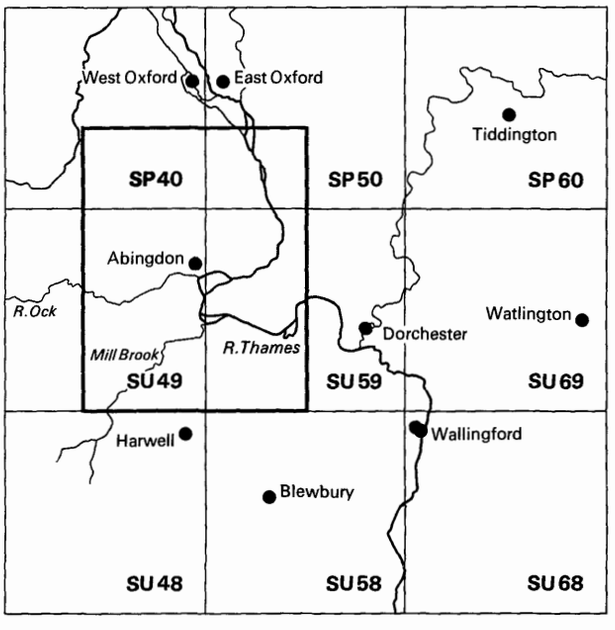
INSTITUTE OF GEOLOGICAL SCIENCES

Natural Environment Research Council

Mineral Assessment Report 38



The sand and gravel resources of the country around Abingdon, Oxfordshire

Description of parts of 1:25 000 sheets SU 49, 59 and SP 40, 50

C. E. Corser

With contributions by P. M. Hopson

ISBN 0 11 884084 3

London Her Majesty's Stationery Office 1978

The first twelve reports on the assessment of British sand and gravel resources appeared in the Report Series of the Institute of Geological Sciences as a subseries. Report No. 13 onwards appear in the Mineral Assessment Report Series of the Institute. Details of published Reports appear at the end of this report.

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

The asterisk on the front cover indicates that parts of the sheets north and east of the one quoted are described in this report

PREFACE

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

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

This report describes the resources of sand and gravel of 154 km^2 of country in the vicinity of Abingdon shown on the accompanying resource map. The survey was conducted in 1971-74 by Dr H. C. Squirrell, Mr C. E. Corser and Mr P. Robson. Mr Corser compiled the report, assisted in the later stages by Mr P. Hopson.

The work is based on geological surveys by officers of the Institute's Field Staff. The most recent survey was by Mr B. C. Coppack, Mr D. Foster, Dr R. J. O. Hamblin, Dr B. Kelk, Dr A. W. Kemp and Mr E. G. Poole in 1969-73 with minor amendments by Mr C. E. Corser in 1973-75. Particular thanks are due to Dr R. J. O. Hamblin for his constructive comments on aspects of the geological history of the area.

Mr J. W. Gardner,CBE (Land Agent) was responsible for negotiating access to land for drilling. The ready co-operation of land owners, tenants and gravel companies in this work is gratefully acknowledged.

A. W. Woodland
Director

Institute of Geological Sciences
Exhibition Road
London SW7 2DE

16 October 1978

CONTENTS

The sand and gravel resources of the country around Abingdon, Oxfordshire

Description of parts of 1:25 000 sheets SU 49, 59 and SP 40, 50

C. E. CORSER

SUMMARY

The assessment of the sand and gravel resources in the Abingdon area, Oxfordshire, is based on the geological maps and borehole records of the Institute of Geological Sciences, records made available by the sand and gravel industry, recent field work and sixty-one boreholes drilled for the Industrial Minerals Assessment Unit.

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

The area has been divided into four resource blocks containing between 2.9 and 20 km^2 of sand and gravel. For these blocks the geology of the deposits is described and the mineral-bearing area, the mean thickness of overburden and mineral, and the mean grading of the mineral are stated. Detailed borehole data are given. The geology, the position of the boreholes and the outlines of the resource blocks are shown on the accompanying map.

Note National Grid references given in this publication lie within 100-kilometre squares SU and SP.

Bibliographical reference

CORSER, C. E. 1978. The sand and gravel resources of the country around Abingdon, Oxfordshire. Description of parts of 1:25 000 sheets SU 49, 59 and SP 40, 50. Miner. Assess. Rep. Inst. Geol. Sci., No. 38.

