ordnance Datum at borehole 47 NW 25 near the old course of the River Ouse, where the formation also attains the maximum proved thickness of 1.3 m (at boreholes 47 NW 19 and 47 NW 22). Willis (1961) considered the formation to represent a marine transgression that occurred between 3000 BC and 2200 BC.

Peat

Peat occurs mainly in the north-west of the area either at the surface or underlying Alluvium or Shell Marl. Peat also underlies the Alluvium of the River Cam. It generally overlies the Barroway Drove Beds and River Terrace Deposits. Drainage of the fens has resulted in rapid peat wastage, which is continuing at present (Richardson and Smith, 1977), and thicknesses quoted in boreholes may soon become an historic record. IMAU boreholes proved an average thickness of 1.1 m, with a maximum 2.5 m at borehole 47 SW 10.

Alluvium

Alluvium consists of clay and silt in varying proportions with small amounts of pebbles, sand, shells and organic matter. It is found alongside the River Cam and Beck Brook and flooring the basin of the River Ouse. Alluvium is being deposited at present between the Old and New Bedford rivers when the intervening area, 'The Wash' [413 778], floods each winter. Elsewhere artificial levées and drains prevent flooding. Much of the alluvium, however, dates from the Romano-British marine transgression (Worssam and Taylor, 1969; Seale, 1975). A sandy clay overlies the Second Terrace at Waterbeach Airfield [495 665] and around Westwick [420 650] where it

Table 3 Weighted mean composition of pebbles in the + 4–16 mm size range

Deposit	Percentage by weight						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
River Terrace Deposits							
Undifferentiated (Ouse)	72	3	8	6	8	1	2
Undifferentiated (Cam)	65	2	2	8	21	1	1
First Terrace	67	3	5	5	17	1	2
Second Terrace	70	2	3	4	18	2	1
Third Terrace	63	3	5	2	26	trace	1
Fourth Terrace	74	3	6	–	15	2	–
Observatory Gravels	75	1	4	1	16	trace	2
Glacial Sand and Gravel	34	1	6	15	33	2	9

is mapped as alluvium. IMAU boreholes proved a maximum thickness of 5.8 m of alluvium at borehole 47 NW 20, with a mean of 1.5 m.

Shell Marl

This deposit is sometimes referred to in the literature as 'Chara' marl as it is composed of mud with calcareous material accumulated largely from stoneworts (Characeae). Shell Marl occurs in patches in the north-west of the area, where it rests on alluvium or peat and attains about 1.0 m in thickness (1.3 m was proved at borehole 47 NW 25). It represents the sites of former fenland meres and abandoned watercourses or 'old slades' (Worssam and Taylor, 1969) possibly initiated during the Romano-British marine transgression (Seale, 1975).

COMPOSITION OF THE SAND AND GRAVEL

River Terrace Deposits constitute most of the potentially workable sand and gravel in the area. The Observatory Gravels and Glacial Sand and Gravel are relatively insignificant both in extent and thickness. The Lower Greensand was investigated to a shallow depth where it underlies Drift mineral deposits. Bulk samples of these sands have been graded in order to provide an indication of the mean grading of the deposit as a whole. The grading characteristics of the Drift deposits and the Lower Greensand are shown in Figure 5.

Lower Greensand

The Lower Greensand was proved in 6 IMAU boreholes to be a pebbly sand with a mean grading of fines 6 per cent, sand 88 per cent and gravel 6 per cent. It is mainly a fine to medium sand consisting of subrounded to rounded quartz with glauconite. Sandstone pebbles constitute the gravel fraction.

Glacial Sand and Gravel

The Glacial Sand and Gravel is characterised by a variation in grading from pebbly sand to 'very clayey' sandy gravel, with a mean grading of fines 20 per cent, sand 59 per cent and gravel 21 per cent. The gravel fraction consists mainly of rounded chalk and angular flint pebbles with smaller but conspicuous amounts of limestone, quartzite and shell fragments. Shape analysis of pebbles in the 6.3–37.5 mm size range shows a low mean flakiness index of 7 per cent with equant pebbles accounting for 72 per cent (see Figure 8 and Table 4). The sand fraction consists of fine to coarse subangular quartz with chalk and flint.

Observatory Gravels and River Terrace Deposits

These deposits are similar in composition, which supports the suggestion that the Observatory Gravels represent a high terrace of an ancient River Cam. These fluvial deposits (excluding Undifferentiated River Terrace Deposits) have a mean grading of fines 8 per cent, sand 57 per cent and gravel 35 per cent. There is a tendency for the higher terraces to be of a finer grade. The lowest, Undifferentiated Terrace is characterised by a high mean gravel content of 44 per cent and a low mean fines content of 3 per cent, whereas the Fourth Terrace has a mean gravel content of 25 per cent and a mean fines content of 8 per cent (Figure 5). The Observatory Gravels partially conform to this trend with a mean fines content of 12 per cent, but they have a mean gravel content of 42 per cent. There is some variation within each terrace in different areas. Although these deposits are mainly sandy gravels, gravel occurs in the buried channels of the rivers Ouse and Cam and pebbly sand often characterises the edges of deposits. Similarly the buried channel of the Third Terrace south of Histon consists mainly of sandy gravel. North and west of Histon the Third and Fourth Terraces are more clayey and sandy. 'Very clayey' pebbly sand occurs around Smithey Fen [450 700].

The gravel fraction is mainly fine but coarse pebbles are common and locally dominant. The pebbles are mainly angular to subangular flint with rounded to well-rounded chalk. Subordinate amounts of quartz, sandstone, quartzite, limestone, phosphatic nodules, igneous rocks and shelly material occur. Variation of pebble composition between boreholes for the fine gravel fraction is shown in Figure. 6.

Chalk pebbles are mainly fine and tend to be dominant in the 4–5 mm size range. Analysis of the chalk content in the 4–8 mm size range indicated a definite increase of chalk pebbles with depth in over half of the boreholes investigated (Figure 7), which suggests that the gravels have probably been leached. The chalk content of the gravel reaches a maximum in the south-east of the area, near the outcrop of the Chalk, with a weighted mean of 38 per cent in the 4–8 mm fraction in borehole 46 SE 103. Minimum values occur in the north-west, in the Ouse basin with 3 per cent in borehole 47 NW 22 (Figure 7).

Phosphatic nodules, consisting mainly of calcium phosphate, calcium carbonate and clay minerals, are not differentiated from limestone in Table 3 and Figure 6.

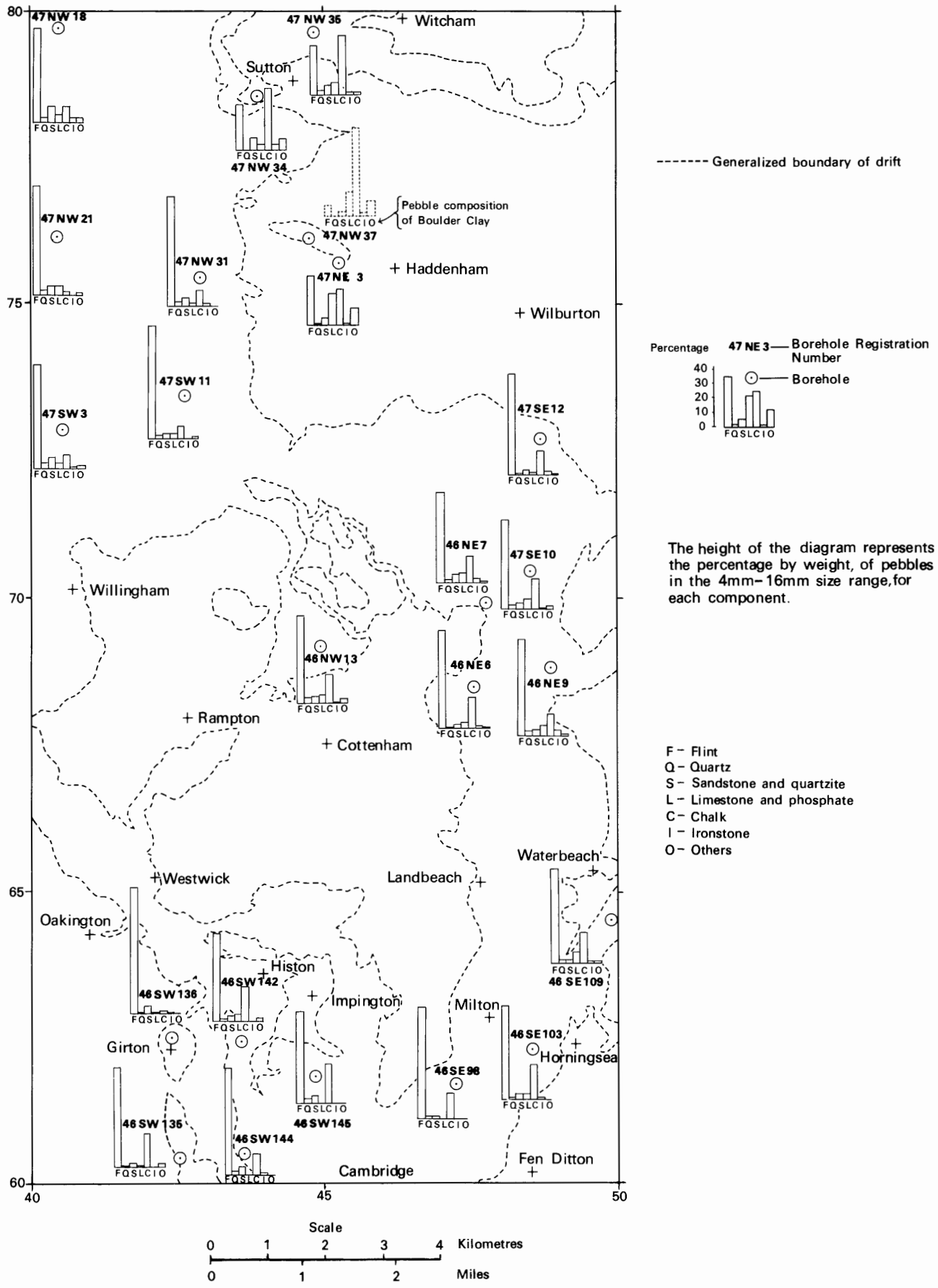


Figure 6 Relative proportions by weight of pebble composition in the + 4–16 mm size range, based on data from 23 IMAU boreholes

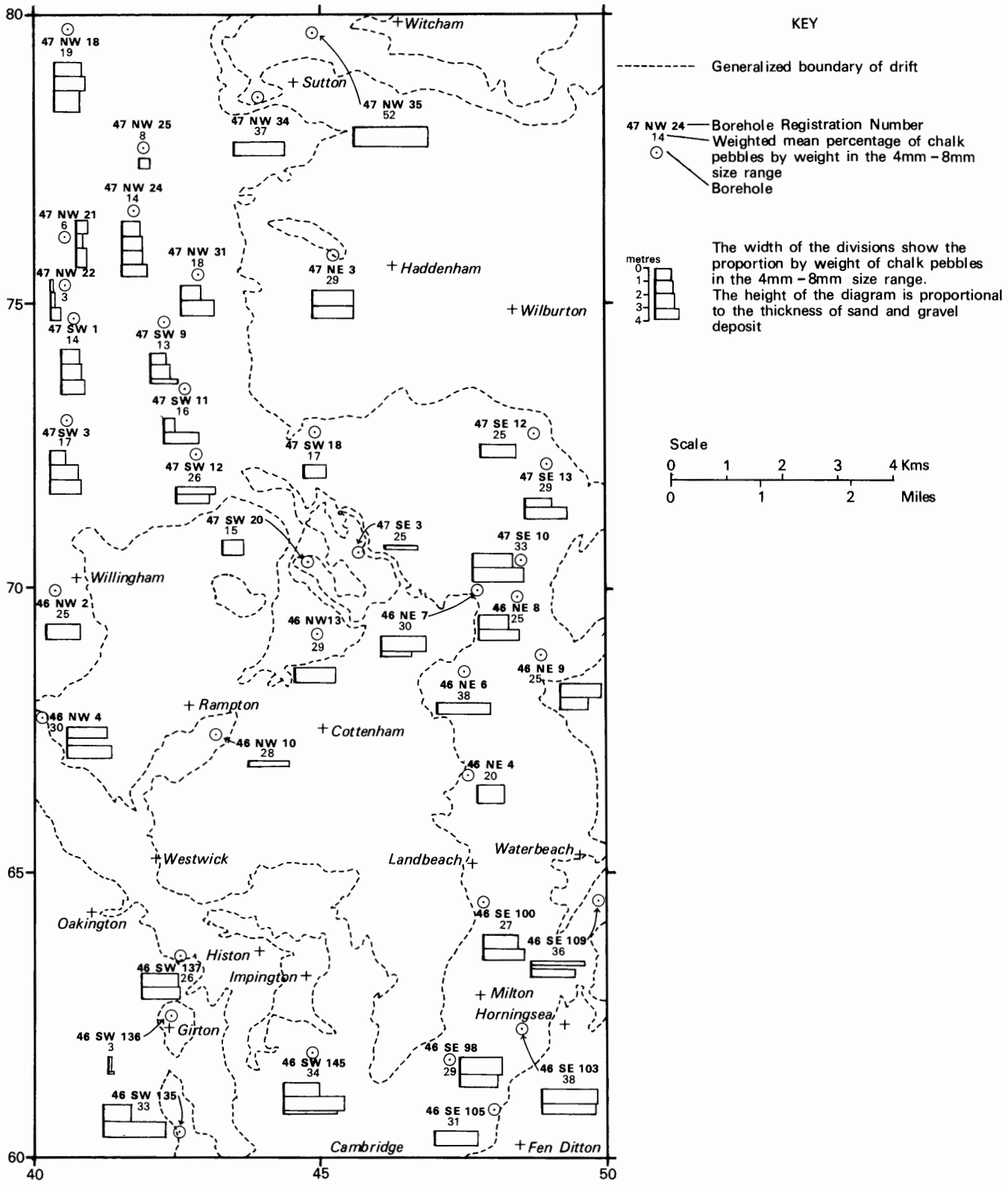


Figure 7 Relative proportions by weight of chalk pebbles in the + 4–8 mm size range, based on data from 38 IMAU boreholes

Table 4 Shape analysis of pebbles in the + 6.3–37.5 mm size range from selected boreholes in the resource sheet area

Deposit	Borehole	Percentages by weight			
		Flaky*	Equant	Bladed	Elongated*
River Terrace Deposits					
Undifferentiated (Ouse)	47 NW 26	25	52	4	19
Undifferentiated (Cam)	46 SE 103	24	45	5	26
First Terrace	47 SW 18	16	65	2	17
Second Terrace	46 NE 6	25	52	4	19
Third Terrace	46 SW 145	27	52	5	16
Fourth Terrace	46 SW 141	20	56	5	19
Observatory Gravels	46 SW 136	19	59	4	18
Glacial Sand and Gravel	47 NW 35	5	69	4	22
Glacial Sand and Gravel	47 NE 3	11	75	2	12
Weighted mean		22	54	4	20

* These classes correspond to the Flakiness and Elongation indices respectively (BS 812).

However, pebble count data from the +4–16 mm fraction from 15 IMAU boreholes in fluvial deposits show a phosphate/limestone ratio of 1.8 for the resource sheet area. Phosphatic nodules are more plentiful towards the south with a phosphate/limestone ratio of 3.8 for sheet TL 46 compared with 0.5 for sheet TL 47. This may be due to the proximity of the basal Gault.

Shape analysis of pebbles in the +6.3–37.5 mm fraction from 7 IMAU boreholes in these deposits shows high mean flakiness and elongation indices of 22 and 20 respectively. The high flakiness index is partly due to the nature of the chalk, which has a mean flakiness index of 46. Nevertheless, the pebbles are still predominantly equant in shape (Figure 8 and Table 4).

A composite sample of sand and gravel was taken from borehole 47 SW 3 and the +10–14 mm material was tested for relative densities and water absorption. The results are shown in Table 5. The high water absorption value of 2.4 per cent is partly the result of the chalk content of the sample, which was 17 per cent. Chalk pebbles collected from 38 IMAU boreholes in the resource sheet area gave a water absorption value of 5.41 per cent.

Table 5 Results of relative density and water absorption tests on a composite sample taken from borehole 47 SW 3

	Test 1	Test 2	Mean
Relative density on an oven-dried basis	2.50	2.46	2.48
Relative density on a saturated and surface-dried basis	2.53	2.53	2.53
Apparent relative density	2.62	2.63	2.62
Water absorption	2.3%	2.5%	2.4%

Material in the +10 – 14 mm size range was oven dried at 105 °C for 24 h and tested according to BS 812 (1975).

The sand fraction is mainly of medium and coarse grade with a smaller proportion passing the 0.25 mm sieve. The fine and medium sand consists mainly of quartz. There is a tendency for the larger grains to be rounded and the smaller grains to be angular. The carbonate content in the fine and medium sands can be locally dominant (Table 6). An analysis of the carbonate content of sand and gravel from borehole 46 SW 144 shows a leaching effect with crystals of calcite and small grains of chalk constituting 53 per cent of the fine sand between 1.6 m and 2.5 m below the surface, compared with 7 per cent between 0.6 m and 1.6 m. Subordinate amounts of flint and ironstone occur in the fine and medium size range. The coarse sand fraction comprises mainly angular flint, rounded chalk and quartz in varying proportions, with subordinate amounts of sandstone, quartzite, limestone, phosphatic nodules, ironstone and igneous material.

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 either were surveyed at the scale of 1 : 10 560 by members of the Field Staff in the Institute's East Anglia and South-east England Unit (Sheet 188) or have been derived by the Field Staff from mapping by the Soil Survey of England and Wales (Sheet 173). Borehole data, which include the stratigraphic relations, thicknesses and mean particle-size distribution of the sand and gravel samples collected during the assessment survey, are also shown.

The geological boundaries are the best interpretation of the information available at the time of survey. However, it is inevitable, particularly in country with highly variable Drift deposits, which are relatively poorly exposed, that new data from boreholes and excavations will reveal some discrepancies.

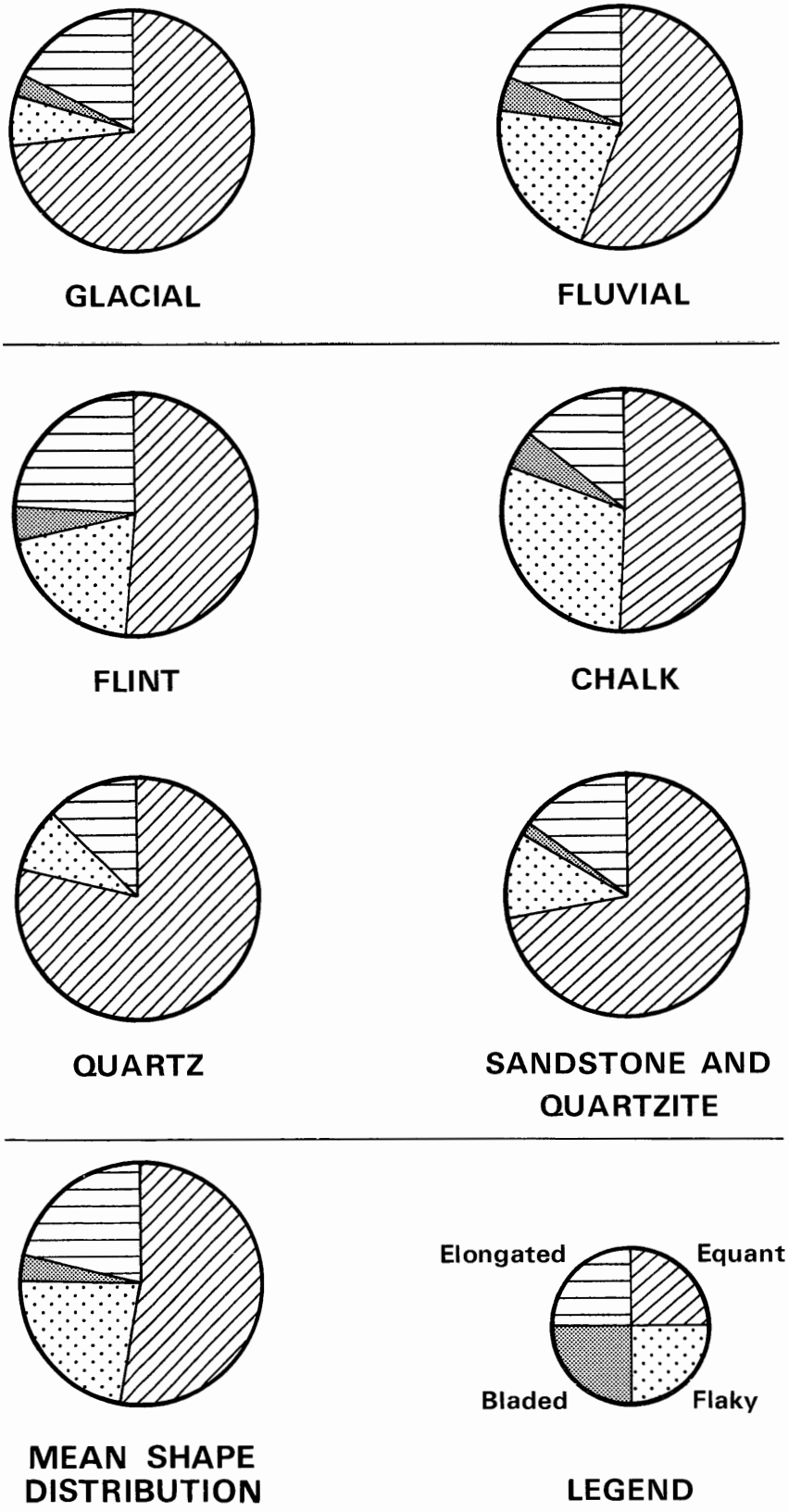


Figure 8 Particle-shape analysis of pebbles (+ 6.3–37.5 mm) in sand and gravel deposits of the resource sheet area, based on weighted means from 9 IMAU boreholes

Table 6 Carbonate content inferred from acid digestion of fine and medium sand samples from 10 IMAU boreholes in the resource sheet area

Borehole	Sample depths (m)	Carbonate content (%) of fine sand ($\frac{1}{16}$–$\frac{1}{4}$ mm)	Carbonate content (%) of medium sand ($\frac{1}{4}$–1 mm)
46 NE 5	2.0–2.8	14	2
46 NE 7	1.1–2.1	10	4
46 SW 135	1.5–2.6	16	12
46 SW 138	1.1–2.1	14	16
46 SW 141	1.8–2.8	58	48
46 SW 144	0.6–1.6	3	3
46 SW 144	1.6–2.5	48	39
46 SE 100	2.0–2.7	10	10
47 NW 19	4.0–5.0	14	10
47 NW 26	3.7–4.7	12	8
47 SW 3	0.7–1.7	12	4

Mineral resource information

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

Areas where bedrock crops out and where the available evidence suggests that sand and gravel is not potentially workable or is absent are uncoloured on the map. In such areas it has been assumed that mineral is absent except in infrequent and relatively minor patches, which cannot be assessed quantitatively in the context of this survey. Areas of unassessed sand and gravel, for example, built-up areas, are indicated by a red stipple.

The area of 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

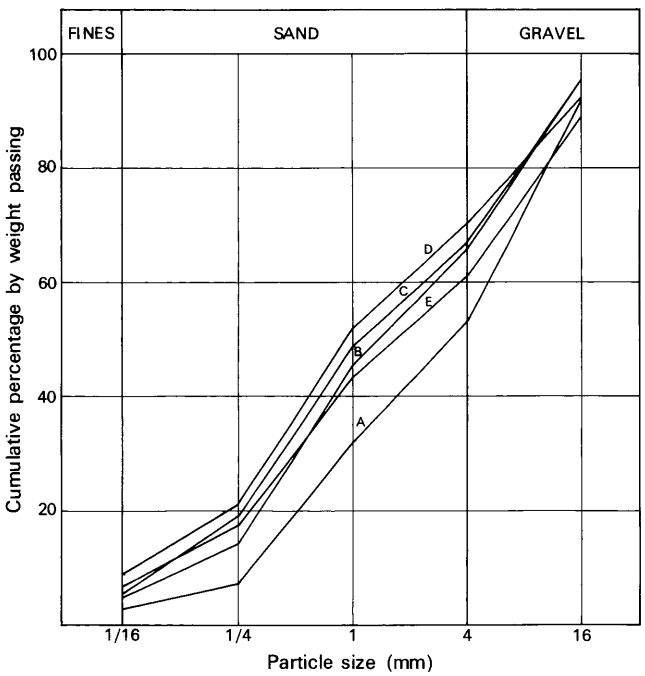
The statistical results are summarised in Table 7. Mean particle-size distributions for the mineral in the resource blocks are shown in Figure 9. No attempt has been made to assess the resources present within the Lower Greensand, although details are given in the borehole logs (Appendix F).