Author and contributor

C. E. Corser, BSc, BA and P. M. Hopson, BSc. Institute of Geological Sciences, Keyworth, Nottingham NG12 5GG.

INTRODUCTION

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

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

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

The following arbitrary physical criteria have been adopted:

1. The deposit should average at least 1 m in thickness.
2. The ratio of overburden to sand and gravel should be no more than 3:1.
3. The proportion of fines (particles passing the No. 200 mesh BS sieve, about 1/16 mm) should not exceed 40 per cent.
4. The deposit must lie within 25 m of the surface, this being taken as the likely maximum working depth under most circumstances. It follows from the second criterion that boreholes are drilled no deeper than 18 m if no sand and gravel has been proved.

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

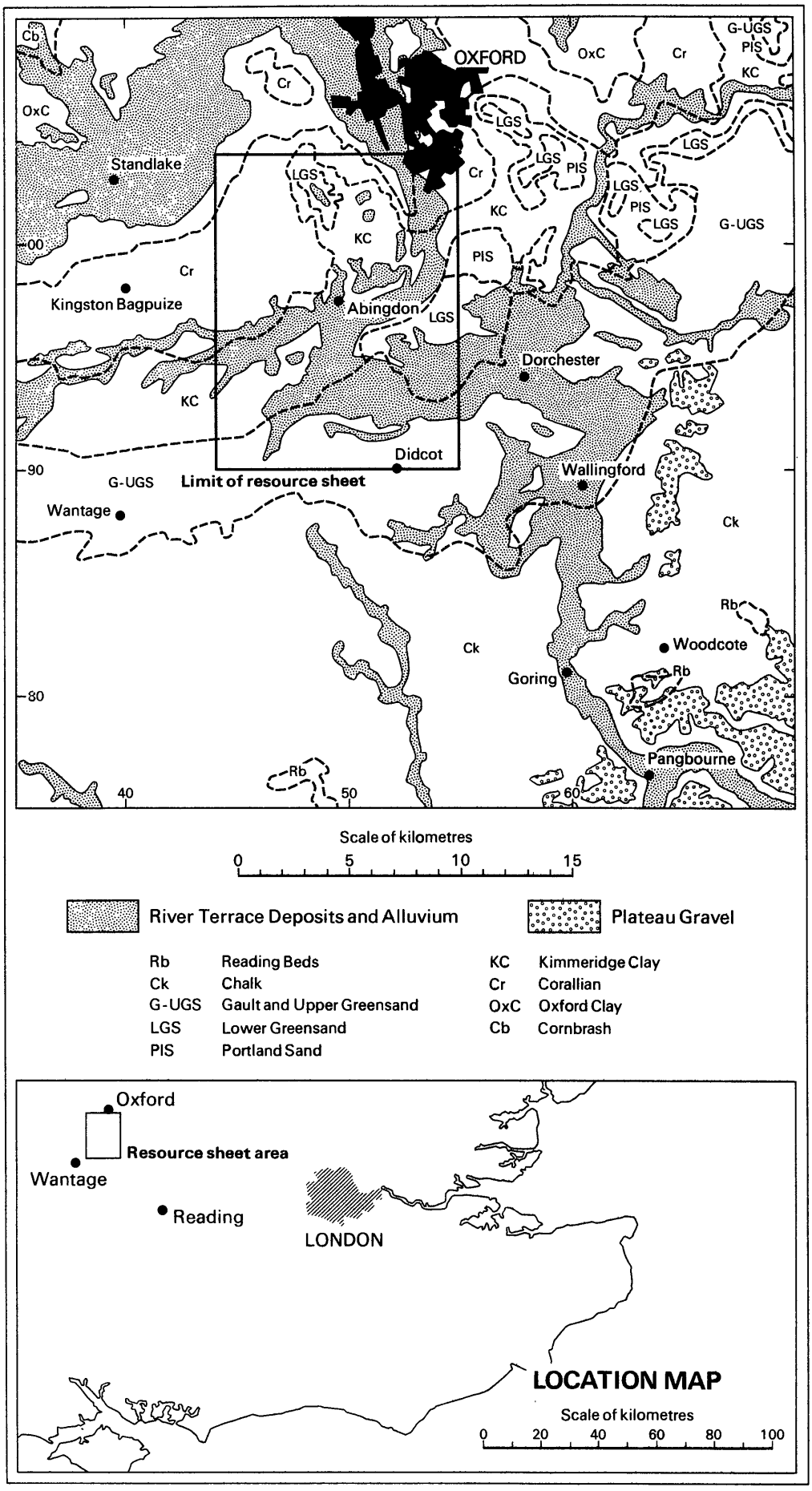


Fig. 1 Generalised sketch map of the regional geological setting of the resource sheet in the Thames Valley

the criteria.