Accuracy of results

For the five resource blocks the accuracy of the results at the symmetrical 95 per cent probability level varies between 20 per cent and 37 per cent (that is, it is probable that nineteen times out of twenty the true volumes present lie within these limits). However, the true values are more likely to be nearer the figures estimated than the limits. Moreover, it is probable that in each block roughly the same percentage limits would apply for the estimate of volume of a very much smaller parcel of ground (say 100 hectares) containing similar sand and gravel deposits if the results from the same number of sample points (as provided by, say, 10 boreholes) were used in calculation.

Table 7 The sand and gravel resources of sheets TL 46 and TL 47

Resource block	Area (km^2)		Mean thickness (m)		Volume of mineral			Mean grading percentage		
	Block	Mineral	Over-burden	Mineral	million m^3	Limits at the 95% probability level		Fines $-\frac{1}{16}$ mm	Sand $+\frac{1}{16}$–4 mm	Gravel +4 mm
						±%	million m^3			
A	18.8	13.7	3.5	2.6	36	32	12	3	51	46
B	16.8	15.7	1.6	2.2	35	26	9	5	61	34
C	12.4	11.5	1.1	1.6	18	37	7	6	61	33
D	28.0	11.6	1.0	3.0	35	28	10	9	61	30
E	24.5	16.1	1.3	1.8	29	20	6	7	54	39
A to E	100.5	68.6	1.7	2.2	151	14	21	6	57	37



Resource block	Percentage by weight passing				
	$\frac{1}{16}$ mm	$\frac{1}{4}$ mm	1 mm	4 mm	16 mm
A	3	8	33	54	92
B	5	15	46	66	95
C	6	19	49	67	95
D	9	21	52	70	93
E	7	18	44	61	90

Figure 9 Mean particle-size distribution for the mineral in the resource blocks

Thus, if closer limits are needed for the quotation of reserves of part of a block, it can be expected that data from more than 10 sample points will be required, even if the area is quite small. This point can be illustrated by considering the whole of the potentially workable sand and gravel on this sheet. The volume (151 million m^3) can be estimated to limits of ± 14 per cent at the 95 per cent probability level, by a calculation based on the data from all the sample points in the five resource blocks.

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

NOTES ON RESOURCE BLOCKS

Block A

This block occupies an area of 18.8 km^2 of which 13.7 km^2 is mineral bearing. The assessment of resources is based on information from 11 IMAU boreholes (Table 8) all of which penetrated Undifferentiated River Terrace Deposits with the exception of borehole 47 NW 28 where First Terrace sand was encountered. The remaining 5.1 km^2 of barren ground comprises either exposed Ampthill Clay or fen deposits (Peat and Shell Marl), beneath which there is no mineral.

The mean proved thickness of mineral in the block is 2.6 m with a range from 0.7 m to 4.0 m. The weighted mean grading is fines 3 per cent, sand 51 per cent and gravel 46 per cent. Most of the IMAU boreholes found gravel or sandy gravel, although borehole 47 NW 31 proved pebbly sand and borehole 47 NW 28 proved 'very clayey' sand.

Overburden, consisting of Barroway Drove Beds, Peat, Alluvium and Shell Marl and soil, ranges in recorded thickness from 0.2 m to 6.4 m with a mean of 3.5 m. The bedrock is Ampthill Clay. Sand and gravel has not been exploited in this block. The estimated volume of mineral is 36 million m^3 ± 32 per cent at the 95 per cent confidence limit.

Block B

Block B lies to the south of Block A and extends over an area of 16.8 km^2. Mineral-bearing ground occupies 15.7 km^2 and consists mainly of First and Undifferentiated River Terrace Deposits although a small patch of Second Terrace occurs at Milking Hills [417 713]. The remaining 1.1 km^2 of barren ground comprises either exposed Ampthill Clay or fen deposits (Peat and Alluvium) beneath which there is no mineral. The results of 14 IMAU boreholes drilled in this block are presented in Table 9.

Thicknesses of mineral proved range from 0.9 m to 3.6 m with a mean of 2.2 m. The mineral mainly consists

Table 8 Block A: data from IMAU boreholes

Borehole number	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines $-\frac{1}{16}$ mm	Fine sand $+\frac{1}{16}$–$\frac{1}{4}$ mm	Medium sand $+\frac{1}{4}$–1 mm	Coarse sand + 1–4 mm	Fine gravel + 4–16 mm	Coarse gravel + 16 mm
47 NW 18	3.5	3.3	1	2	24	25	41	7
47 NW 19	4.0	3.0	2	2	24	22	41	9
47 NW 20	0.7	6.4	8	0	2	8	48	34
47 NW 21	3.3	5.4	2	2	20	20	46	10
47 NW 22	2.7	3.5	4	8	29	17	37	5
47 NW 23	1.2	3.2	6	12	31	16	29	6
47 NW 24	3.8	3.1	1	3	26	23	38	9
47 NW 26	3.3	3.7	1	3	21	25	43	7
47 NW 27	3.5	4.0	2	3	24	25	39	7
47 NW 28	1.2	0.2	32	25	36	4	3	0
47 NW 31	2.0	2.3	2	14	40	21	21	2

Table 9 Block B: data from IMAU boreholes

Borehole number	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines $-\frac{1}{16}$ mm	Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm	Medium sand $+\frac{1}{4}-1$ mm	Coarse sand $+1-4$ mm	Fine gravel $+4-16$ mm	Coarse gravel $+16$ mm
47 SW 1	3.0	2.2	1	6	40	18	27	8
47 SW 2	3.6	2.2	3	5	21	19	41	11
47 SW 3	2.9	0.7	3	4	31	20	35	7
47 SW 4	1.6	0.8	9	11	28	18	31	3
47 SW 6	3.6	0.9	2	7	42	27	21	1
47 SW 7	1.7	1.0	15	24	23	13	22	3
47 SW 8	1.7	1.2	6	4	26	25	35	4
47 SW 9	2.3	1.8	3	15	32	19	28	3
47 SW 10	1.1	2.5	3	6	26	21	39	5
47 SW 11	1.8	2.0	2	12	34	20	28	4
47 SW 12	1.2	2.0	2	5	29	21	38	5
47 SW 13	3.4	2.1	11	22	28	18	19	2
47 SW 15	2.1	1.3	4	6	30	21	33	6
47 SW 17	0.9	2.0	4	15	31	21	25	4

of sandy gravel, although gravel was found in borehole 47 SW 1 and pebbly sand in borehole 47 SW 6. The fines content generally ranges between 1 per cent and 9 per cent but is as high as 15 per cent in borehole 47 SW 7. There is a tendency for the upper part of the deposit to be more clayey and the lower part to show an increase in gravel content at the expense of sand. The weighted mean grading is fines 5 per cent, sand 61 per cent and gravel 34 per cent.

Overburden consists of soil, which varies from clay to sandy clay loam, together with underlying Shell Marl, Alluvium, Peat and Barroway Drove Beds. The mean overburden thickness for the block is 1.6 m, ranging in recorded thickness from 0.7 m to 2.5 m. Bedrock is Ampthill Clay except in the extreme eastern part of the block where it is Kimmeridge Clay.

Sand and gravel has not been worked in this block. The estimated volume of mineral is 35 million $m^3 \pm 26$ per cent at the 95 per cent confidence limit.

Block C

The mineral of this block occupies 11.5 km^2 and consists entirely of First Terrace sand and gravel. Barren ground accounts for only 0.9 km^2 of the total 12.4 km^2 of the block and comprises either Ampthill or Kimmeridge Clay overlain in places by peat and alluvium. The assessment of this block is based on 12 IMAU boreholes (Table 10).

Proved thicknesses of mineral range from 0.2 m to 3.2 m with a mean of 1.6 m. Most of the boreholes proved sandy gravel although the mineral tends to become more sandy and clayey towards the edge of the deposit. Vertical variation in grade is also present, with the lower part of the deposit tending to be less clayey and more pebbly. A layer of clay, 0.3 m thick, was found within the sand and gravel of borehole 47 SE 11. The weighted mean grading for the block as a whole is similar to Block B with fines 6 per cent, sand 61 per cent and gravel 33 per cent.

Recorded overburden thicknesses range from 0.7 m to 1.9 m with an overall mean of 1.1 m. However, the underlying mineral is considered as exposed, except where it lies beneath a narrow tongue of peat at Chittering [498 710]. The overburden consists mainly of soil, which varies from peaty clay to sandy clay loam, although 0.9 m of peat only was found at borehole 47 SE 14. Bedrock is either Ampthill or Kimmeridge Clay with Lower Greensand occurring in the extreme east of the block.

Table 10 Block C: data from IMAU boreholes

Borehole number	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines $-\frac{1}{16}$ mm	Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm	Medium sand $+\frac{1}{4}-1$ mm	Coarse sand $+1-4$ mm	Fine gravel $+4-16$ mm	Coarse gravel $+16$ mm
47 SW 16	1.1	0.7	22	21	31	10	14	2
47 SW 18	1.0	1.7	4	13	30	21	30	2
47 SE 4	2.0	1.0	9	12	53	11	13	2
47 SE 5	3.2	0.9	6	12	25	21	31	5
47 SE 7	1.2	0.8	4	12	29	15	27	13
47 SE 8	3.2	1.0	3	9	25	21	35	7
47 SE 10	2.0	1.2	4	11	29	22	31	3
47 SE 11	1.2	0.7	3	13	34	20	26	4
47 SE 12	1.1	1.0	7	15	28	21	26	3
47 SE 13	1.4	1.1	10	32	22	14	19	3
47 SE 14	0.2	1.9	17	11	33	13	22	4
46 NE 8	1.8	0.7	4	9	24	17	36	10

Table 11 Block D: data from IMAU boreholes

Borehole number	Recorded thickness		Mean grading percentage					
	Mineral	Overburden	Fines $-\frac{1}{16}$ mm	Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm	Medium sand $+\frac{1}{4}-1$ mm	Coarse sand $+1-4$ mm	Fine gravel $+4-16$ mm	Coarse gravel $+16$ mm
	(m)	(m)						
47 SW 5	4.8	1.0	6	13	29	24	24	4
46 NW 2	1.5	2.1	20	14	30	13	20	3
46 NW 3	0.7	1.3				no data		
46 NW 4	1.6	0.6	15	11	32	16	23	3
46 NW 5	5.2	0.6	5	11	42	20	19	3
46 NW 6	2.3	0.9	29	33	28	3	5	2
46 NW 7	0.3	1.4	23	53	23	1	0	0
46 NW 8	5.0	0.8	6	11	33	17	24	9
46 SW 135	2.3	0.3	9	7	29	16	31	8
46 SW 136	1.2	0.6	16	7	18	11	31	17
46 SW 137	1.8	1.1	5	5	23	16	29	22
46 SW 138	6.0	0.1	7	14	28	21	24	6
46 SW 139	1.6	0.7	22	18	25	14	19	2
46 SW 140	1.4	6.0	14	6	8	8	23	41
46 SW 141	2.9	0.8	11	8	28	27	20	6
46 SW 142	7.8	0.4	8	15	32	19	20	6
46 SW 143	5.9	1.1	8	12	31	19	24	6
46 SW 144	1.9	0.6	13	8	25	16	27	11
46 SW 145	2.2	0.7	5	17	42	12	19	5
46 SE 96	1.8	0.5	8	15	32	14	26	5
46 SE 97	3.8	1.1	2	5	31	21	32	9

Sand and gravel has been worked on only a minor scale in this block, at Mitchell Hill Common [478 706] and near the Bridge Inn [480 713]. The estimated volume of mineral is 18 million $m^3 \pm 37$ per cent at the 95 per cent confidence limit.

Block D

Block D extends over an area of 28.0 km^2 between Cambridge and Willingham. Sand and gravel deposits of the Second, Third and Fourth terraces, together with the Observatory Gravels, constitute the mineral of this block and account for 11.6 km^2. The remaining 16.4 km^2 of barren ground comprises either bedrock or Second and Third Terrace Deposits, beneath which there is no mineral. Bedrock consists of Ampthill and Kimmeridge Clay, Lower Greensand and Gault. Bedrock mineral was proved in borehole 46 SW 137 where 4.6 m of sand was recovered from the Lower Greensand. No assessment was made of this deposit.

Thickness and grading data for the 21 IMAU boreholes are summarised in Table 11. These data are supplemented by thickness figures from two Hydrogeology Unit well records and 29 other boreholes. The mean proved thickness of mineral in this block is 3.0 m ranging from 0.3 m to 7.8 m. The area of mineral lying to the south-east of Westwick is designated as 'exposed'. Most of the IMAU boreholes in this area proved sandy gravel, although more clayey categories were proved in boreholes near the edge of the deposit. Mineral lying to the north-west of Westwick lies beneath overburden and IMAU boreholes proved a variety of categories of sand and gravel ranging from sandy gravel to 'very clayey' sand. Vertical variation in grade is not marked but in some boreholes the mineral tends to be more clayey at the top. The weighted mean grading for the block as a whole is fines 9 per cent, sand 61 per cent and gravel 30 per cent.

Boulder Clay, at least 10.7 m thick, was found beneath Third Terrace sand and gravel at borehole 46 SW 138. A number of IMAU boreholes proved layers of clay and silt up to 1.2 m thick within the river terrace sand and gravel.

Overburden ranges from 0.3 m to 6.0 m in recorded thickness with a mean of 1.0 m. As in Block C, most of the overburden consists of soil which varies from a sandy clay loam to a clay. Borehole 46 NW 2 proved 1.1 m of sandy pebbly clay overlying mineral. Alluvium was proved in borehole 47 SW 137.

There are no mineral workings in this block. The estimated volume of mineral is 35 million $m^3 \pm 28$ per cent at the 95 per cent confidence limit.

Table 12 Block E: data from IMAU boreholes

Borehole number	Recorded thickness		Mean grading percentage					
	Mineral	Overburden	Fines $-\frac{1}{16}$ mm	Fine sand $+\frac{1}{16}-\frac{1}{4}$ mm	Medium sand $+\frac{1}{4}-1$ mm	Coarse sand $+1-4$ mm	Fine gravel $+4-16$ mm	Coarse gravel $+16$ mm
	(m)	(m)						
47 SE 9	0.9	1.0	21	33	20	9	14	3
46 NE 3	2.3	1.0	4	10	28	16	29	13
46 NE 4	1.3	1.2	5	13	39	17	19	7
46 NE 5	2.0	0.8	9	20	13	24	27	7
46 NE 6	0.8	0.8	8	10	26	16	35	5
46 NE 7	1.3	1.1	7	7	31	21	30	4
46 NE 9	1.7	0.7	4	11	31	17	31	6
46 NE 10	4.0	0.8	7	13	30	16	25	9
46 NE 11	2.2	0.8	4	11	26	24	28	7
46 NE 12	0.9	0.8	7	10	24	13	36	10
46 NE 13	0.9	1.8	13	13	29	13	25	7
46 NE 14	0.3	1.3	22	8	30	11	27	2
46 NE 15	1.2	1.0	25	16	26	9	19	5
46 NE 16	0.9	0.8	3	5	23	26	39	4
46 NE 17	3.7	2.0	8	14	19	13	32	14
46 SE 99	1.7	0.8	2	7	24	15	32	20
46 SE 100	1.7	1.0	9	13	26	16	28	8
46 SE 101	3.4	0.8	3	6	25	20	32	14
46 SE 102	3.5	0.7	4	8	31	19	30	8
46 SE 103	1.7	1.0	1	2	20	16	38	23
46 SE 104	1.6	0.5	6	14	39	12	22	7
46 SE 106	1.4	1.5	3	14	22	19	36	6
46 SE 107	1.8	0.8	16	16	31	6	21	10
46 SE 108	1.0	0.8	9	9	22	15	33	12
46 SE 109	0.7	3.5	16	4	12	11	35	22

Block E

Mineral-bearing ground in this block occupies an area of 16.1 km^2 and comprises mainly Second Terrace sand and gravel although First and Undifferentiated Terrace sand and gravel border the River Cam. Some of these deposits lie to the south of the block within the urban area of Cambridge and Milton. Barren ground covers an area of 8.4 km^2 and consists of exposed bedrock, which is Kimmeridge Clay, Lower Greensand, Gault or Chalk Marl. The Lower Greensand was partially penetrated in 4 IMAU boreholes indicating mineral of pebbly sand grade. As in Block D, no assessment was made of this deposit. The assessment of this block is based on 25 IMAU boreholes, 6 Hydrogeology Unit well records and 13 other boreholes (Table 12).

The recorded thickness of mineral ranges from 0.3 m to 4.0 m with a mean of 1.8 m. Most of the IMAU boreholes proved sandy gravel although boreholes 46 NE 14 and 15 both found 'very clayey' sandy gravel beneath the alluvium that covers Waterbeach Airfield. Boreholes 46 SE 103 and 109 penetrated the First and Undifferentiated Terrace Deposits bordering the River Cam and proved gravel and 'clayey' gravel respectively. Some IMAU boreholes indicated a tendency for the material at the top of the borehole to be more clayey. The weighted mean grading for the block is fines 7 per cent, sand 54 per cent and gravel 39 per cent.

A silt layer, 1.5 m thick, was proved within the sand and gravel in borehole 46 NE 17 and a similar layer, 0.6 m thick, was found at the base of the sand and gravel in borehole 46 NE 15. The mean overburden thickness is 1.3 m, with a recorded range from 0.5 m to 6.2 m. Overburden consists mainly of soil, which is commonly a sandy clay loam overlying a sandy clay. Alluvium was proved in 4 IMAU boreholes and borehole 46 SE 109 penetrated Peat and Barroway Drove Beds. Boreholes 46 NE 13 and 17 proved a layer of clay overlying sand and gravel.

Sand and gravel has been removed from areas at Milton [480 620], Landbeach [485 655] and to the north of Landbeach [480 680], which accounts for a total area of 1.9 km^2. The estimated volume of mineral is 29 million m^3 $\pm$20 per cent at the 95 per cent confidence limit.

NOTES ON THE REMAINING AREAS

Areas outside the resource blocks are left uncoloured and boreholes show that sand and gravel is likely to be generally absent apart from scattered minor occurrences. This ground is divided for descriptive purposes into two areas.

West of Cottenham

In this area 4 boreholes (46 NW 11, 13, NE 2 and 47 SW 20) proved between 1.0 and 1.5 m of 'very clayey' pebbly sand. The remaining 6 boreholes either did not penetrate sand and gravel or proved thicknesses less than 1.0 m. Field evidence suggests that these River Terrace Deposits are thin and patchy and therefore not potentially workable.

North of Haddenham

Boreholes 47 NW 37, NE 2 and 7 penetrated Boulder Clay in this area and found sand and gravel to be absent. Three boreholes (47 NW 34, 35 and NE 3) penetrated Glacial Sand and Gravel and proved between 1.0 and 2.8 m of sand and gravel. These deposits are patchy and no assessment was attempted. Boreholes 47 NE 4, 5, 6 and 8 proved sand and gravel to be absent (see p. 8).

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

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

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

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

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

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

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

APPENDIX B

STATISTICAL PROCEDURE

Statistical assessment

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

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

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

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

4 The above relationship may be transposed such that

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

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

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

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

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

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

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

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

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

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

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

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

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

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

9 In calculating confidence limits for volume, L_V, the following inequality corresponding to equation [3] is applied: $L_{\bar{l}_m} \leqslant L_V \leqslant 1.05\ L_{\bar{l}_m}$

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

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

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

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

per cent.

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

Inferred assessment

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

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

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

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

APPENDIX C

CLASSIFICATION AND DESCRIPTION OF SAND AND GRAVEL

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

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

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

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

The ratio of sand to gravel 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 12). The procedure is as follows:

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

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

Many differing proposals exist for the classification of the grain size of sediments (Atterberg, 1905; Udden, 1914; Wentworth, 1922; Wentworth, 1935; Allen, 1936; Twenhofel, 1937; Lane and others, 1947). As Archer (1970a, b) has emphasised, there is a pressing need for a simple metric scale acceptable to both scientific and engineering interests, for which the class limit sizes correspond closely with certain marked changes in the natural properties of mineral particles. For example, there is an important change in the degree of cohesion between particles at about the $\frac{1}{16}$-mm size, which approximates to the generally accepted boundary between silt and sand. These and other requirements are met by a system based on Udden's geometric scale and a simplified form of Wentworth's terminology (Table 13), which is used in this Report.