For the particular needs of assessing sand and gravel resources, a grain-size classification based on the geometric scale 1/16 mm, 1/4 mm, 1 mm, 4 mm, 16 mm has been adopted. The boundaries between fines (that is, the clay and silt fractions) and sand, and between sand and gravel grade material, are placed at 1/16 mm and 4 mm respectively (see Appendix C).

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

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

DESCRIPTION OF THE RESOURCE SHEET

This composite sheet, covering an area of 154 km^2, consists of parts of Ordnance Survey 1:25 000 sheets SU 49, 59 and SP 40 and 50, of which 45 km^2 (29 per cent) is gravel-bearing (Table 3). The area is situated in the mid-Thames Valley, with Abingdon as its centre, about 77 km (46 miles) from London and 25 km (15 miles) north-east of Reading (Figure 1). A power station at Didcot with six cooling towers, located near the southern boundary of the resource sheet, is a prominent feature visible from a wide area, notably from the scarp slope of the Chilterns to the east and from the Berkshire Downs in the south-west.

The area supports mixed agriculture, with light industries scattered throughout, the most prominent of which are car factories at Milton, 5 km south of Abingdon and at Cowley. A military airfield occupies a large area north of Abingdon and the Culham Laboratory of the Atomic Energy Research Establishment is located to the south-east. The area is well endowed with transport links; Didcot is the rail junction for the London-Oxford and London-Swindon lines. The recently completed M40 motorway links London with the ring-road system around Oxford and a new motorway link - the Abingdon By-pass (A34T) - cuts the area along a roughly north-south line; this motorway link temporarily ends south of Drayton.

The major portion of the sand and gravel deposits occupy the Thames Valley and small amounts the tributary valleys of the Ock and Mill Brook. Recent housing developments have extended the area of Abingdon to the south at Caldecott and to the east towards Radley, sterilising large areas of the First and Second river terraces.

TOPOGRAPHY

The area is dominated by the broad valleys of the Thames and the adjoining eastern extremity of the Vale of the White Horse. The Thames flows into the area from the north, then, having almost doubled back on itself while circling the high ground at Culham, it leaves the area near Clifton Hampden in a north-easterly direction. To the west, flowing out of the Vale of the White Horse, the River Ock joins the Thames at Abingdon. The Mill and Ginge brooks drain the Chalk and Greensand uplands to the south and flow north-east into the Thames at Sutton Courtenay.

The variable hardness of the gently dipping Upper Jurassic and Cretaceous strata has played a major role in determining the topography of the area. The resulting relief trends south-west to north-east. The soft Gault and Kimmeridge Clay have been more easily eroded, so that today they form the broad flat valley floors, large areas of which are covered by drift deposits lying between 55 m (180 ft) and 61 m (200 ft) above OD. The more resistant Upper Greensand, Lower Greensand and Corallian beds give rise to most of the high ground. The north of the resource sheet is dominated by the ridge of high ground between Littlemore and Besselsleigh. The highest points lie between Kennington and Boars Hill and range in height between 91 and 168 m (300 to 550 ft) above OD. To the east, this high ground is transversely cut by the Thames at Sandford, while in the west small consequent dip-slope streams rising on the ridge flow south to join the subsequent strike stream of the Ock. In the centre, a saddle of high ground between Culham and Clifton Hampden rises from 76 to 91 m (250 to 300 ft) above OD. Along the southern margin near Didcot and Milton the foothill cuestas of the Berkshire Downs reach about 91 m (300 ft) above OD. The scarp slopes have been undercut by the Thames, as, for example, at Nuneham Courtenay, while the dip slopes, which are gently inclined almost parallel to the dip of the beds, are stepped with a covering of River Terrace Deposits.

GEOLOGY

Early work in the area is summarised by Jukes-Browne and Osborne White (1908). Later, the Corallian was described in more detail by Arkell (1933) and Richardson, Arkell and Dines (1946). The latter authors also summarised descriptions of the Oxford Clay (1946). Arkell (1947) describes the area in 'The geology of Oxford'. Definitive descriptions and subdivisions of the solid rocks are also given by Callomon (1968).

Most of the early work on the drift deposits was by Sandford (most importantly 1924, 1926 and 1929). Later works are summarised by Richardson and others (1946) and subsequently, further contributions were made by Bishop (1958), Sandford (1965) and Beckinsale (1970). The accepted correlation of the drift deposits is based largely on Sandford's work and is described by Shotton (1973). The most recent work on the Pleistocene deposits of

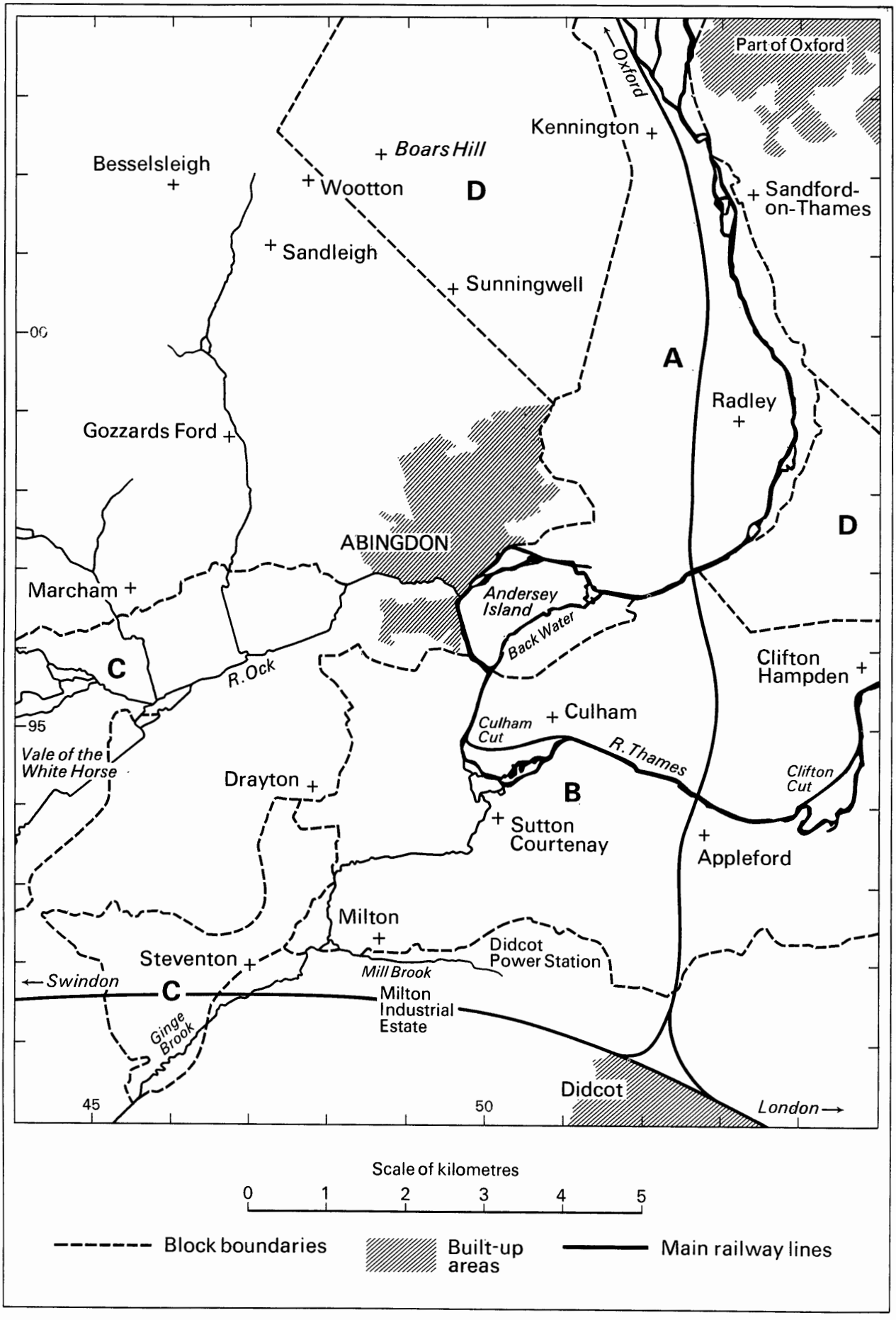


Fig. 2 Sketch map showing the position of the resource block boundaries

the Oxford region is by Goudie and Hart (1974) which is summarised by Smith and Scargill (1974).