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

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

Block calculation **1 : 25 000 Block** } Fictitious

Area
Block: 11.08 km²
Mineral: 8.32 km²

Mean thickness
Overburden: 2.5 m
Mineral: 6.5 m

Volume
Overburden: 21 million m³
Mineral: 54 million m³

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

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

Sample point	Weighing w	Overburden l_o	Overburden wl_o	Mineral l_m	Mineral wl_m	Remarks
SE 14	1	1.5	1.5	9.4	9.4	IMAU boreholes
SE 18	1	3.3	3.3	5.8	5.8	
SE 20	1	nil	—	6.9	6.9	
SE 22	1	0.7	0.7	6.4	6.4	
SE 23	1	6.2	6.2	4.1	4.1	
SE 24	1	4.3	4.3	6.4	6.4	
SE 17	½	1.2	1.6	9.8	7.2	Hydrogeology Unit record
123/45	½	2.0		4.6		
1	¼	2.7	2.6	7.3	5.8	Close group of four boreholes (commercial)
2	¼	4.5		3.2		
3	¼	0.4		6.8		
4	¼	2.8		5.9		
Totals	$\Sigma w = 8$	$\Sigma wl_o = 20.2$		$\Sigma wl_m = 52.0$		
Means		$\overline{wl_o} = 2.5$		$\overline{wl_m} = 6.5$		

Calculation of confidence limits

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

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

L_V is calculated as

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

Figure 10 Example of resource block assessment: calculation and results

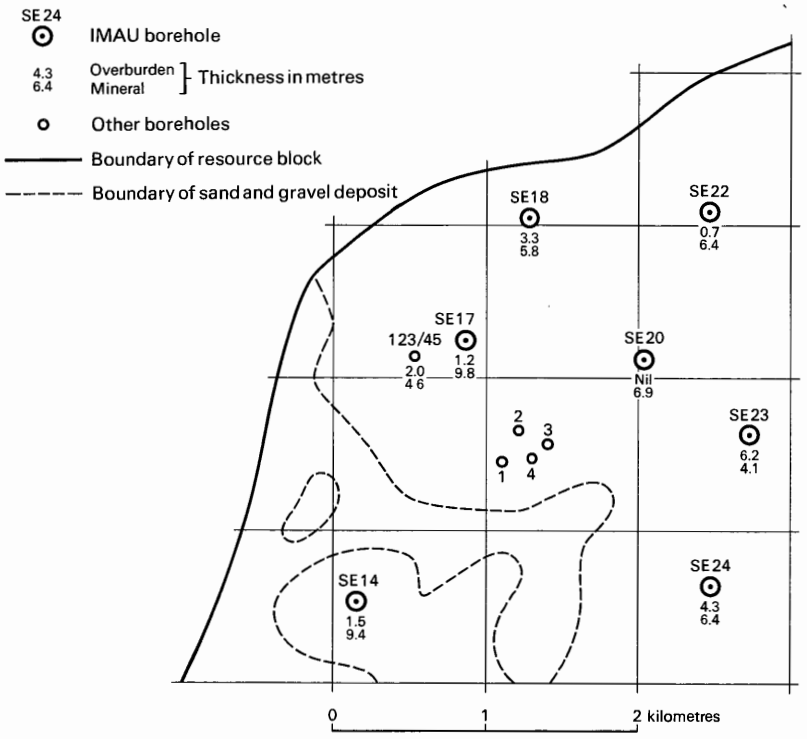


Figure 11 Example of resource block assessment: map of fictitious block

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

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

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

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

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

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

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

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

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

Table 13 Classification of gravel, sand and fines

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

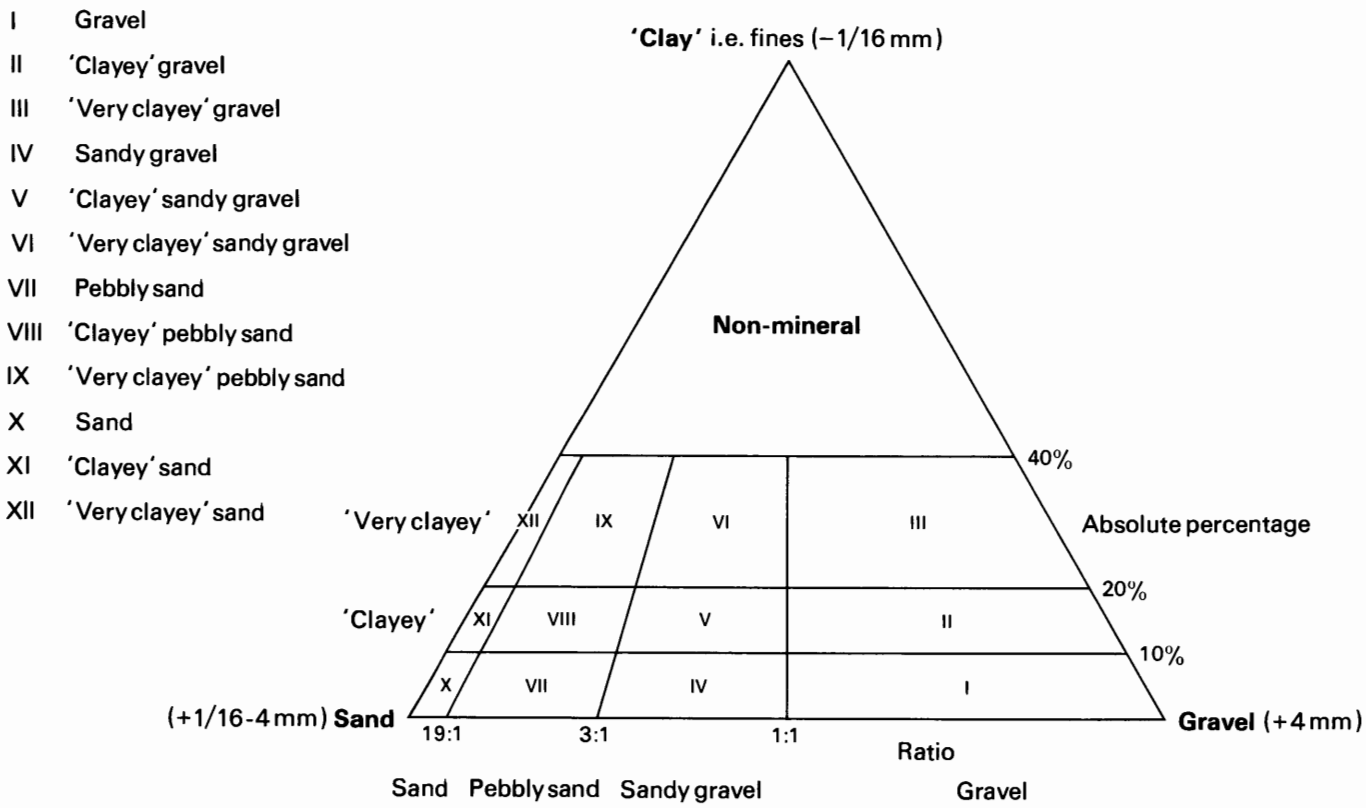


Figure 12 Diagram to show the descriptive categories used in the classification of sand and gravel

APPENDIX D

EXPLANATION OF THE BOREHOLE RECORDS

Annotated example

TL 47 NW 18[1] **4053 7971**[2] **Bedingham's Drove, Sutton**[3] **Block A**

Surface level + 0.3 m[4]
Water struck at − 3.1 m[5]
152 mm percussion[6]
June 1977

Overburden[7] 3.3 m
Mineral 3.5 m
Bedrock 1.2 m+[8]

LOG

Geological classification[9]	Lithology[10]	Thickness m	Depth m
	Soil, very dark brown loam becoming orange mottled with depth	1.5	1.5
Peat	Clay, peaty, grey, becoming black clayey peat with depth	1.8	3.3
River Terrace Deposits (Undifferentiated)	Sandy gravel Gravel: fine with coarse, angular to subangular, brown, grey and white flint with grey subrounded to rounded quartzite and fine, rounded to well-rounded chalk, with some quartz, sandstone, ironstone, limestone and shell fragments Sand: mainly coarse, angular flint and rounded chalk and medium subangular to subrounded quartz	3.5	6.8
Ampthill Clay	Clay, silty, fossiliferous, medium dark grey	1.2+	8.0

GRADING[11]

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
1	51	48	3.3–4.3	1	3	26	26	34	10
			4.3–5.3	1	2	26	25	43	3
			5.3–6.8	1	1	21	24	44	9
			Mean	1	2	24	25	41	7

COMPOSITION[12]

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
3.3–4.3	60	3	11	7	13	4	2
4.3–5.3	69	4	10	4	10	1	2
5.5–6.8	62	2	13	4	11	4	4
Mean	64	3	11	5	11	3	3

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

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

1 The number of the 1 : 25 000 sheet on which the borehole lies, for example TL 47.
2 The quarter of the 1 : 25 000 sheet on which the borehole lies and the number of the borehole in a series for that quarter, for example NW 18.

Thus the full Registration Number is TL 47 NW 18. Usually this is abbreviated to 47 NW 18 in the text.

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

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

4 Surface level
The surface level at the borehole site is given in metres above or below Ordnance Datum.

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

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

7 Overburden, mineral, waste and bedrock
Mineral is sand and gravel which, as part of a deposit, falls within the arbitrary definition of potentially workable material (see p. 1). Bedrock is the 'formation', 'country rock' or 'rock head' below which potentially workable sand and gravel will not be found. Waste is any material other than bedrock or mineral. Where waste occurs between the surface and mineral it is classified as overburden.

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

9 Geological classification
The geological classification is given wherever possible.

10 Lithological description
When sand and gravel is recorded a general description based on the mean grading characteristics (for details see Appendix C) is followed by more detailed particulars. The description of the other rocks is based on visual examination, in the field. Where more than one mineral deposit is recognised, each is designated by a letter, e.g. a, b, etc. The colours of deposits are recorded with reference to a Munsell colour chart and colour names are given in accordance with the Munsell system.

11 Grading data
A continuous series of bulk samples is taken throughout the thickness of sand and gravel. A new sample is commenced whenever there is an appreciable lithological change or at every 1 m of depth.

For each bulk sample the percentages of fines ($-\frac{1}{16}$ mm), fine sand ($+\frac{1}{16}$–$\frac{1}{4}$ mm), medium sand ($+\frac{1}{4}$–1 mm), coarse sand (+ 1–4 mm), fine gravel (+ 4–16 mm) and coarse gravel (+ 16 mm) are stated. The mean grading of groups of samples making up an identified mineral horizon are also given in detail and, to the left, in summary. Where more than one horizon is recognised the mean grading for the whole of the mineral in the borehole is also given. Where necessary in calculating the mean grading, data for individual samples are weighted by the thickness represented.

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

12 Composition
Details of the composition of the 4–16 mm size range of selected samples may be given. Where appropriate, the calculated weighted mean composition of grouped samples may be given. The data are weighted by sample thickness and by the percentage of material in the 4–16 mm size range.

APPENDIX E

LIST OF BOREHOLES USED IN THE ASSESSMENT OF RESOURCES

IMAU BOREHOLES

Borehole number*		Grid reference	Page number
TL 46 NW	2	4034 6993	26
	3	4054 6848	26
	4	4012 6769	27
	5	4042 6671	28
	6	4092 6582	29
	7	4138 6512	29
	8	4148 6606	30
	9	4224 6670	31
	10	4319 6739	31
	11	4358 6985	32
	12	4433 6878	32
	13	4498 6917	33
	14	4473 6941	33
TL 46 NE	2	4562 6955	34
	3	4783 6536	34
	4	4761 6670	35
	5	4773 6747	36
	6	4757 6848	37
	7	4779 6992	38
	8	4849 6978	39
	9	4893 6881	40
	10	4843 6737	41
	11	4860 6644	42
	12	4882 6565	42
	13	4929 6546	43
	14	4970 6632	43
	15	4925 6718	44
	16	4941 6854	45
	17	4983 6925	46
TL 46 SW	134	4189 6473	47
	135	4256 6041	47
	136	4242 6247	48
	137	4257 6350	49
	138	4277 6388	50
	139	4348 6440	51
	140	4342 6322	51
	141	4318 6283	52
	142	4360 6246	53
	143	4370 6157	54
	144	4364 6053	55
	145	4486 6181	56
	146	4480 6336	57
	147	4497 6396	57
TL 46 SE	94	4529 6347	57
	95	4557 6240	58
	96	4517 6201	58
	97	4672 6186	59
	98	4731 6171	60
	99	4781 6337	61
	100	4791 6449	62
	101	4874 6462	63
	102	4857 6373	64
	103	4857 6227	65
	104	4877 6168	66
	105	4810 6084	67
	106	4969 6289	68
	107	4966 6316	69
	108	4902 6361	69
	109	4991 6452	70
TL 47 NW	18	4053 7971	71
	19	4092 7809	72
	20	4004 7732	73
	21	4048 7611	74
	22	4046 7523	75
	23	4190 7566	76
	24	4167 7656	77
	25	4189 7766	78
	26	4190 7886	79
	27	4174 7953	80
	28	4279 7934	80
	29	4283 7830	81
	30	4266 7677	81
	31	4285 7546	82
	32	4368 7673	83
	33	4363 7773	83
	34	4387 7856	84
	35	4480 7970	85
	36	4443 7714	85
	37	4471 7616	86
TL 47 NE	2	4591 7957	86
	3	4524 7575	87
	4	4881 7643	87
	5	4837 7682	88
	6	4801 7800	88
	7	4954 7909	88
	8	4934 7729	89
TL 47 SW	1	4064 7466	89
	2	4031 7382	90
	3	4054 7287	91
	4	4040 7155	92
	5	4049 7022	93
	6	4173 7147	94
	7	4181 7245	94
	8	4140 7393	95
	9	4224 7462	96
	10	4279 7423	96
	11	4260 7342	97
	12	4279 7229	98
	13	4239 7180	99
	14	4349 7191	100
	15	4401 7227	101
	16	4360 7325	101
	17	4337 7426	102
	18	4490 7268	102
	19	4457 7178	103
	20	4479 7040	104
TL 47 SE	1	4577 7258	105
	2	4557 7196	105
	3	4567 7059	106
	4	4663 7030	107
	5	4665 7145	108
	6	4644 7275	108
	7	4768 7205	109
	8	4794 7135	110
	9	4748 7008	110
	10	4854 7047	111
	11	4858 7150	112
	12	4875 7269	113
	13	4898 7216	114
	14	4989 7110	115

* By sheet quadrant.

OTHER BOREHOLES

Hydrogeology Unit records:
188/71, 113, 118, 120, 156, 192, 199 and 329

Other IGS registered boreholes:
TL 46 SW Box 103, Box 121, Box 122, SE 3, 4, 5, 6, 7, 8, 9, 11, 26, 29, 35, 52, 53, 54, 57, 58

APPENDIX F

INDUSTRIAL MINERALS ASSESSMENT UNIT
BOREHOLE RECORDS

TL 46 NW 2 4034 6993 Berry Croft, Willingham **Block D**

Surface level +6.4 m
Water struck at +3.9 m
152 mm percussion
July 1977

Overburden 2.1 m
Mineral 1.5 m
Bedrock 1.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey, stony, sandy clay loam becoming brown stony sandy clay at 0.6 m	1.0	1.0
River Terrace Deposits (Second Terrace)	Clay, sandy with flint and chalk pebbles, light grey and strong brown mottled, becoming more sandy with depth	1.1	2.1
	'Very clayey' sandy gravel Gravel: mainly fine, angular to subangular, brown and white flint and rounded chalk with some quartz, sandstone, ironstone and limestone Sand: medium with fine, subangular to subrounded, quartz with some chalk and ironstone with coarse, rounded chalk and angular flint; brownish yellow becoming olive-yellow with depth	1.5	3.6
Ampthill Clay	Clay, stiff, medium dark grey	1.4+	5.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
20	57	23	2.1–3.1	20	14	30	13	20	3
			3.1–3.6	Sample absent					

TL 46 NW 3 4054 6848 Black Pit Drove, Willingham **Block D**

Surface level +2.6 m
Water struck at +1.1 m
152 mm percussion
July 1977

Overburden +1.3 m
Mineral 0.7 m
Bedrock 1.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown sandy clay loam becoming yellowish brown sandy clay at 0.6 m	1.3	1.3
River Terrace Deposits (Third Terrace)	'Clayey' sandy gravel Gravel: mainly fine, angular to subangular, brown and white flint and rounded to well-rounded chalk with some quartz and sandstone Sand: medium with fine, subangular to subrounded, quartz with some flint chalk and ironstone and coarse, rounded chalk and angular flint	0.7	2.0
Ampthill Clay	Clay, soft, olive, becoming medium dark grey with layers of medium grey argillaceous limestone at depth	1.5+	3.5

GRADING

Sample absent

TL 46 NW 4 4012 6769 Near Allotment Gardens, Longstanton **Block D**

Surface level +2.7 m
Water struck at +0.7 m
152 mm percussion
September 1977

Overburden 0.6 m
Mineral 0.8 m
Waste 0.5 m
Mineral 0.8 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown sandy clay loam becoming light olive-brown stony sandy clay at 0.3 m	0.6	0.6
River Terrace Deposits (Third Terrace)	**a** Sandy gravel Gravel: mainly fine, angular to subangular, brown and grey flint and well-rounded chalk with some ironstone, sandstone and quartz Sand: medium with fine, subangular to rounded, quartz with chalk and ironstone and coarse, rounded chalk and angular flint with ironstone and quartz; brownish yellow	0.8	1.4
	Clay, with chalk pebbles; light yellowish brown	0.5	1.9
	b 'Very clayey' sandy gravel Gravel: mainly fine, angular to subangular, brown and grey flint and well-rounded chalk with some ironstone, sandstone and quartz Sand: medium with fine, subangular to rounded, quartz with chalk and ironstone and coarse, rounded chalk and angular flint with ironstone and quartz; light grey	0.8	2.7
Ampthill Clay	Clay, stiff, with shelly horizons, dark grey	1.0+	3.7

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
a	8	66	26	0.6–1.4	8	14	35	17	23	3
b	22	51	27	1.9–2.7	22	7	28	16	23	4
a+b	15	59	26	Mean	15	11	32	16	23	3

TL 46 NW 5 4042 6671 Near Nether Grove, Longstanton **Block D**

Surface level +9.2 m
Water struck at +7.6 m
152 mm percussion
September 1977

Overburden 0.6 m
Mineral 3.9 m
Waste 1.0 m
Mineral 1.3 m
Bedrock 1.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown loam, becoming brown sandy clay with depth	0.6	0.6
River Terrace Deposits (Fourth Terrace)	**a** Sandy gravel Gravel: mainly fine, angular to subangular, brown and white flint and rounded to well-rounded chalk with some ironstone, sandstone and quartz Sand: medium with fine, subangular to rounded, quartz with chalk and some ironstone and coarse, angular flint and rounded chalk with quartz and ironstone; reddish yellow	3.9	4.5
	Silt, sandy, light brownish grey	1.0	5.5
	b Pebbly sand Gravel: mainly fine, angular to subangular, black, grey, and white flint and rounded to well-rounded chalk with some sandstone and quartz Sand: medium with fine, subangular to rounded, quartz and chalk with some ironstone and coarse, rounded chalk and angular flint; grey	1.3	6.8
Kimmeridge Clay	Clay, dark grey	1.2+	8.0

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
a	4	71	25	0.6–1.5	6	13	32	14	32	3
				1.5–2.5	3	6	29	22	34	6
				2.5–3.5	5	11	45	21	16	2
				3.5–4.5	4	13	44	29	9	1
				Mean	4	11	38	22	22	3
b	5	82	13	5.5–6.5	5	12	54	14	11	4
				6.5–6.8	3	14	65	13	5	—
				Mean	5	12	56	14	10	3
a+b	5	73	22	Mean	5	11	42	20	19	3

TL 46 NW 6 4092 6582 Oakington Airfield, Oakington **Block D**

Surface level +10.8 m
Water struck at +8.5 m
152 mm percussion
September 1977

Overburden 0.9 m
Mineral 2.3 m
Bedrock 1.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown clay loam becoming brownish yellow sandy clay	0.9	0.9
River Terrace Deposits (Third Terrace)	'Very clayey' pebbly sand Gravel: fine to coarse, angular to subangular, brown and white flint with rounded chalk and some sandstone, quartz and phosphatic nodules Sand: fine to medium, subangular to rounded, quartz with chalk and some ironstone and flint; yellowish brown becoming brownish yellow with depth	2.3	3.2
Kimmeridge Clay	Clay, dark grey with medium grey argillaceous limestone layers	1.1	4.3

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
29	64	7	0.9–1.9	25	34	34	3	4	—
			1.9–3.2	33	32	23	3	6	3
			Mean	29	33	28	3	5	2

TL 46 NW 7 4138 6512 Near Manor Farm, Oakington **Block D**

Surface level +13.1 m
Water not struck
152 mm percussion
September 1977

Overburden 1.4 m
Mineral 0.3 m
Bedrock 1.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil: dark greyish brown sandy clay loam, becoming light yellowish brown and grey mottled stony clay at 0.2 m	1.4	1.4
River Terrace Deposits (Fourth Terrace)	'Very clayey' sand, with marly laminations Sand: fine to medium, subangular to rounded, quartz with some chalk and ironstone; strong brown	0.3	1.7
Kimmeridge Clay	Clay, rooty, olive-grey and medium dark grey mottled	1.3+	3.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
23	77	0	1.4–1.7	23	53	23	1	–	–

TL 46 NW 8 4148 6606 Oakington Airfield, Oakington **Block D**

Surface level +9.0 m
Water struck at +7.5 m
152 mm percussion
September 1977

Overburden 0.8 m
Mineral 2.1 m
Waste 1.2 m
Mineral 2.9 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, yellowish brown sandy loam becoming stony sandy clay at 0.2 m	0.8	0.8
River Terrace Deposits (Third Terrace)	**a** Sandy gravel Gravel: fine with coarse, angular to subangular, brown and white flint and fine rounded to well-rounded chalk with some ironstone, sandstone, quartzite and quartz Sand: medium with fine, subangular to rounded, quartz with some chalk and ironstone and coarse, rounded chalk and angular flint with quartz and ironstone; reddish yellow	2.1	2.9
	Silt, clayey, light brownish grey	1.2	4.1
	b Sandy gravel Gravel: fine to coarse, angular to subangular, brown and white flint, becoming grey and black with depth, and fine rounded to well-rounded chalk with some ironstone, sandstone, quartzite, quartz and limestone Sand: medium with fine, subangular to rounded, quartz and chalk with some ironstone and coarse, rounded chalk and angular flint; brown becoming grey with depth	2.9	7.0
Kimmeridge Clay	Limestone, argillaceous, grey	0.1	7.1
	Clay, medium dark grey	0.9+	8.0

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
a	9	61	30	0.8–1.8	7	12	38	17	24	2
				1.8–2.9	10	10	30	16	23	11
				Mean	9	11	34	16	23	7
b	4	60	36	4.1–5.1	4	4	18	18	38	18
				5.1–5.4	4	8	27	24	30	7
				5.4–6.1	4	14	42	16	15	9
				6.1–7.0	5	14	43	14	17	7
				Mean	4	10	33	17	25	11
a+b	6	61	33	Mean	6	11	33	17	24	9

TL 46 NW 9 4224 6670 Cuckoo Bridge, Westwick

Surface level +6.0 m
Water not struck
152 mm percussion
July 1977

Waste 2.3 m
Bedrock 1.4 m

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground, very dark greyish brown and olive mottled sandy clay loam with brick fragments	2.3	2.3
Kimmeridge Clay	Clay, soft, olive with yellowish brown mottles, becoming light olive-grey, with layers of pale yellow calcareous mudstone	1.4+	3.7

TL 46 NW 10 4319 6739 North Fen Farm, Cottenham

Surface level +3.8 m
Water level not recorded
152 mm percussion
February 1977

Waste 1.5 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown stony clay with red and grey mottling	1.1	1.1
River Terrace Deposits (Second Terrace)	Sandy gravel Gravel: mainly fine, angular to subangular, brown and white flint and rounded chalk with some sandstone, quartz and phosphatic nodules Sand: mainly coarse, rounded, chalk and angular flint with quartz and medium subangular to subrounded quartz with chalk flint and ironstone; yellowish brown	0.4	1.5
Kimmeridge Clay	Clay, soft, medium grey	2.9	4.4
	Limestone, argillaceous, medium light grey	0.1+	4.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
6	50	44	1.1–1.5	6	4	16	30	40	4

TL 46 NW 11 4358 6985 The Irams, Willingham

Surface level +3.8 m
Water struck at +1.8 m
152 mm percussion
February 1977

Overburden 1.8 m
Mineral 1.1 m
Bedrock 3.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey and dark yellowish brown mottled sandy clay loam	0.8	0.8
River Terrace Deposits (Second Terrace)	Clay, sandy with marly laminations, yellow	1.0	1.8
	'Very clayey' pebbly sand, with sand and clay laminations between 1.8 m and 2.4 m Gravel: mainly fine, angular to subangular, brown and white flint with rounded to well-rounded chalk and subrounded sandstone with some quartz, limestone and phosphatic nodules Sand: fine to medium, subangular to subrounded, quartz with chalk and flint with coarse rounded chalk	1.1	2.9
Kimmeridge Clay	Clay, stiff, light grey with layers of medium light grey argillaceous limestone	0.8	3.7
	Clay, stiff, fossiliferous, bluish black	2.5+	6.2

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
22	65	13	1.8–2.4	36	44	17	2	1	—
			2.4–2.9	6	13	32	22	20	7
			Mean	22	30	24	11	10	3

TL 46 NW 12 4433 6878 Near Irams Farm, Cottenham

Surface level +3.0 m
Water not struck
152 mm percussion
February 1977

Waste 1.3 m
Bedrock 1.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey humose clay loam becoming reddish grey and dark red mottled clay	1.3	1.3
Kimmeridge Clay	Clay, light grey with reddish yellow sandy clay between 1.7 m and 1.8 m, becoming grey stiff clay with occasional layer of grey argillaceous limestone	1.7+	3.0

TL 46 NW 13 4498 6917 Great North Fen, Cottenham

Surface level +2.7 m
Water not struck
152 mm percussion
July 1977

Overburden 1.0 m
Mineral 1.0 m
Bedrock 2.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey clay loam, becoming light yellowish brown and strong brown mottled sandy clay at 0.8 m	1.0	1.0
River Terrace Deposits (First Terrace)	'Very clayey' pebbly sand Gravel: fine, angular to subangular, brown and white flint with well-rounded chalk and subrounded phosphatic nodules and some quartz, quartzite, sandstone, ironstone, limestone, shell fragments and igneous material Sand: fine to medium, subangular to subrounded, quartz with chalk and coarse, rounded chalk and angular flint; yellowish brown	1.0	2.0
Kimmeridge Clay	Clay, stiff, with shell fragments and selenite, dark grey	2.0+	4.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
21	60	19	1.0–2.0	21	26	18	16	18	1

COMPOSITION

Depth below surface (m)	Percentages by weight in 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
1.0–2.0	60	4	5	6	20	1	4

TL 46 NW 14 4473 6941 Manor Drove, Cottenham

Surface level +2.6 m
Water not struck
152 mm percussion
July 1977

Waste 2.0 m
Bedrock 1.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground, soil and brick	0.9	0.9
	Soil, black and dark red mottled peaty clay	0.4	1.3
Alluvium	Clay, silty, pale olive and yellowish red mottled becoming less silty and light grey with depth	0.7	2.0
Kimmeridge Clay	Clay, stiff, olive-grey and olive-yellow mottled with shell fragments and carbonate, becoming black with depth	1.6+	3.6

TL 46 NE 2 4562 6955 Near Smithy Fen Bridge, Cottenham

Surface level +4.0 m
Water struck at +2.0 m
152 mm percussion
February 1977

Overburden 1.0 m
Mineral 1.5 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown sandy clay loam becoming yellow and red mottled sandy clay at 0.2 m	1.0	1.0
River Terrace Deposits (Second Terrace)	'Very clayey' pebbly sand Gravel: mainly fine, angular to subrounded, brown flint with some chalk, sandstone and quartz Sand: mainly fine to medium, subangular to subrounded, quartz with chalk and some angular flint	1.5	2.5
Kimmeridge Clay	Clay, stiff, grey, with shell fragments	3.0+	5.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
28	67	5	1.0–2.0	31	39	24	3	3	—
			2.0–2.5	22	24	39	7	6	2
			Mean	28	34	29	4	4	1

TL 46 NE 3 4783 6536 The Common, Landbeach **Block E**

Surface level +4.7 m
Water struck at +3.5 m
152 mm percussion
February 1977

Overburden 1.0 m
Mineral 2.3 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown sandy clay loam becoming brown and stony with depth	1.0	1.0
River Terrace Deposits (Second Terrace)	Sandy gravel Gravel: fine to coarse, angular to subangular, brown, white, and grey flint with fine rounded to well-rounded chalk and some sandstone and quartz Sand: medium with fine, subangular to subrounded, quartz with chalk and coarse rounded chalk and angular flint; brownish yellow, becoming light grey with depth	2.3	3.3
Gault	Clay, stiff, grey becoming dark grey with depth	3.0+	6.3

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
4	54	42	1.0–2.1	4	7	18	16	36	19
			2.1–3.3	3	13	38	16	23	7
			Mean	4	10	28	16	29	13

TL 46 NE 4 4761 6670 Near Brookside, Landbeach **Block E**

Surface level +4.1 m
Water struck at +2.9 m and −1.3 m
152 mm percussion
February 1977

Overburden 1.2 m
Mineral 1.3 m
Bedrock 5.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey, stony, loam, becoming brownish yellow sandy clay at 0.5 m	1.2	1.2
River Terrace Deposits (Second Terrace)	**a** Sandy gravel Gravel: fine to coarse, angular to subangular, white, brown and grey flint with fine rounded to well-rounded chalk Sand: medium with fine, subangular to subrounded, quartz with coarse, angular flint and subrounded chalk	1.3	2.5
Gault	Clay, light grey, becoming bluish grey and stiff at 3.1 m and plastic and sandy at 5.5 m	3.4	5.9
Lower Greensand	**b** Pebbly sand Gravel: fine to coarse, olive-grey sandstone fragments Sand: fine to medium, subrounded quartz with glauconite; olive-grey	2.0+	7.9

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
a	5	69	26	1.2–2.5	5	13	39	17	19	7
b	8	80	12	5.9–6.9	9	36	35	5	5	10
				6.9–7.9	8	40	38	6	3	5
				Mean	8	38	36	6	4	8

TL 46 NE 5 4773 6747 Frith Fen, Landbeach **Block E**

Surface level +3.4 m
Water struck +1.4 m
152 mm percussion
May 1977

Overburden 0.8 m
Mineral 2.0 m
Bedrock 2.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown clay loam, becoming yellowish brown and reddish orange mottled, stony, sandy, clay at 0.5 m	0.8	0.8
River Terrace Deposits (Second Terrace)	**a** Sandy gravel Gravel: mainly fine, angular to subangular, brown, white and grey flint, dark greyish green sandstone, with rounded to well-rounded chalk and some quartz Sand: coarse, angular flint, rounded chalk and subangular sandstone and fine with medium, subangular to medium quartz with some sandstone and ironstone; yellowish brown	2.0	2.8
Lower Greensand	**b** Pebbly sand, becoming more clayey and silty with depth, with sandstone at base Gravel: fine to coarse, angular to subangular, greyish green sandstone fragments Sand: fine to medium, subangular, quartz with subrounded glauconite; dark olive-grey	2.8+	5.6

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	9	57	34	0.8–2.0	8	27	24	13	19	9
				2.0–2.8	5	28	24	14	20	9
				Mean	9	20	13	24	27	7
b	7	87	6	2.8–3.8	5	46	30	9	7	3
				3.8–5.0	6	61	24	5	1	3
				5.0–5.6	10	68	15	5	2	—
				Mean	7	57	24	6	3	3

TL 46 NE 6 4757 6848 Green End, Cottenham **Block E**

Surface level +3.2 m
Water struck at +2.0 m
152 mm percussion
February 1977

Overburden 0.8 m
Mineral 0.8 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey sandy clay loam becoming strong brown and pale yellow sandy clay at 0.7 m	0.8	0.8
River Terrace Deposits (Second Terrace)	Sandy gravel Gravel: mainly fine, angular to subangular, brown and grey flint with rounded to well-rounded chalk and some phosphatic nodules, quartz, quartzite, sandstone and ironstone Sand: medium with fine, subangular to subrounded, quartz with chalk and coarse, angular flint and rounded chalk	0.8	1.6
Kimmeridge Clay	Clay, soft, very dark grey becoming stiff, grey, with layers of grey argillaceous limestone below 2.5 m	3.0+	4.6

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
8	52	40	0.8–1.6	8	10	26	16	35	5

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
0.8–1.6	68	1	3	4	21	2	1

TL 46 NE 7 4779 6992 Mitchell Hill Farm **Block E**

Surface level +4.6 m
Water struck at +3.6 m
152 mm percussion
February 1977

Overburden 1.1 m
Mineral 1.3 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey loam becoming brownish yellow, stony, sandy clay at 1.0 m	1.1	1.1
River Terrace Deposits (Second Terrace)	Sandy gravel Gravel: mainly fine, angular to subangular, brown, white and grey flint, with rounded to well-rounded chalk and some sandstone, quartzite, quartz, limestone, phosphatic nodules and shell fragments Sand: mainly medium, subrounded, quartz with rounded ironstone and coarse, angular flint and rounded chalk	1.3	2.4
Kimmeridge Clay	Clay, stiff, fossiliferous, with phosphatic and calcareous nodules, medium grey	3.0+	5.4

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
7	59	34	1.1–2.1	7	7	30	20	32	4
			2.1–2.4	7	6	33	24	26	4
			Mean	7	7	31	21	30	4

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
1.1–2.1	64	2	6	6	19	2	1
2.1–2.4	57	2	3	13	15	9	1
Mean	63	2	6	7	18	3	1

TL 46 NE 8 4849 6978 'Gravel Diggers', Cottenham **Block C**

Surface level +2.5 m
Water struck at −0.7 m
152 mm percussion
February 1977

Overburden 0.7 m
Mineral 1.8 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown clay loam becoming brownish yellow sandy clay at 0.3 m	0.7	0.7
River Terrace Deposits (First Terrace)	Sandy gravel Gravel: fine with coarse, angular to subangular, brown and grey flint with fine, rounded to well-rounded chalk and some sandstone and quartz Sand: medium with fine, subangular to subrounded, quartz and coarse, angular flint and rounded chalk	1.8	2.5
Kimmeridge Clay	Clay, soft, fossiliferous, light grey with medium grey argillaceous limestone between 3.2 m and 3.3 m	3.0+	5.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
4	50	46	0.7–1.7	5	10	26	18	34	7
			1.7–2.5	3	8	21	17	38	13
			Mean	4	9	24	17	36	10

TL 46 NE 9 4893 6881 Top Moor, Cottenham **Block E**

Surface level +2.7 m
Water struck at +1.7 m
152 mm percussion
February 1977

Overburden 0.7 m
Mineral 1.7 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown and brownish yellow mottled stony sandy clay loam becoming pale brown and brownish yellow mottled sandy clay at 0.2 m	0.5	0.5
River Terrace Deposits (Second Terrace)	Sandy gravel Gravel: mainly fine, angular to subrounded, grey and brown flint with rounded to well-rounded chalk and some quartz, quartzite, sandstone, limestone, phosphatic nodules and occasional igneous rocks and shell fragments Sand: medium with fine, subangular to subrounded, quartz and coarse, angular flint and rounded chalk; pale brown becoming yellow with depth	1.7	2.2
Kimmeridge Clay	Clay, stiff, medium grey, with layers of grey argillaceous limestone below 3.7 m	3.0+	5.2

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
4	59	37	0.5–1.5	4	14	34	15	28	5
			1.5–2.2	5	7	27	19	35	7
			Mean	4	11	31	17	31	6

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
0.5–1.5	67	4	4	6	17	2	trace
1.5–2.2	65	1	4	8	13	6	3
Mean	66	3	4	7	15	4	1

TL 46 NE 10 4843 6737 Flint House, Waterbeach **Block E**

Surface level +3.0 m
Water struck at +1.6 m
152 mm percussion
September 1977

Overburden 0.8 m
Mineral 4.0 m
Bedrock 1.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown sandy clay loam becoming light olive-grey and yellow mottled sandy clay at 0.6 m	0.8	0.8
River Terrace Deposits (Second Terrace)	**a** Sandy gravel, clayey with more greyish green sandstone between 3.8 m and 4.8 m Gravel: fine to coarse, angular to subangular, brown, grey and white flint and fine, well-rounded chalk with sandstone and quartz Sand: medium with fine, subangular to rounded, quartz with chalk and some rounded ironstone and coarse, rounded chalk and angular flint; reddish yellow becoming olive-grey with depth	4.0	4.8
Lower Greensand	**b** Pebbly sand Gravel: mainly fine, angular to subangular, very dark grey sandstone and rounded, brownish black ironstone with some quartz Sand: fine to medium, subrounded to rounded, quartz and ironstone with coarse, subangular to rounded ironstone and angular to subangular sandstone; very dark grey	1.9+	6.7

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	7	59	34	0.8–1.8	8	13	31	18	21	9
				1.8–2.8	3	6	29	18	34	10
				2.8–3.8	5	7	24	15	39	10
				3.8–4.8	12	26	38	10	6	8
				Mean	7	13	30	16	25	9
b	4	83	13	4.8–5.8	5	65	26	2	2	—
				5.8–6.7	3	33	20	19	19	6
				Mean	4	50	23	10	10	3

TL 46 NE 11 4860 6644 Waterbeach Airfield, Waterbeach **Block E**

Surface level +3.8 m
Water struck at +2.3 m
152 mm percussion
September 1977

Overburden 0.8 m
Mineral 2.2 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown sandy clay loam becoming brownish yellow sandy clay at 0.7 m	0.8	0.8
River Terrace Deposits (Second Terrace)	Sandy gravel Gravel: mainly fine, angular to subangular, brown, white and grey flint and well-rounded chalk with some quartz. quartzite and sandstone Sand: medium with fine, subangular to rounded, quartz with chalk and some ironstone and coarse, rounded chalk and angular flint; brownish yellow	2.2	3.0
Gault	Clay, stiff, dark grey	1.0+	4.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
4	61	35	0.8–1.8	7	19	28	18	22	6
			1.8–2.8	1	4	24	29	34	8
			2.8–3.0	2	5	25	28	32	8
			Mean	4	11	26	24	28	7

TL 46 NE 12 4882 6565 Near Gravel Pits, Landbeach **Block E**

Surface level +4.4 m
Water struck at +3.0 m
152 mm percussion
March 1977

Overburden 0.8 m
Mineral 0.9 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground, sand and gravel becoming soil and brick at 0.2 m	0.8	0.8
River Terrace Deposits (Second Terrace)	Sandy gravel, with pebbly, olive-grey clay between 1.2 m and 1.4 m Gravel: mainly fine, angular to subangular, brown, white and grey flint with rounded chalk and some sandstone, quartz and occasional phosphatic nodules Sand: medium with fine, subangular to subrounded, quartz with chalk and coarse, angular flint and rounded chalk; yellow	0.9	1.7
Gault	Clay, stiff, olive-grey, becoming grey with depth, rooty between 1.7 m and 2.7 m	3.0+	4.7

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
7	47	46	0.8–1.7	7	10	24	13	36	10

TL 46 NE 13 4929 6546 Vicarage, Waterbeach **Block E**

Surface level +6.1 m
Water struck at +4.0 m
152 mm percussion
September 1977

Overburden 1.8 m
Mineral 0.9 m
Bedrock 1.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown sandy clay loam becoming light yellowish brown sandy clay at 0.7 m	0.8	0.8
River Terrace Deposits (Second Terrace)	Clay, with flint and chalk pebbles, coarse chalk sand grains, grey and yellow mottled	1.0	1.8
	'Clayey' sandy gravel, more sandy in upper part Gravel: mainly fine, angular to subangular, brown, grey and white flint with well-rounded chalk and some phosphatic nodules and a trace of quartz Sand: medium with fine, subangular to subrounded, quartz with some chalk and ironstone and coarse, angular flint and rounded chalk with some ironstone and quartz; light yellowish brown	0.9	2.7
Gault	Clay, olive-grey, becoming medium dark grey with depth	1.1+	3.8

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
13	55	32	1.8–2.7	13	13	29	13	25	7

TL 46 NE 14 4970 6632 Near Denny End, Waterbeach **Block E**

Surface level +5.5 m
Water struck at +4.0 m
152 mm percussion
September 1977

Overburden 1.3 m
Mineral 0.3 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark brown clay loam becoming light olive-brown clay at 0.2 m	0.8	0.8
Alluvium	Clay with chalk pebbles, grey with ochreous mottling	0.5	1.3
River Terrace Deposits (Second Terrace)	'Very clayey' sandy gravel Gravel: mainly fine, angular to subangular, brown, grey and white flint and well-rounded chalk with some phosphatic nodules and a trace of sandstone and quartz Sand: medium with fine, subangular to subrounded, quartz with some chalk and ironstone and coarse rounded chalk and angular flint with some ironstone; light yellowish brown	0.3	1.6
Gault	Clay, grey	1.0+	2.6

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
22	49	29	1.3–1.6	22	8	30	11	27	2

TL 46 NE 15 4925 6718 Waterbeach Airfield, Waterbeach **Block E**

Surface level +5.2 m
Water struck at +3.4 m
152 mm percussion
September 1977

Overburden 1.0 m
Mineral 1.2 m
Waste 0.6 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown sandy clay loam	0.7	0.7
Alluvium	Clay, sandy, yellowish brown	0.3	1.0
River Terrace Deposits (Second Terrace)	'Very clayey' sandy gravel, with light grey, very clayey sand between 1.2 m and 1.4 m Gravel: mainly fine, angular to subangular, brown, grey and white flint and well-rounded chalk with some sandstone, quartz and phosphatic nodules Sand: medium and fine, subangular to rounded, quartz with chalk and some rounded ironstone and coarse, angular flint and rounded chalk; light yellowish brown	1.2	2.2
	Silt, clayey, sandy light grey, becoming more clayey with depth	0.6	2.8
Gault	Clay, stiff, grey	1.0+	3.8

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
25	51	24	1.0–1.8	30	17	26	8	16	3
			1.8–2.2	15	15	27	11	24	8
			Mean	25	16	26	9	19	5

TL 46 NE 16 4941 6854 Denny Abbey, Waterbeach **Block E**

Surface level +4.8 m
Water struck at +3.6 m
152 mm percussion
May 1977

Overburden 0.8 m
Mineral 0.9 m
Bedrock 2.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown sandy clay loam becoming yellowish brown stony sandy clay	0.8	0.8
River Terrace Deposits (Second Terrace)	Sandy gravel Gravel: mainly fine, angular to subangular, brown, white and grey flint and rounded to well-rounded chalk with a trace of sandstone, quartzite and quartz Sand: coarse, rounded chalk and angular flint and medium with fine, subangular to rounded quartz with chalk; yellowish brown	0.9	1.7
Gault	Clay, stiff, yellowish grey with reddish orange and silty horizons	2.7+	4.4

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
3	54	43	0.8–1.7	3	5	23	26	39	4

TL 46 NE 17 4983 6925 Stoney Hills, Waterbeach **Block E**

Surface level +3.0 m
Water struck at +1.5 m
152 mm percussion
February 1977

Overburden 2.0 m
Mineral 0.5 m
Waste 1.5 m
Mineral 3.2 m
Bedrock 3.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground, soil and brick	0.7	0.7
	Soil, greyish brown with reddish brown mottled sandy clay, becoming a mottled marl at 0.9 m	0.3	1.0
River Terrace Deposits (First Terrace)	Clay, silty, with chalk and flint pebbles, grey and orange mottled	1.0	2.0
	a 'Very clayey' pebbly sand Gravel: fine, angular to subangular, brown and grey flint with some rounded chalk and subrounded sandstone Sand: medium with fine, subangular to subrounded, quartz with coarse angular flint	0.5	2.5
	Silt, clayey, slightly sandy, organic laminated, with shell fragments, light grey becoming grey with depth	1.5	4.0
	b Gravel, clayey, with many pebbles, mainly black flint, coated with concretionary calcareous tufa between 4.0 m and 4.5 m; sandstone cobbles between 6.0 m and 6.2 m and more sandy and clayey between 6.9 m and 7.2 m Gravel: fine to coarse, angular to subangular, black, brown and white flint with subrounded sandstone, phosphatic nodules and fine rounded chalk and some quartz, quartzite, ironstone and limestone Sand: fine to medium, subangular to rounded, quartz with chalk and coarse, rounded chalk and angular black flint; olive-grey	3.2	7.2
Lower Greensand	**c** Sand Sand: medium to fine, subangular to subrounded quartz, glauconitic; olive-grey	0.3	7.5
Kimmeridge Clay	Clay, with sand horizons and layers of argillaceous limestone between 9.0 m and 9.2 m and at 10.5 m; very dark grey becoming grey with depth	3.0+	10.5

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
a	24	62	14	2.0–2.5	24	18	34	10	13	1
b	5	44	51	4.0–4.5	12	10	17	10	39	12
				4.5–5.0	3	5	22	19	38	13
				5.0–6.0	2	4	17	18	40	19
				6.0–6.2	Not sampled					
				6.2–7.2	7	29	16	8	25	15
				Mean	5	13	17	14	35	16
a+b	8	46	46	Mean	8	14	19	13	32	14
c	8	90	2	7.2–7.5	8	31	53	6	2	—

TL 46 SW 134 4189 6473 Near Meadow Farm, Oakington **Block D**

Surface level +7.4 m
Water struck at −2.2 m
152 mm percussion
March 1977

Waste 10.3 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown and reddish yellow mottled stony sandy clay	1.0	1.0
Boulder Clay	Clay, brownish yellow, becoming light olive-brown and strong brown mottled	1.1	2.1
	Clay, laminated, silty, with some coarse chalk sand, dark grey	4.0	6.1
	Silt, dark grey	3.1	9.2
	Clay, with chalk and occasional quartzite pebbles and limestone cobbles, very dark grey	1.1	10.3
Kimmeridge Clay	Clay, firm, fossiliferous, very dark grey	3.0+	13.3

TL 46 SW 135 4256 6041 Near Bunker's Hill, Girton **Block D**

Surface level +23.8 m
Water struck at +22.0 m
152 mm percussion
January 1977

Overburden 0.3 m
Mineral 2.3 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, greyish brown, stony, sandy, clay loam	0.3	0.3
Observatory Gravels	Sandy gravel Gravel: fine with coarse, angular to subangular, white, yellow and grey flint with fine rounded to well-rounded chalk, with some ironstone, quartz and limestone and occasional sandstone, quartzite and phosphatic nodules Sand: medium with fine, subangular to rounded, quartz with chalk and coarse, subrounded chalk with angular flint; yellowish brown	2.3	2.6
Gault	Clay, firm, grey	3.0+	5.6

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
9	52	39	0.3–1.5	13	7	30	13	29	8
			1.5–2.6	5	7	27	19	34	8
			Mean	9	7	29	16	31	8

COMPOSITION

Depth below surface (m)	Percentages by weight in 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
0.3–1.5	80	1	3	1	12	trace	3
1.5–2.6	58	2	3	2	33	–	2
Mean	69	1	3	1	23	trace	3

TL 46 SW 136 4242 6247 Near Red House Farm, Girton **Block D**

Surface level +19.6 m
Water struck at +17.8 m
152 mm percussion
January 1977

Overburden 0.6 m
Mineral 1.2 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, yellowish brown sandy clay loam	0.6	0.6
Observatory Gravels	'Clayey' gravel Gravel: fine to coarse, angular to subangular, brown, white and grey flint with subangular to subrounded sandstone and quartzite and some fine chalk, quartz, limestone and ironstone Sand: medium with fine, subangular to subrounded, quartz and coarse, angular flint and subrounded chalk	1.2	1.8
Gault	Clay, stiff, grey	3.0+	4.8

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
16	36	48	0.6–1.6	17	7	18	10	30	18
			1.6–1.8	11	7	19	13	35	15
			Mean	16	7	18	11	31	17

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
0.6–1.6	87	1	7	1	3	1	—
1.6–1.8	91	1	4	1	2	trace	1
Mean	88	1	6	1	3	1	trace

TL 46 SW 137 4257 6350 Near Meadow Road, Histon **Block D**

Surface level +8.3 m
Water struck at +7.2 m, +0.9 m and −0.1 m
152 mm percussion
February 1977

Overburden 1.1 m
Mineral 1.8 m
Bedrock 11.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, greyish brown clay loam	0.1	0.1
Alluvium	Clay, sandy, stony, pale yellow	1.0	1.1
River Terrace Deposits (Second Terrace)	**a** Gravel Gravel: fine to coarse, angular to subangular, brown and grey flint with fine, rounded chalk and some sandstone, quartzite and quartz Sand: medium with fine, subrounded, quartz with subangular chalk and coarse, angular flint and subrounded chalk; pale yellow	1.8	2.9
Gault	Clay, stiff, grey, becoming sandy at 6.7 m	4.4	7.3
Lower Greensand	**b** 'Clayey' sand, with a sandstone horizon between 7.3 m and 7.4 m Sand: fine to medium, subrounded to rounded, quartz with some sandstone fragments, glauconitic, dark olive-grey	0.9	8.2
	Clay, stiff, sandy, very dark grey becoming soft and black at 9.0 m	1.2	9.4
	c Sand with sandstone horizons between 11.4 m and 11.5 m and 11.9 m and 12.4 m Sand: fine to medium, subrounded to rounded, quartz with sandstone fragments and phosphatic nodules, glauconitic, dark olive-grey	3.7	13.1
Ampthill Clay	Clay, stiff, dark grey with pyritised borings and ammonites	1.6+	14.7

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
a	5	44	51	1.1–2.1	7	5	18	14	29	27
				2.1–2.9	2	4	30	18	30	16
				Mean	5	5	23	16	29	22
b	11	88	1	7.3–8.2	11	46	37	5	1	—
c	4	96	0	9.4–10.4	3	63	32	2	—	—
				10.4–11.4	3	49	45	2	1	—
				11.4–12.4	4	40	53	3	—	—
				12.4–13.1	5	43	51	1	—	—
				Mean	4	49	45	2	—	—
b+c	5	95	0	Mean	5	49	44	2	—	—

TL 46 SW 138 4277 6388 Girton Crossing, Histon **Block D**

Surface level +10.4 m
Water struck at +9.1 m and +3.0 m
152 mm percussion
February 1977

Overburden 0.1 m
Mineral 6.0 m
Waste 10.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark yellowish brown stony clay loam	0.1	0.1
River Terrace Deposits (Third Terrace)	Sandy gravel, clayey with mainly brown flint pebbles from 0.1 m to 1.1 m Gravel: fine to coarse, angular to subangular, brown, white and grey flint and fine, rounded to well-rounded chalk with some sandstone, quartzite, quartz, ironstone and phosphatic nodules Sand: medium with fine, subangular to subrounded, quartz with subangular chalk and some ironstone and coarse, subrounded chalk and angular flint; yellow	6.0	6.1
Boulder Clay	Clay, stiff, grey, becoming dark grey at 7.4 m	2.0	8.1
	Silt, clayey, light grey	5.1	13.2
	Clay, stiff, dark grey, becoming soft and sandy at 13.5 m, with fine rounded chalk and some limestone, sandstone and mafic igneous pebbles	3.6+	16.8