Just over a third of the area is covered by Recent and Pleistocene sediments, which include two main categories of gravel-bearing deposits. The first, and most extensive, is made up of River Terrace Deposits which largely comprise locally derived material; the second consists of Plateau Gravel (Northern Drift) composed of material from more distant sources.

SOLID GEOLOGY

The bedrock strata, which range from the Upper Jurassic to the Cretaceous (Figure 3), lie at the north-western extremity of the London Basin and have a gentle south-easterly dip of between 2 and 6°. Minor faults trending east-west at Hinksey and near Lockwood, Nuneham, downthrow to the south and north respectively.

There are unconformities at the base of the Gault, at the base of the Lower Greensand and at the base of the Portland Sand. In the east, around Culham, both the Lower Greensand and Portland Sand are absent, with the result that the Gault lies on the Kimmeridge Clay. Around Nuneham, only the Portland deposits are missing and the higher ground is formed by a protective capping of the Lower Greensand, which lies on the softer Kimmeridge Clay.

The description of the lithology of the bedrock is based on Industrial Minerals Assessment Unit boreholes and on records in Geological Survey memoirs (see References). Calculations of bedrock thicknesses (Table 1) are based on information from twenty-one Hydrogeological Department borehole records (Table 2).

Oxford Clay

The Oxford Clay crops out in two small areas in the north (Figure 3). The eastern outcrop is partly concealed by Thames Valley drift deposits at South Hinksey where it has been recorded in two Industrial Minerals Assessment Unit (IMAU) boreholes (SP 50 SW 54 and 55) to a depth of 0.5m (1.5 ft) and 1.7m (5.5 ft) respectively. The western outcrop is drift-free. A maximum thickness of 10.4m (34.0 ft) is recorded in Hydrogeological Department Record 253/101 (Table 2). The formation consists of dark grey, brown-weathering, silty, poorly bedded clay which commonly contains shell fragments. Gryphaea sp. occurs throughout and is particularly abundant in the uppermost 5 m (17 ft).

Corallian

The Corallian consists of up to 24.7 m (81.0 ft) of interbedded oolitic and pisolitic limestones, sands, sandstones and coral rock with some clays. There are two locally developed, laterally impersistent facies with local stratigraphical names, the 'Coral Rag' and the 'Lower Calcareous Grit'. The former, representing a deeper-water phase, is made up of rubbly limestones composed mainly of corals. The latter, representing a shallow-water phase, consists of varying proportions of sand and limestone doggers. The sequence is thought to represent changeable shallow-water depositional conditions, thus the lithology is very variable and correlation is difficult. The recently published Abingdon (253) Sheet, gives some data on these facies variations.

The beds crop out on the high ground in the vicinity of Besselsleigh, Marcham and Littlemore. The central section, near Kennington, is capped by the Kimmeridge Clay and Lower Greensand. The deposits were proved in only two IMAU boreholes (SU 49 NE 139 and 140).

Limestone pebbles from the Corallian make up a minor proportion of the Thames Valley gravels (which in this area are dominantly of gravel from the Great Oolite) and a major proportion of the Ock Valley gravels.

Kimmeridge Clay

The Kimmeridge Clay makes up approximately 35 per cent of the solid outcrop on the resource sheet. It is relatively soft and easily eroded and is therefore often found on valley floors, and is frequently overlain by terrace deposits and alluvium. The Kimmeridge Clay varies widely in thickness from 9.9 m (32.5 ft) to 40.8 m (134.0 ft) (see Table 2). It has been recorded in 25 IMAU boreholes and is exposed in several large gravel pits around Abingdon. The formation consist of dark-grey, calcareous, silty clay, locally containing selenite. The highest beds may be very sandy, as in the area north of Nuneham Courtenay. The beds are generally fossiliferous, with fragile iridescent ammonite shells the most frequent and readily recognisable fossils in borehole samples. The Kimmeridge Clay rests unconformably on the eroded surface of the Corallian and is overlain unconformably by either the Lower Greensand or the Gault, except in the north-east (near Lower Farm, Nuneham Courtenay) where it is comformably overlain by the Portland Sand.