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
7	63	30	0.1–0.9	28	23	28	4	12	5
			0.9–1.1	18	13	30	7	27	5
			1.1–2.1	4	7	28	22	34	5
			2.1–3.1	2	18	22	19	33	6
			3.1–4.1	3	8	35	27	22	5
			4.1–5.1	5	11	26	25	26	7
			5.1–6.1	3	17	28	26	15	11
			Mean	7	14	28	21	24	6

TL 46 SW 139 4348 6440 Gun's Lane, Histon **Block D**

Surface level +10.1 m
Water struck at 8.6 m
152 mm percussion
September 1977

Overburden 0.7 m
Mineral 1.6 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown sandy clay loam	0.7	0.7
River Terrace Deposits (Third Terrace)	'Very clayey' sandy gravel Gravel: mainly fine, angular to subangular, grey and white with 'brown flint' and rounded to well-rounded chalk, with some sandstone, ironstone and quartz Sand: medium and fine, subangular to subrounded, quartz with some chalk, flint and ironstone and coarse, rounded chalk and angular flint; yellowish brown and grey mottled becoming brownish yellow at 1.3 m	1.6	2.3
Gault	Clay, stiff, light olive-brown and yellow mottled, becoming medium grey with depth	1.0+	3.3

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
22	57	21	0.7–1.3	36	14	19	11	19	1
			1.3–2.3	13	21	28	16	19	3
			Mean	22	18	25	14	19	2

TL 46 SW 140 4342 6322 Near Park Farm, Histon **Block D**

Surface level +12.4 m
Water struck at +9.4 m
152 mm percussion
January 1977

Overburden 6.0 m
Mineral 1.4 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, greyish brown sandy clay loam becoming calcareous brown clay at 0.3 m	1.3	1.3
River Terrace Deposits (Third Terrace)	Clay, sandy with fine, angular to subangular, flint pebbles, becoming sandy clay at 2.6 m and silty at 3.16 m; yellowish brown becoming grey with depth	2.8	4.1
	Clay, stiff, grey	1.9	6.0
	'Clayey' gravel Gravel: fine to coarse, angular to subrounded, grey and black flint with some fine quartz and chalk Sand: fine to coarse, subangular to subrounded, quartz with angular flint	1.4	7.4
Gault	Clay, stiff, grey	3.0+	10.4

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
14	22	64	6.0–7.4	14	6	8	8	23	41

TL 46 SW 141 4318 6283 Near Bower's Farm, Histon **Block D**

Surface level +15.1 m
Water struck at 12.9 m
152 mm percussion
January 1977

Overburden 0.8 m
Mineral 2.9 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, greyish brown, stony, sandy clay loam becoming yellowish brown calcareous sandy clay at 0.2 m	0.8	0.8
River Terrace Deposits (Fourth Terrace)	'Clayey' sandy gravel Gravel: fine with coarse, angular to subangular, brown, grey and white flint with fine chalk and some sandstone and quartz and a trace of limestone and ironstone Sand: medium with fine, subangular to subrounded, chalk and quartz and coarse, rounded chalk with angular flint	2.9	3.7
Gault	Clay, stiff, grey	3.0+	6.7

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
11	63	26	0.8–1.8	18	16	26	11	20	9
			1.8–2.8	8	5	32	31	21	3
			2.8–3.7	7	3	25	39	18	8
			Mean	11	8	28	27	20	6

TL 46 SW 142 4360 6246 Near Allotments, Histon **Block D**

Surface level +11.7 m
Water struck at +10.3 m
152 mm percussion
January 1977

Overburden 0.4 m
Mineral 7.8 m
Bedrock 2.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, greyish brown silty clay loam	0.4	0.4
River Terrace Deposits (Third Terrace)	Sandy gravel with 'clayey' sand between 0.4 m and 0.7 m Gravel: fine with coarse, angular to subangular, brown, white and grey flint with fine rounded to well-rounded chalk and some sandstone, quartzite, quartz, limestone and phosphatic nodules with a trace of ironstone, siltstone, mudstone, igneous rock and shell fragments Sand: medium with fine, subangular to subrounded, quartz with chalk and coarse angular flint and rounded chalk; light yellowish brown	7.8	8.2
Gault	Clay, stiff, light grey, becoming darker with depth	2.0+	10.2

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
8	66	26	0.4–1.4	30	28	19	10	12	1
			1.4–2.4	12	13	27	13	30	5
			2.4–3.4	3	18	44	18	17	—
			3.4–4.4	1	19	34	21	20	5
			4.4–5.4	3	8	24	23	28	14
			5.4–6.4	5	12	38	22	16	7
			6.4–7.4	5	10	34	21	22	8
			7.4–8.2	3	10	41	22	16	8
			Mean	8	15	32	19	20	6

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
0.4–1.4	60	1	21	1	16	–	1
1.4–2.4	66	1	4	trace	27	–	2
2.4–3.4	62	2	3	3	23	–	7
3.4–4.4	68	3	1	5	22	–	1
4.4–5.4	56	5	1	8	26	–	4
5.4–6.4	60	2	1	6	27	–	4
6.4–7.4	62	1	4	6	23	1	3
7.4–8.2	55	3	2	7	27	trace	6
Mean	62	2	4	5	24	trace	3

TL 46 SW 143 4370 6157 Woodhouse Farm, Impington **Block D**

Surface level +12.3 m
Water struck at +10.7 m
152 mm percussion
January 1979

Overburden 1.1 m
Mineral 2.9 m
Waste 0.3 m
Mineral 3.0 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, greyish brown sandy clay loam, becoming brown clay at 0.3 m	1.1	1.1
River Terrace Deposits (Third Terrace)	**a** Sandy gravel Gravel: mainly fine, angular to subangular, brown and white flint with rounded to well-rounded chalk and some sandstone, quartzite, quartz and phosphatic nodules Sand: medium with fine, subangular to subrounded, quartz with chalk and coarse angular flint and rounded chalk; light yellowish brown becoming very pale brown	2.9	4.0
	Silt, clayey, organic, laminated	0.3	4.3
	b Sandy gravel Gravel: fine to coarse, angular to subangular, grey and black flint with rounded to well-rounded chalk and some quartz, sandstone and phosphatic nodules Sand: medium with fine, subangular to subrounded, quartz with chalk and coarse, angular flint and rounded chalk; yellow	3.0	7.3
Gault	Clay, stiff, grey	3.0+	10.3

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	9	60	31	1.1–2.1	18	18	23	18	22	1
				2.1–3.1	2	7	26	23	35	7
				3.1–4.0	6	11	34	21	22	6
				Mean	9	12	27	21	26	5
b	8	63	29	4.3–5.3	5	16	30	18	25	6
				5.3–6.3	8	9	37	19	19	8
				6.3–7.3	10	10	35	15	19	11
				Mean	8	12	34	17	21	8
a+b	8	62	30	Mean	8	12	31	19	24	6

TL 46 SW 144 4364 6053 White House, Histon **Block D**

Surface level +19.4 m
Water struck at +17.4 m
152 mm percussion
January 1977

Overburden 0.6 m
Mineral 1.9 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, greyish brown stony, silty clay loam	0.6	0.6
River Terrace Deposits (Fourth Terrace)	'Clayey' sandy gravel, clayey between 0.6 m and 1.6 m. High chalk content below 1.6 m Gravel: mainly fine, angular to subangular, black and brown flint and rounded to well-rounded chalk, with some quartz and ironstone Sand: medium with fine, becoming coarser with depth, subangular to rounded quartz with angular to well-rounded chalk and angular flint and some rounded ironstone; dark yellowish brown, becoming olive-yellow with depth	1.9	2.5
Gault	Clay, firm grey	3.0+	5.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
13	49	38	0.6–1.6	21	10	29	7	22	11
			1.6–2.5	4	6	21	26	33	10
			Mean	13	8	25	16	27	11

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
0.6–1.6	88	5	2	–	2	3	–
1.6–2.5	63	2	8	–	25	2	–
Mean	74	3	6	–	15	2	–

TL 46 SW 145 4486 6181 Near Cawcutt's Farm, Impington **Block D**

Surface level +12.7 m
Water struck at +11.1 m
152 mm percussion
January 1977

Overburden 0.7 m
Mineral 2.2 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, greyish brown clay loam becoming brownish yellow, stony, sandy silty clay at 0.3 m	0.7	0.7
River Terrace Deposits (Third Terrace)	Sandy gravel Gravel: mainly fine, angular to subangular, brown, white and grey flint and rounded to well-rounded chalk with some sandstone, quartzite and quartz Sand: medium with fine, subangular to subrounded, quartz with chalk, with coarse angular flint and rounded chalk; yellow	2.2	2.9
Gault	Clay, stiff, olive becoming dark grey with depth	3.0+	5.9

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
5	71	24	0.7–1.7	8	10	44	12	21	5
			1.7–2.7	2	24	41	11	16	6
			2.7–2.9	4	13	43	13	21	6
			Mean	5	17	42	12	19	5

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
0.7–1.7	69	2	7	–	22	–	trace
1.7–2.7	58	3	3	1	35	–	–
2.7–2.9	63	2	5	1	29	–	–
Mean	64	3	5	trace	28	–	trace

TL 46 SW 146 4480 6336 Near Impington Park, Impington

Surface level +13.7 m
Water struck at +8.2 m
152 mm percussion
February 1977

Waste 0.7 m
Bedrock 4.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown silty clay loam	0.7	0.7
Gault	Clay, soft, silty, pale brown, becoming very pale brown at 1.5 m and grey at 3.1 m	4.9+	5.6

TL 46 SW 147 4497 6396 Near Mill Lane Farm, Histon **Block D**

Surface level +11.4 m
Water not struck
152 mm percussion
February 1977

Waste 1.2 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey sandy clay loam, becoming pale brown and red or olive mottled stony sandy clay at 0.2 m	1.2	1.2
Gault	Clay, stiff, slightly sandy, fossiliferous, pale olive becoming grey with depth	3.0+	4.2

TL 46 SE 94 4529 6347 Near Mitton Road, Impington

Surface level +11.5 m
Water struck at +10.0 m
152 mm percussion
February 1977

Waste 1.6 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, greyish brown sandy clay loam becoming brownish yellow and olive mottled clay with depth	1.5	1.5
River Terrace Deposits (Third Terrace)	'Clayey' pebbly sand Gravel: fine, angular to subangular, grey and brown flint and rounded chalk with some quartz and sandstone Sand: fine to coarse, subangular to rounded, quartz with angular flint and subangular to rounded chalk	0.1	1.6
Gault	Clay, firm, light grey	3.0+	4.6

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
10	75	15	1.5–1.6	10	20	36	19	15	—

TL 46 SE 95 4557 6240 Near King's Hedges, Impington **Block D**

Surface level +12.3 m
Water struck at +10.7 m
152 mm percussion
February 1977

Waste 1.9 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark brown clay loam, becoming brownish yellow stony clay with depth	1.5	1.5
River Terrace Deposits (Third Terrace)	'Very clayey' sandy gravel Gravel: fine, angular to subangular, yellow flint and rounded chalk with some quartz and sandstone Sand: fine to coarse, subangular to rounded, quartz with angular flint and subangular to rounded chalk; yellow	0.4	1.9
Gault	Clay, firm, grey	3.0+	4.9

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
33	50	17	1.5–1.9	33	16	21	13	16	1

TL 46 SE 96 4517 6201 Near Field Steading, Impington **Block D**

Surface level +12.7 m
Water struck at +11.5 m
152 mm percussion
February 1977

Overburden 0.5 m
Mineral 1.8 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown silt loam becoming brown stony clay with depth	0.5	0.5
River Terrace Deposits (Third Terrace)	Sandy gravel, with more chalk below 1.5 m Gravel: mainly fine, angular to subangular, grey and brown flint and rounded to well-rounded chalk with some quartz and sandstone Sand: medium, subrounded to rounded, quartz with coarse angular flint and rounded chalk, and fine subangular quartz with chalk; yellow	1.8	2.3
Gault	Clay, olive-grey becoming medium grey with depth	3.0+	5.3

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
8	61	31	0.5–1.5	13	15	28	11	26	7
			1.5–2.3	3	16	36	17	26	2
			Mean	8	15	32	14	26	5

TL 46 SE 97 4672 6186 Trinity Farm, Milton **Block D**

Surface level +9.5 m
Water struck at +8.1 m
152 mm percussion
February 1977

Overburden 1.1 m
Mineral 1.6 m
Waste 0.8 m
Mineral 2.2 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown clay loam, becoming yellowish brown stony sandy clay at 0.3 m	1.1	1.1
River Terrace Deposits (Third Terrace)	**a** Sandy gravel, more pebbly between 1.3 m and 2.3 m Gravel: mainly fine, angular to subangular, brown and white flint and rounded chalk with some sandstone, quartzite, limestone and phosphatic nodules Sand: mainly medium, subrounded, quartz with chalk and coarse, angular flint and subrounded chalk; light brownish yellow	1.6	2.7
	Clay, sandy, silty, organic brownish yellow becoming very dark greyish brown and more silty with depth	0.8	3.5
	b Sandy gravel with coarse pebbles between 3.8 m and 4.0 m and occasional clay seams Gravel: mainly fine, angular to subangular, yellow flint and rounded to well-rounded chalk with some quartz, sandstone and phosphatic nodules Sand: mainly medium, subrounded, quartz with chalk and coarse, angular flint and subrounded to rounded chalk; light yellowish brown becoming reddish yellow with depth	2.2	5.7
Gault	Clay, plastic, light brownish grey becoming firm dark grey	3.0+	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	+16–64
a	1	64	35	1.1–2.3	1	8	30	20	30	11
				2.3–2.7	3	8	53	19	15	2
				Mean	1	8	36	20	26	9
b	2	53	45	3.5–4.5	4	3	29	17	37	10
				4.5–5.7	1	3	27	26	36	7
				Mean	2	3	28	22	37	8
a+b	2	57	41	Mean	2	5	31	21	32	9

TL 46 SE 98 4731 6171 Near Chesterton Fen, Cambridge

Surface level +6.8 m
Water struck at +5.8 m
152 mm percussion
March 1977

Overburden 0.1 m
Mineral 2.1 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey humose loam	0.1	0.1
River Terrace Deposits (Second Terrace)	Sandy gravel Gravel: fine with coarse, angular to subangular, brown, white and black flint with fine, rounded white with brown chalk and some sandstone, quartzite, quartz and phosphatic nodules Sand: medium, subrounded, quartz with chalk and coarse, angular flint and rounded chalk with fine, subangular to subrounded quartz; yellowish brown, becoming dark grey below 1.3 m	2.1	2.2
Gault	Clay, olive-grey, becoming medium dark grey with depth	3.0+	5.2

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
4	59	37	0.1–1.3	6	19	29	13	28	5
			1.3–2.2	1	5	30	21	33	10
			Mean	4	13	30	16	30	7

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
0.1–1.3	77	3	2	–	18	–	–
1.3–2.2	80	1	2	–	17	–	trace
Mean	78	2	2	–	18	–	trace

TL 46 SE 99 4781 6337 Rectory Farm, Milton **Block E**

Surface level +7.4 m
Water struck at +6.3 m
152 mm percussion
March 1977

Overburden 0.8 m
Mineral 1.7 m
Bedrock 2.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown stony clay loam	0.8	0.8
River Terrace Deposits (Second Terrace)	Gravel Gravel: fine to coarse, brown, grey and black, angular to subangular, flint with fine rounded chalk, and some sandstone, quartzite, quartz, phosphatic nodules and a trace of ironstone Sand: medium and coarse, subrounded, chalk and quartz with angular flint, with fine, subangular to subrounded quartz; brownish yellow	1.7	2.5
Gault	Clay, sticky, grey, becoming firm and medium dark grey with depth	2.5+	5.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
2	46	52	0.8–1.8	3	7	21	19	31	19
			1.8–2.5	1	6	29	10	32	22
			Mean	2	7	24	15	32	20

TL 46 SE 100 4791 6449 Near Worts Farm, Landbeach **Block E**

Surface level +6.1 m
Water struck at +4.1 m
152 mm percussion
July 1977

Overburden 1.0 m
Mineral 1.7 m
Bedrock 2.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark yellowish brown sandy clay loam	1.0	1.0
River Terrace Deposits (Second Terrace)	Sandy gravel, with a clay seam between 2.1 m and 2.2 m and cobbles between 2.3 m and 2.7 m Gravel: fine to coarse, angular to subangular, brown, white with black flint and fine, rounded to well-rounded chalk and some sandstone, quartz and phosphatic nodules Sand: medium, subrounded, quartz with chalk and some ironstone and coarse, subrounded to rounded chalk and angular flint, with fine subangular to subrounded quartz; pale olive	1.7	2.7
Gault	Clay, plastic, medium grey	2.0+	4.7

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
9	55	36	1.0–2.0	11	16	22	16	28	7
			2.0–2.7	7	10	31	15	28	9
			Mean	9	13	26	16	28	8

TL 46 SE 101 **4874 6462** **Near The Hawks, Landbeach** **Block E**

Surface level +5.0 m
Water struck at +4.0 m
152 mm percussion
February 1977

Overburden 0.8 m
Mineral 3.4 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown clay loam, becoming light yellowish brown loam at 0.4 m	0.8	0.8
River Terrace Deposits (Second Terrace)	Sandy gravel Gravel: fine to coarse, angular to subangular, brown, white with black flint and fine, rounded to well-rounded chalk with some sandstone, quartz, limestone and phosphatic nodules Sand: mainly medium, subrounded, quartz with subangular to subrounded chalk and angular flint and coarse, subrounded to rounded chalk and angular flint; brownish yellow becoming pale olive with depth	3.4	4.2
Gault	Clay, plastic, grey, becoming firm and bluish grey with depth	3.0+	7.2

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
3	51	46	0.8–1.2	16	27	29	9	13	6
			1.2–2.2	0	7	25	21	31	16
			2.2–3.2	1	3	33	22	32	9
			3.2–4.2	2	1	16	22	40	19
			Mean	3	6	25	20	32	14

TL 46 SE 102 4857 6373 Near Meadow Farm, Milton **Block E**

Surface level +5.7 m
Water struck at +4.4 m
152 mm percussion
February 1977

Overburden 0.7 m
Mineral 3.5 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown sandy loam becoming dark yellowish brown sandy clay at 0.2 m	0.7	0.7
River Terrace Deposits (Second Terrace)	Sandy gravel Gravel: fine, angular to subangular, brown, white and grey flint with rounded to well-rounded chalk and some sandstone, quartz and phosphatic nodules with coarse, subangular to subrounded flint Sand: mainly medium, subrounded, quartz with chalk with coarse, angular flint and subrounded to rounded chalk; yellow, becoming very pale brown with depth	3.5	4.2
Gault	Clay, firm, grey	3.0+	7.2

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
4	58	38	0.7–1.7	9	14	28	16	29	4
			1.7–2.5	2	5	20	18	42	13
			2.5–3.5	1	7	37	17	26	12
			3.5–4.2	5	6	38	26	21	4
			Mean	4	8	31	19	30	8

TL 46 SE 103 4857 6227 Baits Bite Lock, Milton **Block E**

Surface level +3.4 m
Water struck at +2.4 m
152 mm percussion
February 1977

Overburden 1.0 m
Mineral 1.7 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown clay, becoming yellowish brown sandy clay at 0.2 m	0.6	0.6
Alluvium	Clay, firm, very dark greyish brown	0.4	1.0
River Terrace Deposits (First Terrace)	Gravel Gravel: fine to coarse, angular to subangular, grey, white and brown flint and fine, rounded to well-rounded chalk, with phosphatic nodules and some quartz and sandstone Sand: medium, subrounded, quartz and chalk and coarse, angular flint and subrounded to rounded chalk; pale yellow	1.7	2.7
Gault	Clay, sticky, pale yellow, becoming firm and grey with depth	3.0+	5.7

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
1	38	61	1.0–2.0	0	2	18	15	38	27
			2.0–2.7	3	3	22	18	38	16
			Mean	1	2	20	16	38	23

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
1.0–2.0	66	1	6	4	22	1	trace
2.0–2.7	65	1	2	3	27	1	1
Mean	66	1	4	4	24	1	trace

TL 46 SE 104 4877 6168 Biggin Abbey, Fen Ditton **Block E**

Surface level +5.6 m
Water struck at +4.2 m
152 mm percussion
July 1977

Overburden 0.5 m
Mineral 1.6 m
Bedrock 1.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown stony, sandy loam	0.5	0.5
River Terrace Deposits (Second Terrace)	Sandy gravel Gravel: fine, angular to subangular, grey, white and brown flint and rounded to well-rounded chalk with some phosphatic nodules, sandstone, quartzite and quartz and a trace of limestone, with coarse subangular flint Sand: medium with fine, subrounded, quartz with ironstone, with coarse, angular flint and subrounded to rounded chalk; dark brown becoming yellowish brown with depth	1.6	2.1
Gault	Clay, firm, pale olive becoming medium dark grey with depth	1.7+	3.8

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
6	65	29	0.5–1.4	9	11	30	13	28	9
			1.4–2.1	1	18	51	11	15	4
			Mean	6	14	39	12	22	7

TL 46 SE 105 4810 6084 Green End, Fen Ditton

Surface level +4.8 m
Water struck at +1.1 m
152 mm percussion
July 1977

Overburden 4.8 m
Mineral 1.6 m
Bedrock 1.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown silty, clay loam	1.0	1.0
Alluvium	Silt, shelly, dark greyish brown	1.6	2.6
Peat	Peat, silty, shelly, brown and greenish black	1.0	3.6
Barroway Drove Beds	Silt, shelly, dark grey, becoming clayey and greenish grey below 3.7 m	1.2	4.8
River Terrace Deposits (Undifferentiated)	Gravel Gravel: fine to coarse, angular to subangular, black and grey flint and rounded to well-rounded chalk with some phosphatic nodules, sandstone, quartz and limestone Sand: coarse, subrounded to rounded, chalk and angular flint and medium, subrounded quartz; dark grey	1.6	6.4
Gault	Clay, firm, medium grey	1.6+	8.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
1	40	59	4.8–5.8	1	2	17	21	35	24
			5.8–6.4	Sample absent					

TL 46 SE 106 4969 6289 Near Parsonage Farm, Horningsea **Block E**

Surface level +4.5 m
Water struck at +2.4 m
152 mm percussion
September 1977

Overburden 1.5 m
Mineral 1.4 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	1.4	1.4
	Soil, dark yellowish brown sandy clay	0.1	1.5
River Terrace Deposits (First Terrace)	Sandy gravel, more sandy between 1.5 m and 2.1 m Gravel: mainly fine, angular to subangular, brown with grey flint and rounded to well-rounded chalk with some ironstone, sandstone, quartz and phosphatic nodules Sand: medium, subrounded to rounded, quartz with ironstone and coarse, angular to subangular flint and rounded chalk with fine, subangular to rounded quartz, reddish yellow	1.4	2.9
Gault	Clay, olive-grey becoming medium grey with depth	1.0+	3.9

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
3	55	42	1.5–2.5	3	16	24	17	33	7
			2.5–2.9	2	10	17	23	44	4
			Mean	3	14	22	19	36	6

TL 46 SE 107 4966 6316 Manor House, Horningsea **Block E**

Surface level +4.4 m
Water struck at +2.5 m
152 mm percussion
July 1977

Overburden 0.8 m
Mineral 1.8 m
Bedrock 1.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown sandy clay loam	0.8	0.8
River Terrace Deposits (Second Terrace)	'Clayey' sandy gravel Gravel: fine to coarse, angular to subangular, brown with grey and white flint with some fine chalk, sandstone, quartzite, quartz, limestone and phosphatic nodules Sand: medium to fine, subangular to subrounded, quartz with some ironstone with coarse, angular flint and rounded chalk; strong brown becoming light olive-brown with depth	1.8	2.6
Gault	Clay, firm, medium grey becoming medium dark grey with depth	1.4+	4.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
16	53	31	0.8–1.6	16	16	31	6	21	10
			1.6–2.6	Sample absent					

TL 46 SE 108 4902 6361 Milton Fen, Milton **Block E**

Surface level +4.3 m
Water struck at +3.3 m
152 mm percussion
March 1977

Overburden 0.8 m
Mineral 1.0 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey clay loam becoming dark greyish brown clay at 0.4 m	0.8	0.8
River Terrace Deposits (First Terrace)	Sandy gravel Gravel: fine to coarse, angular to subangular, brown, grey, and white flint with some fine chalk, sandstone, quartzite, quartz and phosphatic nodules Sand: medium, subrounded quartz and coarse, angular flint and subrounded to rounded chalk, with fine subangular to subrounded quartz; brownish yellow	1.0	1.8
Gault	Clay, firm, medium grey	3.0+	4.8

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
9	46	45	0.8–1.8	9	9	22	15	33	12

TL 46 SE 109 4991 6452 Near The Old Tillage, Waterbeach **Block E**

Surface level +2.8 m
Water struck at −0.2 m
152 mm percussion
February 1977

Overburden 3.5 m
Mineral 0.3 m
Waste 0.3 m
Mineral 0.4 m
Bedrock 3.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark reddish brown humose clay loam	1.0	1.0
Alluvium	Clay, peaty, black	1.5	2.5
Peat	Peat, reddish black	0.5	3.0
? Barroway Drove Beds	Clay, pebbly, pale blue	0.5	3.5
River Terrace Deposits (Undifferentiated)	**a** Gravel Gravel: fine to coarse, angular to subangular, black and grey flint and fine, rounded to well-rounded chalk with some sandstone, quartzite, quartz, limestone and phosphatic nodules Sand: mainly medium, subrounded quartz and coarse, angular flint and subrounded chalk	0.3	3.8
	Clay, firm, pale blue	0.3	4.1
	b 'Very clayey' gravel Gravel: fine to coarse, angular to subangular, brown, grey and white flint with fine rounded to well-rounded chalk and phosphatic nodules and some sandstone, quartzite, quartz, limestone, ironstone and shell fragments Sand: mainly medium, subrounded quartz and coarse, angular flint and subrounded chalk; yellow	0.4	4.5
Gault	Clay, firm, grey	3.5+	8.0

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	6	32	62	3.5–3.8	6	4	14	14	44	18
b	24	23	53	4.1–4.5	24	3	11	9	28	25
a+b	16	27	57	Mean	16	4	12	11	35	22

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
3.5–3.8	65	2	2	8	21	1	1
4.1–4.5	65	3	3	10	17	1	1
Mean	65	2	2	8	21	1	1

TL 47 NW 18 4053 7971 Bedingham's Drove, Sutton **Block A**

Surface level +0.3 m
Water struck at −3.1 m
152 mm percussion
June 1977

Overburden 3.3 m
Mineral 3.5 m
Bedrock 1.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark brown loam becoming orange mottled with depth	1.5	1.5
Peat	Clay, peaty, grey, becoming black clayey peat with depth	1.8	3.3
River Terrace Deposits (Undifferentiated)	Sandy gravel Gravel: fine with coarse, angular to subangular, brown, grey and white flint with grey, subrounded to rounded quartzite and fine, rounded to well-rounded chalk, with some quartz, sandstone, ironstone, limestone and shell fragments Sand: mainly coarse, angular flint and rounded chalk and medium, subangular to subrounded quartz	3.5	6.8
Ampthill Clay	Clay, silty, fossiliferous, medium dark grey	1.2+	8.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
1	51	48	3.3–4.3	1	3	26	26	34	10
			4.3–5.3	1	2	26	25	43	3
			5.3–6.8	1	1	21	24	44	9
			Mean	1	2	24	25	41	7

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
3.3–4.3	60	3	11	7	13	4	2
4.3–5.3	69	4	10	4	10	1	2
5.3–6.8	62	2	13	4	11	4	4
Mean	64	3	11	5	11	3	3

TL 47 NW 19 4092 7809 Sutton Meadlands, Sutton **Block A**

Surface level +0.7 m
Water struck at −2.3 m
152 mm percussion
June 1977

Overburden 3.0 m
Mineral 4.0 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark brown peaty loam	0.8	0.8
Peat	Peat, clayey, very dark brown	0.8	1.6
Barroway Drove Beds	Clay, peaty, grey	1.3	2.9
Peat	Peat, black	0.1	3.0
River Terrace Deposits (Undifferentiated)	Gravel Gravel: fine with coarse, angular to subangular, black and brown flint becoming brown and white below 4.0 m, with rounded quartzite and fine, well-rounded chalk and some quartz, sandstone, ironstone, limestone and shell fragments Sand: mainly medium, subrounded to rounded, quartz and coarse, angular flint and rounded chalk with quartz, sandstone, ironstone and limestone; brown	4.0	7.0
Ampthill Clay	Clay, stiff, medium dark grey	1.0+	8.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
2	48	50	3.0–4.0	2	3	21	12	49	13
			4.0–5.0	2	3	33	21	36	5
			5.0–6.0	1	2	19	33	42	3
			6.0–7.0	1	2	23	24	36	14
			Mean	2	2	24	22	41	9

TL 47 NW 20 4004 7732 Ring Farm, Sutton **Block A**

Surface level +2.2 m
Water struck at −3.2 m
152 mm percussion
June 1977

Overburden 6.4 m
Mineral 0.7 m
Bedrock 0.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.4	0.4
	Soil, very dark brown silty clay loam	0.2	0.6
Alluvium	Clay, silty, bluish grey with very dark brown, shelly, peaty clay below 1.3 m, and pebbles at 2.4 m; becoming more silty with depth	5.8	6.4
River Terrace Deposits (Undifferentiated)	Gravel Gravel: fine to coarse, angular to subangular, black and brown flint with rounded quartzite and some quartz, sandstone and chalk Sand: mainly coarse, angular flint with rounded chalk; greyish brown	0.7	7.1
Ampthill Clay	Clay, silty, fossiliferous, medium dark grey	0.9+	8.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
8	10	82	6.4–7.1	8	0	2	8	48	34

TL 47 NW 21 4048 7611 Near Cradge Bank, Sutton **Block A**

Surface level +1.9 m
Water level not recorded
152 mm percussion
June 1977

Overburden 5.4 m
Mineral 3.3 m
Waste 0.7 m
Bedrock 1.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.1	0.1
	Soil, dark brown, stony clay loam	1.3	1.4
Alluvium	Clay, soft, dark grey and dusky blue, shelly with plant remains, becoming firmer and very dark brown and dark olive-grey with depth	4.0	5.4
River Terrace Deposits (Undifferentiated)	Gravel Gravel: fine with coarse, angular to subangular, brown and white flint with phosphatic nodules and some quartz, quartzite, sandstone, limestone, chalk, shelly fragments and igneous material Sand: mainly coarse, angular flint with rounded chalk and medium, subangular to subrounded quartz; brown becoming greyish brown with depth	3.3	8.7
	Clay, stiff, greyish black with mainly flint and quartzite pebbles	0.7	9.4
Ampthill Clay	Clay, silty, very dark grey, with occasional shell fragments	1.1+	10.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
2	42	56	5.4–6.4	1	2	19	17	45	16
			6.4–7.4	2	2	24	23	43	6
			7.4–8.7	3	2	17	20	50	8
			Mean	2	2	20	20	46	10

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
5.4–6.4	70	7	13	4	3	1	2
6.4–7.4	81	2	5	9	2	trace	1
7.4–8.7	77	5	4	9	3	1	1
Mean	76	4	7	8	3	trace	2

TL 47 NW 22 4046 7523 Hermitage Farm, Haddenham **Block A**

Surface level +2.0 m
Water struck at −0.1 m
152 mm percussion
June 1977

Overburden 3.5 m
Mineral 2.7 m
Bedrock 0.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown and orange mottled clay loam becoming clay at 0.3 m	1.0	1.0
Peat	Peat, black, with some clay; becoming greenish black at 1.5 m	1.2	2.2
Barroway Drove Beds	Clay, peaty, greenish black	1.3	3.5
River Terrace Deposits (Undifferentiated)	Sandy gravel Gravel: fine with coarse, angular to subangular, brown, black and grey flint with some fine quartz, quartzite, sandstone, ironstone, chalk, limestone and shell fragments Sand: medium with fine, subrounded, quartz with some angular flint, subrounded quartzite and ironstone and coarse, angular flint with subrounded quartzite and rounded chalk; olive becoming light olive-brown	2.7	6.2
Ampthill Clay	Clay, dark grey with occasional shell fragments	0.9+	7.1

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
4	54	42	3.5–4.5	7	6	33	16	35	3
			4.5–5.5	1	8	25	16	41	9
			5.5–6.2	2	11	27	21	35	4
			Mean	4	8	29	17	37	5

TL 47 NW 23 4190 7566 Near Willow Hall Farm, Haddenham **Block A**

Surface level +1.3 m
Water struck at −0.9 m
152 mm percussion
March 1977

Overburden 3.2 m
Mineral 1.0 m
Waste 1.3 m
Mineral 0.2 m
Bedrock 1.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark reddish brown peaty clay loam, becoming clay at 0.7 m	1.0	1.0
Peat	Peat, black	1.2	2.2
Barroway Drove Beds	Silt, clayey, soft, grey on clay, silty, black with some angular flint pebbles and wood fragments	1.0	3.2
River Terrace Deposits (Undifferentiated)	**a** Sandy gravel Gravel: fine with coarse, angular to subangular, black, white and brown flint with fine, well-rounded chalk and some quartz and sandstone Sand: medium with fine, subrounded, quartz and coarse, angular flint with rounded chalk; dark grey	1.0	4.2
	Silt, clayey, laminated, calcareous, bluish grey, with flint and chalk pebbles	1.3	5.5
	b 'Clayey' sandy gravel Gravel: fine to coarse, angular to subangular, black, white and brown flint with some fine, well-rounded chalk and subrounded sandstone and shell fragments Sand: medium with fine, subrounded, quartz with some chalk and flint with coarse, angular flint and rounded chalk; dark grey	0.2	5.7
Ampthill Clay	Clay, stiff, medium grey, with shell fragments and carbonate crystals	1.8+	7.5

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
a	4	59	37	3.2–4.2	4	12	29	18	31	6
b	16	62	22	5.5–5.7	16	12	41	9	16	6
a+b	6	59	35	Mean	6	12	31	16	29	6

TL 47 NW 24 4167 7656 Foulmire Fen, Haddenham **Block A**

Surface level +1.6 m
Water struck at −2.4 m
152 mm percussion
June 1977

Overburden 3.1 m
Mineral 3.8 m
Bedrock 1.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown peaty loam	1.0	1.0
Peat	Peat, black with clay laminae between 2.9 m and 3.1 m	2.1	3.1
River Terrace Deposits (Undifferentiated)	Sandy gravel Gravel: fine with coarse, angular to subangular, brown, white and grey flint with fine, well-rounded chalk and some quartz, quartzite, sandstone and limestone Sand: mainly medium, subrounded, quartz with some chalk and coarse, angular flint with rounded chalk; brown	3.8	6.9
Ampthill Clay	Clay, firm, dark grey with occasional shell fragments	1.6+	8.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
1	52	47	3.1–4.1	0	4	22	17	42	15
			4.1–5.1	0	3	36	24	34	3
			5.1–6.1	1	2	22	27	41	7
			6.1–6.9	1	2	25	26	34	12
			Mean	1	3	26	23	38	9

TL 47 NW 25 4189 7766 South Fen, Sutton **Block A**

Surface level +0.8 m
Water struck at −3.3 m
152 mm percussion
June 1977

Waste 4.8 m
Bedrock 1.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown peaty loam	1.4	1.4
Shell Marl	Clay, peaty, soft, grey	1.3	2.7
Peat	Peat, clayey, very dark brown with plant fragments	1.2	3.9
Barroway Drove Beds	Clay, peaty, soft, grey	0.2	4.1
River Terrace Deposits (Undifferentiated)	Gravel Gravel: fine to coarse, angular to subangular, black, brown and white flint with fine, well-rounded chalk and some quartz, quartzite and sandstone Sand: mainly medium, subrounded, quartz and coarse, angular flint and rounded chalk; olive-brown to dark greyish brown	0.7	4.8
Ampthill Clay	Clay, stiff, silty, medium dark grey	1.7+	6.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
3	44	53	4.1–4.8	3	3	21	20	40	13

TL 47 NW 26 4190 7886 The Gullet, Sutton **Block A**

Surface level +1.7 m
Water struck at −2.0 m
152 mm percussion
June 1977

Overburden 3.7 m
Mineral 3.3 m
Bedrock 1.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown and orange mottled clay loam, becoming black peaty clay loam at 0.6 m	0.8	0.8
Alluvium	Clay, peaty, black	0.7	1.5
Peat	Peat, very dark grey	1.0	2.5
Barroway Drove Beds	Silt, medium dark grey	1.2	3.7
River Terrace Deposits (Undifferentiated)	Gravel Gravel: fine with coarse, angular to subangular, black, grey, brown and white flint with fine, well-rounded chalk and some quartz, quartzite, sandstone, ironstone, limestone, shell fragments and igneous material Sand: mainly coarse, angular, flint with rounded chalk and subrounded quartzite, quartz and ironstone and medium, subrounded quartz with chalk and some ironstone; dark grey, becoming dark brown with depth	3.3	7.0
Ampthill Clay	Clay, stiff, dark grey and olive mottled	1.5+	8.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
1	49	50	3.7–4.7	1	5	28	21	37	8
			4.7–5.7	1	4	21	23	45	6
			5.7–7.0	1	1	16	30	46	6
			Mean	1	3	21	25	43	7

TL 47 NW 27 4174 7953 Bedingham's Farm, Sutton **Block A**

Surface level +0.3 m
Water struck at −3.6 m
152 mm percussion
June 1977

Overburden 4.0 m
Mineral 3.5 m
Bedrock 1.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	1.2	1.2
	Soil, very dark brown peaty loam	1.2	2.4
Alluvium	Clay, soft, peaty, grey with plant remains	1.4	3.8
Peat	Peat, clayey, very dark brown	0.2	4.0
River Terrace Deposits (Undifferentiated)	Sandy gravel Gravel: fine with coarse, angular to subangular, brown and white flint with fine, well-rounded chalk and some quartz, quartzite, sandstone, ironstone and limestone Sand: mainly coarse, angular flint and rounded chalk and medium, subrounded quartz; yellowish brown becoming brown with depth	3.5	7.5
Ampthill Clay	Clay, firm, dark grey	1.2+	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	+16–64
2	52	46	4.0–5.0	2	5	30	25	33	5
			5.0–6.0	4	2	22	21	41	10
			6.0–7.5	1	2	21	27	41	8
			Mean	2	3	24	25	39	7

TL 47 NW 28 4279 7934 Sutton Gault, Sutton **Block A**

Surface level +1.1 m
Water not struck
152 mm percussion
September 1977

Overburden 0.2 m
Mineral 1.2 m
Bedrock 2.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark reddish brown peaty clay loam	0.2	0.2
River Terrace Deposits (First Terrace)	'Very clayey' sand Sand: mainly medium and fine, subrounded to rounded, quartz with rounded ironstone and some subangular chalk; reddish yellow	1.2	1.4
Ampthill Clay	Clay, grey and yellow mottled, becoming medium dark grey with argillaceous limestone at 3.0 m	2.1+	3.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
32	65	3	0.2–1.4	32	25	36	4	3	—

TL 47 NW 29 4283 7830 South Fen Farm, Sutton **Block A**

Surface level +0.3 m
Water struck at −0.6 m
152 mm percussion
June 1977

Waste 3.2 m
Bedrock 1.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark brown loam	0.9	0.9
Peat	Peat, very dark brown, becoming clayey with depth	1.4	2.3
River Terrace Deposits (Undifferentiated)	'Clayey' gravel Gravel: mainly fine, angular to subangular, black, brown and white flint with some quartz, sandstone and chalk Sand: medium with fine, subangular to subrounded, quartz and coarse, angular flint with rounded chalk; dark greyish brown	0.9	3.2
Ampthill Clay	Clay, slightly silty, medium dark grey	1.3+	4.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
11	34	55	2.3–3.2	11	5	18	11	48	7

TL 47 NW 30 4266 7677 Small Fen, Haddenham **Block A**

Surface level +2.0 m
Water level not recorded
152 mm precussion
June 1977

Waste 2.2 m
Bedrock 1.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown, stony loam becoming very dark brown silty loam at 0.5 m	0.9	0.9
Peat	Peat, soft, very dark brown to black, becoming clayey and sandy with depth	1.1	2.0
River Terrace Deposits (First Terrace)	Sand Sand: mainly medium, subrounded, quartz with coarse, angular flint; greyish brown	0.2	2.2
Ampthill Clay	Clay, firm, light grey and brownish yellow mottled, becoming grey at depth	1.6+	3.8

TL 47 NW 31 4285 7546 Adventurers' Head Drove, Haddenham

Surface level +1.9 m
Water struck at −0.4 m
152 mm percussion
June 1977

Overburden 2.3 m
Mineral 2.0 m
Bedrock 1.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.8	0.8
Peat	Clay, peaty, soft, very dark grey becoming black peat with depth	1.2	2.0
Barroway Drove Beds	Clay, soft, grey, becoming pebbly with depth	0.3	2.3
River Terrace Deposits (Undifferentiated)	Pebbly sand Gravel: mainly fine, angular to subangular, brown and white flint with rounded to well-rounded chalk and some quartz, quartzite, sandstone, ironstone and limestone Sand: medium with fine, subangular to subrounded, quartz and coarse, angular flint with rounded chalk and subrounded sandstone; brown	2.0	4.3
Ampthill Clay	Clay, medium grey	1.7+	6.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
2	75	23	2.3–3.3	1	11	37	23	26	2
			3.3–4.3	2	16	44	20	16	2
			Mean	2	14	40	21	21	2

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
2.3–3.3	76	4	6	2	9	3	trace
3.3–4.3	76	1	4	2	14	2	1
Mean	76	3	6	2	11	2	trace

TL 47 NW 32 4368 7673 Galls Farm, Haddenham **Block A**

Surface level +2.7 m
Water not struck
152 mm percussion
June 1977

Waste 1.4 m
Bedrock 2.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark brown sandy clay loam becoming brown and yellowish red mottled sandy clay at 0.8 m	1.0	1.0
River Terrace Deposits (First Terrace)	'Very clayey' pebbly sand Gravel: fine, angular to subangular, brown and white flint with some quartz and sandstone Sand: fine and medium, subangular to subrounded, quartz with some coarse, angular flint; strong brown	0.4	1.4
Ampthill Clay	Clay, soft, medium dark grey, with shell fragments and selenite crystals	2.4+	3.8

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
34	58	8	1.0–1.4	34	27	24	7	8	—

TL 47 NW 33 4363 7773 Rymanmoor Short Turning, Sutton **Block A**

Surface level +1.1 m
Water struck at −1.3 m
152 mm percussion
June 1977

Waste 3.2 m
Bedrock 2.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark brown peaty loam	1.4	1.4
Peat	Peat, very dark brown with grey pebbly peaty clay layer at 1.9 m	0.9	2.3
River Terrace Deposits (Undifferentiated)	Silt, clayey, light grey with angular to subangular flint pebbles	0.9	3.2
Ampthill Clay	Clay, silty, medium dark grey and light olive-brown mottled, becoming dark grey with occasional shell fragments and selenite crystals	2.0+	5.2

TL 47 NW 34 4387 7856 Bury Hill, Sutton

Surface level +10.8 m
Water not struck
152 mm percussion
June 1977

Overburden 1.4 m
Mineral 1.0 m
Bedrock 2.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.4	0.4
	Soil, dark yellowish brown, stony, sandy clay loam	1.0	1.4
Glacial Sand and Gravel	'Very clayey' sandy gravel Gravel: fine, rounded to well-rounded, chalk and fine to coarse, angular to subangular, grey and white flint with shell fragments and fine sandstone and some quartzite, ironstone and limestone Sand: fine and medium, subangular, quartz and coarse rounded chalk and angular flint; light yellowish brown	1.0	2.4
Kimmeridge Clay	Clay, fossiliferous, orange and grey, becoming medium grey and greyish black with depth	2.6+	5.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
39	42	19	1.4–2.4	39	20	18	4	7	12

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
1.4–2.4	32	trace	9	4	43	4	8

TL 47 NW 35 4480 7970 Mepal Airfield, Sutton

Surface level +21.9 m
Water struck at +21.3 m and +15.9 m
152 mm percussion
June 1977

Mineral 1.4 m
Waste 4.6 m
Bedrock 2.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Glacial Sand and Gravel	Pebbly sand Gravel: fine to coarse, subangular to well-rounded, chalk and angular grey and white flint with subrounded sandstone and limestone with some fine quartz, sandstone, quartzite and shell fragments Sand: mainly fine and medium, subangular, quartz with some chalk and flint; brownish yellow	1.4	1.4
Boulder Clay	Clay, silty, sandy, olive-grey, with fine, subrounded, chalk and angular flint pebbles; becoming firmer and very dark grey with depth	4.6	6.0
Kimmeridge Clay	Clay, silty, firm, medium dark grey	2.1+	8.1

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
8	70	22	0.0–1.4	8	41	25	4	8	14

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
0.0–1.4	35	3	7	9	42	2	2

TL 47 NW 36 4443 7714 Setchell's Farm, Haddenham **Block A**

Surface level +2.2 m
Water level not recorded
152 mm percussion
June 1977

Waste 1.5 m
Bedrock 1.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.3	0.3
	Soil, very dark brown to black silt loam	0.8	1.1
River Terrace Deposits (First Terrace)	'Clayey' pebbly sand Gravel: mainly fine, angular to subangular, brown and white flint and rounded chalk Sand: mainly coarse, angular flint and medium, subrounded quartz; brown	0.4	1.5
Ampthill Clay	Clay, grey and brownish yellow mottled becoming medium dark grey with selenite crystals	1.9+	3.4

TL 47 NW 37 4471 7616 North Hill, Haddenham

Surface level +35.9 m
Water struck at +30.2 m
152 mm percussion
June 1977

Waste 6.2 m
Mineral 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown, stony, clay loam becoming very dark grey with depth	0.5	0.5
Boulder Clay	Clay, with mainly fine, subrounded chalk and some subangular limestone and angular flint pebbles, and fine to coarse, subangular to subrounded, quartz sand, with subangular to rounded chalk and subangular limestone; olive, becoming yellowish brown and grey mottled at 1.4 m and dark grey at 5.0 m	5.7	6.2
Kimmeridge Clay	Clay, stiff, shelly, black	1.0+	7.2

TL 47 NE 2 4591 7957 Witcham, Wentworth

Surface level +19.4 m
Water not struck
152 mm percussion
June 1977

Waste 3.4 m
Bedrock 1.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.2	0.2
	Soil, dark brown stony, sandy clay loam, becoming clayey at 0.4 m and yellowish brown sandy clay at 0.6 m	0.8	1.0
Boulder Clay	Clay, light olive-brown and medium grey mottled, with mainly fine subrounded to rounded chalk pebbles and pockets of reddish yellow silty fine sand	0.8	1.8
	Clay, dark grey and dark olive-grey with some yellowish brown mottles, with less chalk pebbles than above	1.5	3.3
	Clay greyish black with mainly chalk and limestone pebbles and cobbles	0.1	3.4
Kimmeridge Clay	Clay, stiff, fossiliferous, dark grey and greyish black with carbonate crystals and a layer of medium grey argillaceous limestone between 4.3 m and 4.4 m	1.6+	5.0

TL 47 NE 3 4524 7575 Porch House, Haddenham

Surface level +28.1 m
Water struck at +25.2 m
152 mm percussion
June 1977

Overburden 1.0 m
Mineral 2.8 m
Bedrock 2.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown sandy clay loam	1.0	1.0
Glacial Sand and Gravel	'Clayey' sandy gravel, with dark grey silty clay layer at 2.9 m and mainly limestone pebbles and sand with calcite crystals from 2.9 m to 3.8 m Gravel: fine to coarse, angular to subangular, grey and brown flint, grey limestone, fine white calcite and rounded to well-rounded chalk with some quartz, quartzite, sandstone, ironstone and igneous material Sand: fine and medium, subangular, quartz with ironstone and chalk with mainly coarse, angular calcite and grey limestone with some flint; strong brown becoming grey below 2.9 m	2.8	3.8
Kimmeridge Clay	Clay, stiff, black, with shell fragments	2.2+	6.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
19	59	22	1.0–2.1	19	37	29	5	5	5
			2.1–2.9	26	43	18	4	2	7
			2.9–3.8	11	5	12	23	26	23
			Mean	19	28	20	11	11	11