Portland Sand

Forming high ground just north of Nuneham Courtenay, an area of Portland Sand lies just within the eastern boundary of the resource sheet. The beds were not proved in any IMAU boreholes, but are thought to have a maximum thickness of 15.0 m (49 ft). They consist of yellow sand with doggers of sandy limestone.

Lower Greensand

The Lower Greensand has been recorded in three IMAU boreholes and consists of beds of greenish-red sand with some fine-grained, well rounded, white and near-transparent quartz gravel and grey clay.

The beds, which are only rarely fossiliferous, have a wide range of thicknesses from 1.8 m (5.9 ft) up to 16.6 m (54.5 ft) (see Table 2). In places, the beds have been cemented into a hard, ferruginous gritstone, particularly on the hill [50 55] just north of Culham (Dr R. J. O. Hamblin, personal communication).

The Lower Greensand rests unconformably on the Kimmeridge Clay and is unconformably over-

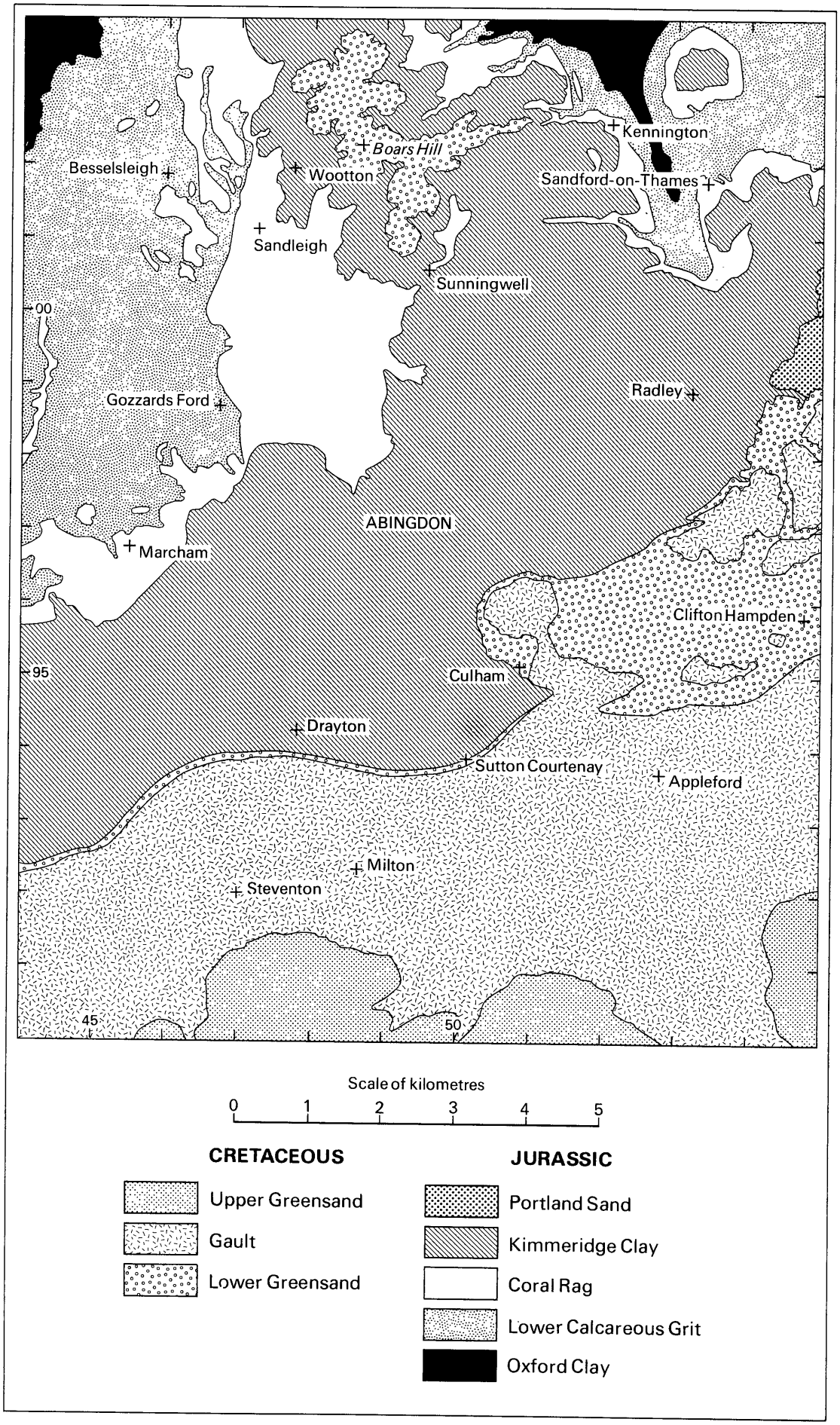


Fig. 3 Solid geology

Table 1 Geological classification of strata cropping out in the area of the resource map