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
1.0–2.9	34	1	5	22	25	1	12

TL 47 NE 4 4881 7643 Grunty Fen Farm, Wilburton

Surface level +4.0 m
Water not struck
152 mm percussion
May 1977

Waste 1.1 m
Bedrock 2.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown clay loam, becoming dark greyish brown and orange mottled clay at 0.6 m and sandy and silty at 0.9 m	1.1	1.1
Kimmeridge Clay	Clay, dark greyish brown, rooty, with selenite crystals and layers of grey argillaceous limestone	2.0+	3.1

TL 47 NE 5 4837 7682 Near Hawk's Nest Farm, Wilburton

Surface level +3.4 m
Water not struck
152 mm percussion
May 1977

Waste 1.3 m
Bedrock 2.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown clay loam, becoming very dark greyish brown and orange mottled clay at 1.0 m	1.3	1.3
Kimmeridge Clay	Clay, grey and yellowish brown mottled with carbonate and selenite crystals becoming silty and very dark grey with depth, with layers of light grey argillaceous limestone	2.1+	3.4

TL 47 NE 6 4801 7800 Near Manor House, Wentworth

Surface level +4.3 m
Water not struck
152 mm percussion
May 1977

Waste 0.7 m
Bedrock 1.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown clay loam	0.7	0.7
Kimmeridge Clay	Clay, firm, silty, light grey and brownish yellow mottled with carbonate and selenite crystals, becoming rooty with depth with limestone at 2.0 m	1.3+	2.0

TL 47 NE 7 4954 7909 Marroway Road, Witchford

Surface level +11.1 m
Water struck at +7.1 m
152 mm percussion
July 1977

Waste 5.9 m
Bedrock 1.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown clay loam with reddish brown mottles between 0.2 m and 0.4 m, becoming olive-brown sandy clay loam at 0.4 m	0.6	0.6
Boulder Clay	Clay, sandy, brownish yellow and medium light grey with some fine angular flint and subrounded to rounded chalk pebbles	0.8	1.4
	Clay, light olive-brown becoming olive-grey and slightly sandy with depth, with fine rounded chalk and angular flint and some limestone and sandstone pebbles	1.6	3.0
	Clay, soft, dark grey with mainly chalk pebbles and coarse sand becoming stiff at 3.2 m	2.2	5.2
	Clay, silty, dark grey, with fine sand and some chalk pebbles and coarse sand	0.7	5.9
Kimmeridge Clay	Clay, stiff, silty, dark grey with light grey argillaceous limestone at 7.8 m	1.9+	7.8

TL 47 NE 8 4934 7729 Pools Road, Wilburton

Surface level +0.6 m
Water not struck
152 mm percussion
May 1977

Waste 0.5 m
Bedrock 3.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown, peaty clay loam, becoming grey and reddish brown mottled clay loam at 0.4 m	0.5	0.5
Kimmeridge Clay	Clay, silty, sandy, olive-grey and orange mottled with shell fragments between 1.6 m and 1.7 m, becoming dark grey stiff clay at 2.4 m, with light grey argillaceous limestone layers between 1.7 m and 2.1 m and at 3.6 m	3.1+	3.6

TL 47 SW 1 4064 7466 Upper Delph Drove, Haddenham **Block B**

Surface level +1.7 m
Water struck at −0.7 m
152 mm percussion
June 1977

Overburden 2.2 m
Mineral 3.0 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey clay loam	1.0	1.0
Peat	Peat, black	1.0	2.0
Barroway Drove Beds	Clay, medium bluish grey with peat laminae, becoming greenish grey and yellow mottled sandy clay at 2.1 m	0.2	2.2
River Terrace Deposits (Undifferentiated)	Sandy gravel Gravel: fine with coarse, angular to subangular, brown, white and grey flint with fine well-rounded chalk and some quartz, sandstone, ironstone, limestone and phosphatic nodules Sand: medium with fine, subangular to subrounded, quartz, with some chalk, flint and ironstone and coarse, angular flint with rounded chalk and subrounded sandstone and ironstone; olive-grey becoming light olive-brown with depth	3.0	5.2
Ampthill Clay	Clay, stiff, dark grey, with a layer of argillaceous limestone at 6.2 m	1.0+	6.2

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
1	64	35	2.2–3.2	3	11	26	22	34	4
			3.2–4.2	1	4	37	17	26	15
			4.2–5.2	0	2	57	15	21	5
			Mean	1	6	40	18	27	8

TL 47 SW 2 4031 7382 Weathersome Common, Willingham **Block B**

Surface level +1.8 m
Water struck at +1.2 m
152 mm percussion
June 1977

Overburden 2.2 m
Mineral 3.6 m
Bedrock 0.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown stony clay	1.0	1.0
Peat	Peat, clayey	0.5	1.5
Shell Marl	Clay, calcareous, brown with reddish brown mottling	0.1	1.6
Alluvium	Silt, black	0.2	1.8
Peat	Peat, brownish black	0.2	2.0
Barroway Drove Beds	Clay, sandy, dark greenish grey	0.2	2.2
River Terrace Deposits (Undifferentiated)	Gravel Gravel: fine with coarse, angular to subangular, grey, black and white flint, becoming coarser and brown with depth, with fine rounded chalk and some quartz, quartzite, sandstone, limestone and phosphatic nodules Sand: medium with fine, subangular to subrounded, quartz with flint and chalk and coarse, angular flint and rounded chalk with some sandstone and limestone; dark olive-grey, becoming olive-brown with depth	3.6	5.8
Ampthill Clay	Clay, stiff, olive, becoming dark grey with depth and with medium light grey argillaceous limestone between 5.9 m and 6.2 m	0.7+	6.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
3	45	52	2.2–2.8	10	10	26	15	34	5
			2.8–3.8	1	6	25	26	38	4
			3.8–4.8	1	2	16	17	45	19
			4.8–5.8	1	2	17	18	48	14
			Mean	3	5	21	19	41	11

TL 47 SW 3 4054 7287 Reed Ground Farm, Willingham **Block B**

Surface level +3.4 m
Water struck at +1.4 m
152 mm percussion
June 1977

Overburden 0.7 m
Mineral 2.9 m
Bedrock 1.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown, stony, sandy loam, becoming brown with depth	0.7	0.7
River Terrace Deposits (First Terrace)	Sandy gravel Gravel: mainly fine, angular to subangular, brown, white and grey flint with rounded to well-rounded chalk and some quartz, quartzite, sandstone, ironstone, limestone, phosphatic nodules, shell fragments and igneous material Sand: medium with fine, subangular to subrounded, quartz with chalk and coarse, angular flint with subrounded chalk, quartz and sandstone; reddish yellow becoming olive with depth	2.9	3.6
Ampthill Clay	Clay, stiff, dark greenish grey	1.4+	5.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
3	55	42	0.7–1.7	5	5	33	19	35	3
			1.7–2.7	2	4	38	23	27	6
			2.7–3.6	1	2	20	19	44	14
			Mean	3	4	31	20	35	7

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
0.7–1.7	79	5	7	2	5	–	2
1.7–2.7	71	4	6	4	13	1	1
2.7–3.6	67	3	13	5	10	1	1
Mean	72	4	8	4	9	1	2

TL 47 SW 4 4040 7155 Middle Fen, Willingham **Block B**

Surface level +3.6 m
Water struck at +1.8 m
152 mm percussion
September 1977

Overburden 0.8 m
Mineral 1.6 m
Bedrock 1.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown clay loam becoming brown stony sandy clay at 0.7 m	0.8	0.8
River Terrace Deposits (First Terrace)	Sandy gravel, clayey between 1.6 m and 1.7 m Gravel: mainly fine, angular to subangular, brown and white flint with rounded to well-rounded chalk and some quartz, quartzite, sandstone, ironstone and limestone Sand: medium with fine, subangular to rounded, quartz with some ironstone and chalk and coarse, angular flint with chalk, quartz and ironstone; strong brown becoming light yellowish brown with depth	1.6	2.4
Ampthill Clay	Clay, stiff, medium dark grey	1.1+	3.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
9	57	34	0.8–1.6	9	17	30	16	27	1
			1.6–2.4	8	5	26	20	36	5
			Mean	9	11	28	18	31	3

TL 47 SW 5 4049 7022 Near Bourney's Manor Farm, Willingham **Block D**

Surface level +6.7 m
Water struck at +5.4 m
152 mm percussion
March 1977

Overburden 1.0 m
Mineral 3.5 m
Waste 0.5 m
Mineral 1.3 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	1.0	1.0
River Terrace Deposits (Second Terrace)	**a** Sandy gravel, becoming more sandy with depth Gravel: mainly fine, angular to subangular, brown and white flint and rounded to well-rounded chalk with some quartz, quartzite and sandstone Sand: medium with fine, subangular to subrounded, quartz with chalk and flint and coarse, rounded chalk and flint; yellowish brown becoming pale yellow with depth	3.5	4.5
	Silt, clayey, pale olive	0.5	5.0
	b 'Clayey' sandy gravel Gravel: fine to coarse, black, brown and white flint and fine, rounded chalk with sandstone becoming mainly fine to coarse, subangular to subrounded, grey limestone with depth Sand: medium with fine, subangular to subrounded, quartz and coarse, rounded chalk and angular flint	1.3	6.3
Ampthill Clay	Clay, stiff, silty, medium dark grey	3.0+	9.3

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
a	4	68	28	1.0–2.0	2	7	26	24	38	3
				2.0–3.0	2	11	35	26	23	3
				3.0–4.0	4	12	26	35	20	3
				4.0–4.5	12	27	25	18	16	2
				Mean	4	13	28	27	25	3
b	12	60	28	5.0–6.0	6	15	32	19	23	5
				6.0–6.3	30	8	23	12	14	13
				Mean	12	13	30	17	21	7
a+b	6	66	28	Mean	6	13	29	24	24	4

TL 47 SW 6 4173 7147 Milking Hills, Willingham **Block B**

Surface level +3.8 m
Water struck at +2.2 m
152 mm percussion
May 1977

Overburden 0.9 m
Mineral 3.6 m
Bedrock 0.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey sandy clay loam	0.9	0.9
River Terrace Deposits (Second Terrace)	Pebbly sand Gravel: fine, angular to subangular, brown and white flint with rounded to well-rounded chalk and some quartz, sandstone, ironstone, limestone and shell fragments Sand: mainly medium, subrounded, quartz and coarse, angular flint and rounded chalk; brown becoming light olive-brown with depth	3.6	4.5
Ampthill Clay	Clay, stiff, olive-grey, becoming medium dark grey with depth and with layers of medium grey argillaceous limestone between 4.8 m and 5.0 m	0.9+	5.4

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
2	76	22	0.9–1.9	6	12	35	19	27	1
			1.9–2.9	1	8	49	27	15	0
			2.9–3.9	0	3	45	32	19	1
			3.9–4.5	0	4	36	34	25	1
			Mean	2	7	42	27	21	1

TL 47 SW 7 4181 7245 The Norlands, Willingham **Block B**

Surface level +2.9 m
Water struck at +0.9 m
152 mm percussion
June 1977

Overburden 1.0 m
Mineral 1.7 m
Bedrock 1.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey stony, sandy clay becoming brown at 0.8 m	1.0	1.0
River Terrace Deposits (First Terrace)	'Clayey' sandy gravel Gravel: mainly fine, angular to subangular, brown flint with rounded chalk and some quartz, quartzite, sandstone and limestone Sand: fine to medium, subangular to rounded, quartz, with some flint with coarse, angular flint with quartz, chalk and sandstone; yellowish brown becoming brownish yellow with depth	1.7	2.7
Ampthill Clay	Clay, stiff, medium dark grey	1.3+	4.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
15	60	25	1.0–2.0	24	36	23	6	10	1
			2.0–2.7	3	6	22	24	39	6
			Mean	15	24	23	13	22	3

TL 47 SW 8 4140 7393 College Farm, Haddenham **Block B**

Surface level +2.7 m
Water struck at +1.2 m
152 mm percussion
June 1977

Overburden 1.2 m
Mineral 1.7 m
Bedrock 2.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark yellowish brown stony clay loam becoming yellowish brown sandy clay at 1.1 m	1.2	1.2
River Terrace Deposits (First Terrace)	Sandy gravel Gravel: mainly fine, angular to subangular, brown flint with rounded to well-rounded chalk and some quartz, quartzite, sandstone and limestone Sand: mainly medium, subangular to subrounded, quartz with some chalk and flint and coarse, angular flint and rounded chalk with sandstone and quartz; yellowish brown	1.7	2.9
Ampthill Clay	Clay, stiff, dark grey	2.1+	5.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
6	55	39	1.2–2.2	9	5	29	21	34	2
			2.2–2.9	1	3	21	32	36	7
			Mean	6	4	26	25	35	4

TL 47 SW 9 4224 7462 Cracknell Farm, Haddenham **Block B**

Surface level +1.2 m
Water struck at −0.8 m
152 mm percussion
March 1977

Overburden 1.8 m
Mineral 2.3 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark reddish brown, stony, peaty loam becoming clay at 0.4 m	0.8	0.8
Peat	Peat, black	1.0	1.8
River Terrace Deposits (Undifferentiated)	Sandy gravel Gravel: mainly fine, angular to subangular, black flint becoming brown and white with depth, with rounded to well-rounded chalk and some quartz, quartzite and sandstone Sand: medium with fine, subangular to subrounded, quartz with chalk and flint and coarse, subrounded to rounded chalk and angular flint; olive-grey becoming olive with depth	2.3	4.1
Ampthill Clay	Clay, stiff, dark bluish grey, becoming silty with depth	3.0+	7.1

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
3	66	31	1.8–2.8	3	18	30	15	30	4
			2.8–3.8	2	13	35	22	26	2
			3.8–4.1	2	10	30	22	31	5
			Mean	3	15	32	19	28	3

TL 47 SW 10 4279 7423 Clayton's Bridge, Haddenham **Block B**

Surface level +0.9 m
Water struck at −1.6 m
152 mm percussion
March 1977

Overburden 2.5 m
Mineral 1.1 m
Bedrock 1.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Peat	Peat, black, with wood fragments	2.5	2.5
River Terrace Deposits (Undifferentiated)	Sandy gravel Gravel: mainly fine, angular to subangular, black, grey and white flint with rounded to well-rounded chalk and some quartz and sandstone Sand: medium with fine, subangular to subrounded, quartz with chalk and flint and coarse, angular flint and rounded chalk; olive	1.1	3.6
Ampthill Clay	Clay, firm, medium dark grey	1.4+	5.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
3	53	44	2.5–3.6	3	6	26	21	39	5

TL 47 SW 11 **4260 7342** **Dam Bank Bridge, Haddenham** **Block B**

Surface level +1.3 m
Water struck at −0.7 m
152 mm percussion
March 1977

Overburden 2.0 m
Mineral 1.8 m
Bedrock 1.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.2	0.2
	Soil, dark brownish black, stony, peaty loam	0.6	0.8
Peat	Peat, black	1.0	1.8
Barroway Drove Beds	Silt, sandy, clayey, grey	0.2	2.0
River Terrace Deposits (Undifferentiated)	Sandy gravel Gravel: mainly fine, angular to subangular, black, grey and brown flint with rounded to well-rounded chalk and some quartz, quartzite, sandstone, limestone, shell fragments and igneous material Sand: medium with fine, subangular to subrounded, quartz with some chalk and flint and coarse, angular flint and rounded chalk; olive	1.8	3.8
Ampthill Clay	Clay, stiff, medium dark grey	1.2+	5.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
2	66	32	2.0–3.0	3	14	37	18	26	2
			3.0–3.8	0	10	31	22	31	6
			Mean	2	12	34	20	28	4

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
2.0–3.0	82	3	5	5	3	–	2
3.0–3.8	75	3	2	3	16	–	1
Mean	78	3	4	4	9	–	2

TL 47 SW 12 4279 7229 Queenholme Farm, Willingham **Block B**

Surface level +1.7 m
Water struck at +0.5 m
152 mm percussion
May 1977

Overburden 2.0 m
Mineral 1.2 m
Bedrock 1.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown stony clay loam	0.6	0.6
Peat	Peat, black, with clay laminae between 1.4 m and 2.0 m	1.4	2.0
River Terrace Deposits (Undifferentiated)	Sandy gravel Gravel: mainly fine, angular to subangular, grey and brown flint with rounded to well-rounded chalk and some quartz Sand: medium with fine, subangular to subrounded, quartz and coarse, angular flint with subrounded chalk; greyish brown, becoming light olive-brown with depth	1.2	3.2
Ampthill Clay	Clay, stiff, medium dark grey	1.3+	4.5

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
2	55	43	2.0–2.5	2	5	32	19	36	6
			2.5–3.2	2	5	26	23	40	4
			Mean	2	5	29	21	38	5

TL 47 SW 13 4239 7180 The Shoals, Willingham **Block B**

Surface level +2.1 m
Water struck at −0.2 m
152 mm percussion
May 1977

Overburden 2.1 m
Mineral 3.4 m
Bedrock 1.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown and red mottled, calcareous clay	1.0	1.0
Alluvium	Clay, silty, sandy, calcareous, light grey	0.5	1.5
	Silt, clayey, sandy, brownish yellow	0.6	2.1
River Terrace Deposits (Undifferentiated)	'Clayey' pebbly sand, with 'very clayey' sand between 2.1 m and 3.2 m Gravel: mainly fine, angular to subangular, brown and grey flint with rounded to well-rounded chalk and some quartz, sandstone, limestone and shell fragments Sand: medium and fine, subangular to subrounded, quartz with some chalk and ironstone and coarse, angular flint with rounded chalk and some quartz; olive-yellow becoming dark greyish brown with depth	3.4	5.5
Ampthill Clay	Clay, soft, medium dark grey, becoming stiff at 7.0 m	1.6+	7.1

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
11	68	21	2.1–3.2	30	54	12	2	2	0
			3.2–3.5	4	10	22	26	33	5
			3.5–4.5	1	8	36	23	28	4
			4.5–5.5	3	4	39	27	26	1
			Mean	11	22	28	18	19	2

TL 47 SW 14 4349 7191 Halfmoon Bridge, Willingham **Block B**

Surface level +2.4 m
Water struck at −0.1 m
152 mm percussion
May 1977

Waste 2.7 m
Bedrock 2.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown stony, clay loam, becoming grey and red mottled clay at 0.5 m	1.0	1.0
Peat	Peat, black, with medium bluish grey clay laminae below 1.3 m	1.0	2.0
Barroway Drove Beds	Clay, medium bluish grey becoming yellow with depth	0.3	2.3
River Terrace Deposits (First Terrace)	'Clayey' sandy gravel Gravel: mainly fine, angular to subangular, black, brown and white flint with rounded to well-rounded chalk and some quartz and sandstone Sand: medium with fine, subangular to subrounded, quartz with rounded ironstone and coarse, angular flint and rounded chalk; olive	0.4	2.7
Ampthill Clay	Clay, stiff, with selenite crystals, dark grey	2.3+	5.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
16	48	36	2.3–2.7	16	15	20	13	33	3

TL 47 SW 15 4401 7227 High Bridge Farm, Haddenham **Block B**

Surface level +1.7 m
Water struck at +0.4 m
152 mm percussion
September 1977

Overburden 1.3 m
Mineral 2.1 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown humose clay	0.9	0.9
Peat	Peat, dark reddish brown	0.4	1.3
River Terrace Deposits (Undifferentiated)	Sandy gravel Gravel: mainly fine, angular to subangular, brown, grey and white flint with rounded to well-rounded chalk and some quartz, sandstone, ironstone and limestone Sand: mainly medium, subrounded to rounded, quartz with subangular to subrounded chalk and rounded ironstone and coarse, angular flint and rounded chalk; yellowish brown becoming light olive-brown	2.1	3.4
Ampthill Clay	Clay, stiff, very dark grey becoming medium grey	1.0+	4.4

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
4	57	39	1.3–2.3	4	7	25	22	35	7
			2.3–3.4	4	6	34	20	31	5
			Mean	4	6	30	21	33	6

TL 47 SW 16 4360 7325 Ewell Fen, Haddenham **Block C**

Surface level +2.3 m
Water not struck
152 mm percussion
June 1977

Overburden 0.7 m
Mineral 1.1 m
Bedrock 2.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, black, stony, humose clay loam becoming peaty clay at 0.5 m	0.7	0.7
River Terrace Deposits (First Terrace)	'Very clayey' pebbly sand Gravel: mainly fine, angular to subangular, brown, grey and white flint Sand: medium and fine, subrounded, quartz and coarse angular flint, rounded chalk and subrounded quartz; dark yellowish brown	1.1	1.8
Ampthill Clay	Clay, soft, bluish grey and yellowish brown mottled, with selenite crystals, becoming stiff and dark grey at 2.5 m with shelly material below 3.5 m	2.6+	4.4

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
22	62	16	0.7–1.8	22	21	31	10	14	2

TL 47 SW 17 4337 7426 Near Granger's Drove, Haddenham **Block B**

Surface level +1.2 m
Water struck at −0.4 m
152 mm percussion
June 1977

Overburden 2.0 m
Mineral 0.9 m
Bedrock 1.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark olive-grey stony clay becoming very dark greyish brown sandy clay loam at 0.4 m	0.6	0.6
Peat	Clay, peaty black becoming peat at 1.4 m	1.4	2.0
River Terrace Deposits (Undifferentiated)	Sandy gravel Gravel: mainly fine, angular to subangular, black and white flint with rounded chalk and some quartz, sandstone and limestone Sand: medium with fine, subangular to subrounded, quartz with rounded chalk and subangular sandstone and coarse, angular flint with rounded chalk and some quartz and sandstone; light olive-brown	0.9	2.9
Ampthill Clay	Clay, stiff, dark grey, becoming medium dark grey with depth	1.1+	4.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
4	67	29	2.0–2.9	4	15	31	21	25	4

TL 47 SW 18 4490 7268 Cross Drove, Haddenham **Block C**

Surface level +1.2 m
Water sturck at −0.8 m
152 mm percussion
June 1977

Overburden 1.7 m
Mineral 1.0 m
Bedrock 1.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown clay loam becoming yellowish red sandy clay loam at 0.6 m	1.0	1.0
River Terrace Deposits (First Terrace)	Clay, sandy, light yellowish brown	0.7	1.7
	Sandy gravel Gravel: mainly fine, angular to subangular, brown and grey flint with rounded to well-rounded chalk and some quartz, quartzite, sandstone, limestone and phosphatic nodules Sand: medium with fine, subrounded, quartz with some flint, chalk and ironstone and coarse, rounded chalk and angular flint; strong brown	1.0	2.7
Ampthill Clay	Clay, stiff, medium dark grey	1.3+	4.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
4	64	32	2.0–2.7	4	13	30	21	30	2

TL 47 SW 19 4457 7178 Smithey Fen Farm, Cottenham

Surface level +3.2 m
Water struck at +2.0 m
152 mm percussion
February 1977

Waste 1.9 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.7	0.7
	Soil, dark yellowish brown sandy clay	0.3	1.0
River Terrace Deposits (First Terrace)	Sandy gravel Gravel: fine, angular to subangular, grey and brown flint and rounded chalk with some sandstone and limestone Sand: medium with fine, subangular to subrounded quartz and coarse, angular flint and rounded chalk; yellow	0.9	1.9
Kimmeridge Clay	Clay, stiff, medium grey with clay and medium light grey argillaceous limestone between 2.4 m and 3.1 m	3.0+	4.9

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
6	60	34	1.0–1.9	6	6	32	22	33	1

TL 47 SW 20 4479 7040 Near Oxholme Drove, Cottenham

Surface level +3.5 m
Water struck at +2.2 m
152 mm percussion
February 1977

Overburden 1.1 m
Mineral 1.3 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown, stony, clay loam becoming brownish yellow mottled sandy clay at 0.8 m	1.1	1.1
River Terrace Deposits (Second Terrace)	'Very clayey' pebbly sand Gravel: fine, angular to subangular, yellow and white flint with rounded to well-rounded chalk and subangular limestone and some quartz, quartzite, sandstone and phosphatic nodules Sand: medium with fine, subrounded, quartz with ironstone, with coarse, angular flint and rounded chalk, brownish yellow	1.3	2.4
Kimmeridge Clay	Limestone, argillaceous, medium light grey	0.1	2.5
	Clay, stiff, fossiliferous, medium grey becoming silty with depth	2.8	5.3
	Limestone, argillaceous, medium light grey	0.1+	5.4

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$
23	70	7	1.1–2.1	22	18	47	8	5	—
			2.1–2.4	23	7	32	22	15	1
			Mean	23	15	44	11	7	0

TL 47 SE 1 4577 7258 **Dairy House Farm, Haddenham** **Block C**

Surface level +1.1 m
Water struck at −0.4 m
152 mm percussion
May 1977

Waste 3.0 m+
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty clay becoming dark reddish brown and orange mottled clay at 0.9 m	1.3	1.3
River Terrace Deposits (First Terrace)	Sandy gravel Gravel: mainly fine, angular to subangular, brown and white flint and rounded to well-rounded chalk with some quartz, sandstone and phosphatic nodules Sand: medium with fine, subangular to subrounded, quartz and coarse, angular flint and rounded chalk	0.8	2.1
	Clay, stiff, grey with angular brown flint pebbles between 2.6 m and 3.0 m	0.9	3.0
Ampthill Clay	Clay, stiff, shelly, grey	1.0+	4.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
3	53	44	1.3–2.1	3	11	22	20	36	8

TL 47 SE 2 4557 7196 **Linden End Doles Drove, Haddenham** **Block B**

Surface level +1.6 m
Water not struck
152 mm percussion
July 1977

Waste 3.2 m
Bedrock 1.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown clay loam becoming dark reddish brown peaty clay at 0.6 m	1.0	1.0
Alluvium	Clay, silty, laminated, yellowish brown becoming olive-grey with depth with flint pebbles between 2.8 m and 3.2 m	2.2	3.2
Kimmeridge Clay	Clay, soft, shelly, dark grey	1.8+	5.0

TL 47 SE 3 4567 7059 Smithey Fen, Cottenham

Surface level +4.2 m
Water struck at +3.2 m
152 mm percussion
February 1977

Waste 1.2 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.1	0.1
	Soil, brown clay loam becoming sandy clay at 0.7 m and clay at 0.9 m	1.0	0.9
River Terrace Deposits (Second Terrace)	'Very clayey' sandy gravel Gravel: mainly fine, angular to subangular, brown, grey and black flint with rounded chalk and some sandstone Sand: medium with fine, subangular to subrounded, quartz with chalk and flint and coarse, angular flint and rounded chalk; light yellowish brown	0.2	1.2
Kimmeridge Clay	Clay, stiff, grey, with carbonate crystals and argillaceous limestone between 3.6 m and 3.7 m	3.0+	4.2

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
20	50	30	1.0–1.2	20	12	23	15	27	3

TL 47 SE 4 4663 7030 Willow Farm, Cottenham **Block C**

Surface level +2.7 m
Water struck at +1.2 m
152 mm percussion
May 1977

Overburden 1.0 m
Mineral 2.0 m
Bedrock 2.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	0.5	0.5
	Soil, very dark greyish brown, stony, sandy clay loam becoming yellowish brown, stony, sandy clay at 0.7 m	0.5	1.0
River Terrace Deposits (First Terrace)	Pebbly sand Gravel: mainly fine, angular to subangular, brown and white flint with rounded chalk and some quartz, sandstone, ironstone, limestone and phosphatic nodules Sand: medium with fine, subangular to subrounded, quartz with some ironstone and chalk, with coarse, angular flint and rounded chalk with some sandstone; yellowish brown	2.0	3.0
Kimmeridge Clay	Clay, stiff, dark grey becoming silty, fossiliferous with carbonate crystals at 4.6 m	2.0+	5.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
9	76	15	1.0–2.0	14	13	52	8	12	1
			2.0–3.0	4	11	54	14	14	3
			Mean	9	12	53	11	13	2

TL 47 SE 5 4665 7145 Setchell Lodge, Cottenham **Block C**

Surface level +1.8 m
Water struck at +0.2 m
152 mm percussion
May 1977

Overburden 0.9 m
Mineral 3.2 m
Bedrock 2.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey clay becoming very dusky red with rusty red mottled peaty clay at 0.8 m	0.9	0.9
River Terrace Deposits (First Terrace)	Sandy gravel Gravel: mainly fine, angular to subangular, brown, white, and grey flint and rounded to well-rounded chalk with some quartz, quartzite, sandstone, ironstone, limestone and phosphatic nodules Sand: medium with fine, subangular to subrounded, quartz with some chalk, flint and ironstone and coarse, rounded chalk and angular flint with some quartz; yellowish brown becoming olive with depth	3.2	4.1
Kimmeridge Clay	Clay, greyish black becoming medium dark grey at 4.2 m with clay and argillaceous limestone between 5.6 m and 6.1 m	2.2+	6.3

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
6	58	36	0.9–1.9	7	13	22	19	34	5
			1.9–2.9	3	14	25	23	30	5
			2.9–4.1	7	9	27	20	31	6
			Mean	6	12	25	21	31	5

TL 47 SE 6 4644 7275 Hoghill Drove, Haddenham **Block C**

Surface level +1.7 m
Water struck at −0.2 m
152 mm percussion
May 1977

Waste 2.1 m
Bedrock 1.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown and orange mottled humose clay	0.9	0.9
Peat	Peat, structureless, black	0.3	1.2
River Terrace Deposits (First Terrace)	Pebbly sand Gravel: fine, angular to subangular, brown and white flint with rounded to well-rounded chalk and some quartz and sandstone Sand: medium with fine, subangular to rounded, quartz and coarse, angular flint and rounded chalk with quartz; brown	0.9	2.1
Ampthill Clay	Clay, stiff, medium dark grey	1.3+	3.4

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
4	78	18	1.2–2.1	4	19	37	22	17	1

TL 47 SE 7 4768 7205 Australia Farm, Wilburton Block C

Surface level +1.3 m
Water struck at −0.2 m
152 mm percussion
July 1977

Overburden 0.8 m
Mineral 1.2 m
Bedrock 1.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, black humose clay loam becoming peaty clay loam at 0.6 m	0.8	0.8
River Terrace Deposits (First Terrace)	Sandy gravel Gravel: fine to coarse, angular to subangular, brown, white and grey flint and fine rounded chalk with some sandstone, quartzite and phosphatic nodules Sand: medium with fine, subangular to subrounded, quartz with some ironstone and coarse, rounded chalk and angular flint with some quartz, sandstone and phosphate fragments; brown	1.2	2.0
Kimmeridge Clay	Clay, stiff, dark grey becoming medium grey at 2.3 m with medium grey argillaceous limestone between 2.9 m and 3.2 m	1.8+	3.8

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
4	56	40	0.8–2.0	4	12	29	15	27	13

TL 47 SE 8 4794 7135 **Bridge Inn, Wilburton** **Block C**

Surface level +2.0 m
Water struck at +0.2 m
152 mm percussion
July 1977

Overburden 1.0 m
Mineral 3.2 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown stony clay loam becoming dark brown clay at 0.8 m	1.0	1.0
River Terrace Deposits (First Terrace)	Sandy gravel Gravel: mainly fine, angular to subangular, brown, grey and white flint and rounded to well-rounded chalk with some quartz, sandstone, ironstone, limestone and phosphatic nodules Sand: medium with fine, subangular to subrounded, quartz with chalk and ironstone and coarse, rounded chalk and angular flint with some quartz and sandstone; light yellowish brown	3.2	4.2
Kimmeridge Clay	Limestone, argillaceous, medium light grey	0.1	4.3
	Clay, stiff, medium dark grey	0.9+	5.2

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
3	55	42	1.0–2.0	7	10	25	17	34	7
			2.0–3.0	2	9	26	23	33	7
			3.0–4.0	1	7	25	22	38	7
			4.0–4.2	4	10	26	23	31	6
			Mean	3	9	25	21	35	7

TL 47 SE 9 4748 7008 **Napoleon Beer House, Cottenham** **Block E**

Surface level +3.8 m
Water struck at +2.2 m
152 mm percussion
May 1977

Overburden 1.0 m
Mineral 0.9 m
Bedrock 3.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown stony sandy clay loam	1.0	1.0
River Terrace Deposits (Second Terrace)	'Very clayey' pebbly sand Gravel: mainly fine, angular to subangular, yellow sandstone with brown flint Sand: fine to medium, subangular to rounded, quartz and coarse, angular sandstone and flint with rounded chalk; yellowish brown	0.9	1.9
Kimmeridge Clay	Clay, stiff, shelly, greyish black becoming dark grey with depth	3.1+	5.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
21	62	17	1.0–1.9	21	33	20	9	14	3

TL 47 SE 10 4854 7047 Undertakers' Drove, Cottenham **Block C**

Surface level +2.5 m
Water struck at +1.0 m
152 mm percussion
February 1977

Overburden 1.2 m
Mineral 2.0 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey humose clay loam becoming dark reddish brown sandy clay at 0.6 m	1.2	1.2
River Terrace Deposits (First Terrace)	Sandy gravel Gravel: mainly fine, angular to subangular, brown and grey flint with rounded chalk and some quartz, quartzite, sandstone, ironstone, limestone, phosphatic nodules, shell fragments and igneous material Sand: medium with fine, subangular to subrounded, quartz and coarse, angular flint and rounded chalk; light yellowish brown	2.0	3.2
Kimmeridge Clay	Clay, stiff, medium light grey with medium dark grey argillaceous limestone layer at 4.7 m	3.0+	6.2

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
4	62	34	1.2–2.2	5	15	32	14	30	4
			2.2–3.2	3	6	26	30	32	3
			Mean	4	11	29	22	31	3

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
1.2–2.2	66	4	4	8	17	1	trace
2.2–3.2	58	3	4	6	25	2	2
Mean	62	3	4	7	21	1	2

TL 47 SE 11 4858 7150 Upper Cuts, Wilburton **Block C**

Surface level +1.0 m
Water struck at +0.2 m
152 mm percussion
September 1977

Overburden 0.7 m
Mineral 0.7 m
Waste 0.3 m
Mineral 0.5 m
Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark grey clay loam	0.7	0.7
River Terrace Deposits (First Terrace)	**a** Sandy gravel Gravel: fine with coarse, angular to subangular, brown, grey and white flint and fine, well-rounded chalk with some quartz, quartzite, sandstone, ironstone and phosphatic nodules Sand: medium with fine, subangular to rounded, quartz with some chalk and ironstone and coarse, rounded chalk and angular flint with some quartz sandstone and ironstone; dark yellowish brown	0.7	1.4
	Clay, with rounded chalk and subangular flint pebbles, very dark grey	0.3	1.7
	b Sandy gravel Gravel: fine, angular to subangular, brown, grey and white flint and well-rounded chalk with some quartz, quartzite, sandstone, ironstone and phosphatic nodules Sand: medium with fine, subangular to rounded, quartz with some chalk and ironstone and coarse, rounded chalk and angular flint with some quartz, sandstone and ironstone; yellowish brown	0.5	2.2
Kimmeridge Clay	Clay, stiff, medium dark grey becoming dark grey with depth	1.0+	3.2

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
a	3	63	34	0.7–1.4	3	15	29	19	27	7
b	2	73	25	1.7–2.2	2	11	40	22	24	1
a+b	3	67	30	Mean	3	13	34	20	26	4

TL 47 SE 12 4875 7269 Middle Cuts, Wilburton **Block C**

Surface level +1.0 m
Water struck at 0.0 m
152 mm percussion
September 1977

Overburden 1.0 m
Mineral 1.1 m
Bedrock 1.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark reddish brown peaty loam becoming light yellowish brown sandy clay at 0.9 m	1.0	1.0
River Terrace Deposits (First Terrace)	Sandy gravel Gravel: mainly fine, angular to subangular, brown and white flint with well-rounded chalk and some quartz, sandstone, ironstone, limestone, phosphatic nodules and shell fragments Sand: medium with fine, subrounded to rounded, quartz with some ironstone and chalk and coarse, rounded chalk and angular flint with ironstone and quartz	1.1	2.1
Kimmeridge Clay	Clay, stiff, dark grey, becoming medium dark grey with depth	1.1+	3.2

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
7	64	29	1.0–2.1	7	15	28	21	26	3

COMPOSITION

Depth below surface (m)	Percentages by weight in the 4–16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
1.0–2.1	70	1	4	4	17	3	1

TL 47 SE 13 4898 7216 **Cross Drove, Wilburton** **Block C**

Surface level +1.6 m
Water level not recorded
152 mm percussion
July 1977

Overburden 1.1 m
Mineral 1.4 m
Bedrock 1.5 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, very dark greyish brown humose clay loam becoming yellowish brown and red mottled sandy clay at 0.6 m	1.1	1.1
River Terrace Deposits (First Terrace)	'Clayey' pebbly sand, with sand between 1.1 m and 1.8 m Gravel: mainly fine, angular to subangular, brown and white flint and rounded chalk with some quartz and sandstone Sand: fine to medium, subangular to subrounded, quartz with coarse, rounded chalk and angular flint; yellowish brown	1.4	2.5
Kimmeridge Clay	Clay, stiff, medium dark grey	1.5+	4.0

GRADING

Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
Fines	Sand	Gravel		Fines	Sand			Gravel	
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16–64
10	68	22	1.1–1.8	15	54	17	8	6	—
			1.8–2.5	5	10	27	19	33	6
			Mean	10	32	22	14	19	3

TL 47 SE 14 4989 7110 Willow Grange, Cottenham **Block C**

Surface level +1.8 m
Water struck at +0.8 m
152 mm percussion
March 1977

Overburden 1.9 m
Mineral 0.2 m
Bedrock 4.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark greyish brown silty clay becoming dusky red, peaty, stony, sandy, silty clay at 0.2 m	1.0	1.0
Peat	Peat, black	0.9	1.9
River Terrace Deposits (First Terrace)	**a** 'Clayey' sandy gravel Gravel: mainly fine, angular black flint Sand: medium with fine, subangular to subrounded, quartz with rounded glauconite, with coarse, angular flint; dark olive-grey	0.2	2.1
Lower Greensand	**b** Pebbly sand, with sandstone between 3.2 m and 3.3 m and clay laminae between 3.7 m and 4.0 m Gravel: fine to coarse, subangular to subrounded, sandstone Sand: medium and fine quartz with glauconite	1.9	4.0
Kimmeridge Clay	Clay, soft, sandy, olive-grey; becoming stiff, shelly medium dark grey with depth, with layers of medium grey argillaceous limestone between 5.8 m and 6.2 m	3.0+	7.0

GRADING

	Mean for deposit *percentages*			Depth below surface (m)	*percentages*					
	Fines	Sand	Gravel		Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}$–$\frac{1}{4}$	$+\frac{1}{4}$–1	+1–4	+4–16	+16–64
a	17	57	26	1.9–2.1	17	11	33	13	22	4
b	4	88	8	2.1–3.1	4	40	47	4	2	3
				3.1–4.0	4	40	39	6	6	5
				Mean	4	40	43	5	4	4

APPENDIX G

LIST OF WORKINGS

Location	*Grid reference*	*Deposit worked*
ACTIVE (February 1978)		
Landbeach (Landbeach Pit)	468 680	River Terrace Deposit
ABANDONED (backfilled or flooded)		
Cottenham	478 706	River Terrace Deposit
Landbeach	485 655	River Terrace Deposit
Landbeach	477 658	River Terrace Deposit
Milton (Milton Pits)	480 620	River Terrace Deposit
Milton	473 630	River Terrace Deposit
Wilburton	480 713	River Terrace Deposit

APPENDIX H

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

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

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INSTITUTE OF GEOLOGICAL SCIENCES

INDUSTRIAL MINERALS ASSESSMENT UNIT

THE SAND AND GRAVEL RESOURCES OF THE AREA AROUND COTTENHAM, CAMBRIDGESHIRE

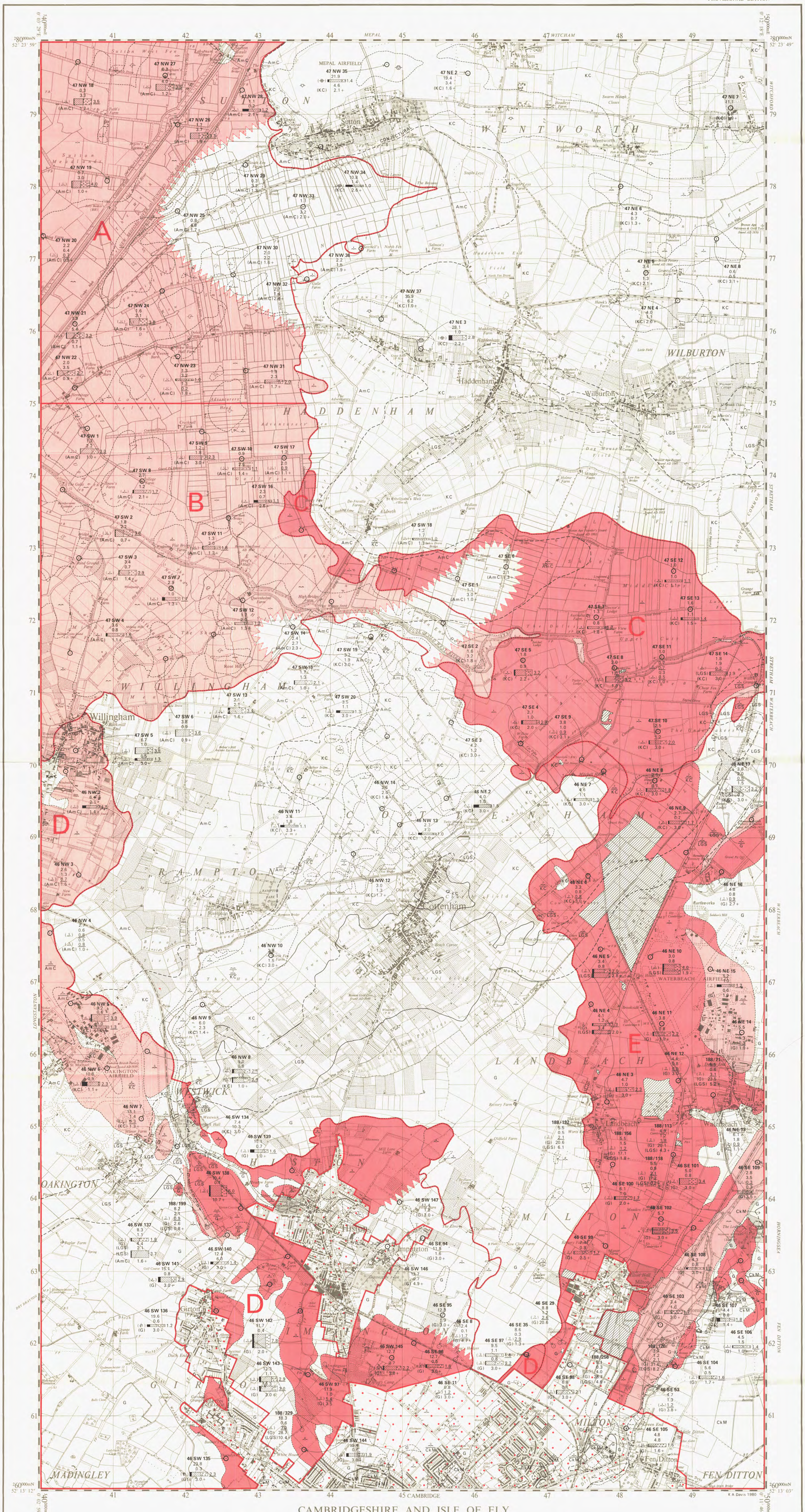
Scale 1:25 000 or about 2½ Inches to 1 Mile

ORDNANCE SURVEY
SHEET TL46 & TL47
PROVISIONAL EDITION

THE SAND AND GRAVEL RESOURCES OF THE AREA AROUND COTTENHAM, CAMBRIDGESHIRE

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

53



CAMBRIDGESHIRE AND ISLE OF ELY

Scale 1:25000

Yards 1000 0 1 2 Miles
Metres 1000 0 1 2 3 Kilometres

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.
Contour values are in feet.
1 square inch on this map represents 99·639 acres on the ground

Compiled from 6″ sheets last fully revised 1900-25.
Other partial systematic revision 1937-50 has been incorporated.
Waterbeach Airfield revised 1966. Oakington Airfield revised 1970.
Major roads revised 1970.

EXPLANATION OF SYMBOLS AND ABBREVIATIONS

DRIFT

RECENT AND PLEISTOCENE

- **Shell Marl** - calcareous muds. SM-1
- **Alluvium** - silts and clays. A-35
- **Peat** - black and brown peat with clay. P-5
- **Barroway Drove Beds** - mainly clay (proved in boreholes only). BD-1
- **Undifferentiated Terrace** (proved in boreholes only) UT-5
- **First Terrace** 1T-20
- **Alluvium on Second Terrace** A-36
- **Second Terrace** 2T-14
- **Third Terrace** 3T-12
- **Fourth Terrace** 4T-7

(Terraces:) **River Terrace Deposits** - sands, gravels and clays.

- **Observatory Gravels** - mainly sand and gravel. OG-1
- **Glacial Sand and Gravel** - mainly sand and gravel. GS-18
- **Boulder Clay** - dark grey pebbly sandy clay. BC-20

SOLID

CRETACEOUS

- CkM **Chalk Marl** - greyish white marl with phosphatic nodules.
- G **Gault** - grey clay.
- LGS **Lower Greensand** - olive grey sand with sandstone layers.

JURASSIC

- KC **Kimmeridge Clay** - grey clay with layers of light grey argillaceous limestone.
- AmC **Ampthill Clay** - grey clay with phosphatic nodules and layers of light grey argillaceous limestone.

Worked-out Ground -(sand and gravel.) WO-4

BOUNDARY LINES

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

Broken lines denote uncertainty.

BOREHOLE DATA

SITE LOCATIONS

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

I.M.A.U. BOREHOLES

Borehole Registration Number → 46 NW 8; Surface level in metres above O.D. (Newlyn) → 9.0; Borehole Site; Overburden → 0.8; Waste; Mineral (sand and gravel) → 2.1, 1.2, 2.9; Geological Classification → (KC); Bedrock → 1.0+; Grading diagram

Thicknesses in metres.

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

Borehole Registration Number
Each I.M.A.U. borehole is identified by a Registration Number, e.g. 46 NW 8. The first four characters refer to the quarter sheet and the figures following to the I.G.S. serial number for the borehole within that quarter.

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

Sand (+1/16 - 4mm); Fines (-1/16mm); Gravel (+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 fines and gravel may be omitted or exaggerated.

OTHER BOREHOLES
The layout of information is the same as for I.M.A.U. boreholes although data may not be as comprehensive. They are registered in the same series except for records in the Hydrogeological Department, for example, 188/71 signifies Hydrogeological Department borehole 71 on New Series One-Inch Geological Sheet 188.

CATEGORIES OF DEPOSITS

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

Where appropriate on other sheets a category, 'discontinuous spreads of mineral beneath overburden' is recognised.

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.

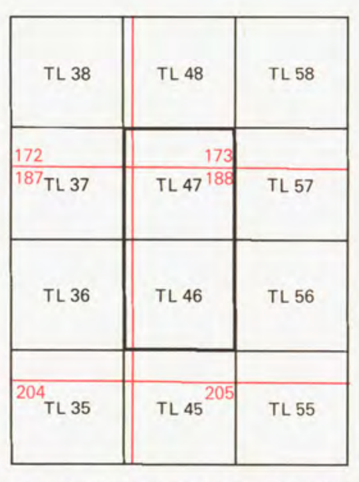


Diagram showing the relation of the National Grid 1:25000 sheets with the New Series One-Inch Geological Sheets 172, 173, 204 and 205 and 1:50000 Geological Sheets 187 and 188.

Original geological survey on the One-Inch scale by F.J.Bennett, A.J.Jukes-Browne, H.W.Penning, S.B.J.Skertchly and H.B.Woodward in 1881-3. Primary survey on the Six-Inch scale by S.C.A.Holmes J.H.Taylor, J.R.Earp, B.C.Worssam, S.E.Hollingworth and E.E.L.Dixon in 1936-53.

Sand and Gravel Survey by A.J.Dixon, R.W.Gatliff, J.R.A.Giles and J.B.L.Wild in 1977. R.G.Thurrell, Head, Industrial Minerals Assessment Unit.

1:25000 Sand and Gravel Resources Sheet published 1980. G.M.Brown, D.Sc; F.R.S.; *Director, Institute of Geological Sciences.*
1100/80

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

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