	Maximum recorded thickness m	Major lithologies
DRIFT		
Recent and Pleistocene		
Peat	1.0	Peat with silt and sand
Alluvium	3.3	Silt, clay and peat
River Terrace Deposits		
First Terrace (Floodplain or Northmoor)	5.5	
Second Terrace (Summertown-Radley)	5.9	Limestone gravel
Third Terrace (Wolvercote)	2.4	
Fourth Terrace (Hanborough)	2.4	
Head	2.8	Clay, silt and sand with occasional pebbles
Plateau Gravel (Northern Drift)	6.5	Quartzite, flint and exotic pebbles in a sandy matrix
SOLID		
Cretaceous		
Upper Greensand	10.0 (estimated)	Silty marls and glauconitic sands
Gault	43.9	Grey silty clay
(local unconformity)		
Lower Greensand	16.6	Sands, gravels and sandstone
(local unconformity)		
Upper Jurassic	15.0 (estimated)	Sandy limestones and sands
Portland Sand		
(local unconformity)	40.8	Dark-grey silty and fossiliferous clay
Kimmeridge Clay		
(unconformity)	24.7	Rubbly limestones on calcareous sand with doggers of sandstone
Corallian: Coral Rag and Lower Calcareous Grit		
Oxford Clay	10.4	Greyish brown silty clay

lain by the Gault. It forms a ridge in the region of Culham and Nuneham Park and at Boars Hill, where it is capped respectively by patches of Gault and Plateau Gravel. From Culham to Steventon the Lower Greensand has been almost entirely overlapped by the Gault; only a thin deposit of ferruginous sands and grey clays remains hidden beneath the terrace and Head deposits.

Gault

The Gault occupies about 25 per cent of the solid outcrop area. It averages 18 m (59 ft) in thickness and has a maximum recorded thickness of 43.9 m (144.0 ft). It outcrops in a broad belt at the foot of the Upper Greensand scarp in the south of the area. The clay, is blue or grey and weathers to brown or orange-brown. Locally, it is silty and micaceous, especially in the upper part. Gypsum and phosphatic nodules also occur. The Gault rests unconformably on the Lower Greensand and oversteps in places onto the Kimmeridge Clay, for example, in the Vale of the White Horse. IMAU boreholes proved the clay at several localities and exposures are found in the gravel workings at Sutton Courtenay and north of Drayton. Weathered samples of the Gault, the Oxford Clay and the Kimmeridge Clay are similar in appearance, but fresh samples are distinguishable by colour: Oxford Clay is dark brown, Kimmeridge Clay is bluish black and Gault bluish grey.

Upper Greensand

The Upper Greensand crops out on the high ground in the south. It consists of pale green, fine-grained, calcareous siltstone (marlstone). It was not proved in any IMAU boreholes.

DRIFT GEOLOGY

The origin of some of the Drift deposits, particularly the source of the materials, their deposition and the limits of glaciation, are still uncertain. Three broad categories of deposits exist: Plateau Gravel, River Terrace Deposits and Head. They are described below, in order of decreasing age, with the exception of Head which probably was formed at more than one period in the history of the area.

Plateau Gravel (Northern Drift)

The term Plateau Gravel in this report embraces Drift lying above 85 m (280 ft). It consists of ill-sorted, but well-rounded fine to cobble-size pebbles of reddish-brown and variably coloured quartzite

Table 2 Hydrogeological Department borehole records used in the assessment of bedrock thicknesses

Hydrogeological Department Record number	Grid ref.	Approx. surface level above OD		Thicknesses											
				Drift		Gault		Lower Greensand		Kimmeridge Clay		Corallian		Oxford Clay	
		m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft
237/45	5322 0131	54.9	180	5.5	18.0	-	-	-	-	-	-	12.0+	39.4+	-	-
253/2	4785 9443	62.5	205	6.7	21.9	-	-	-	-	37.5	123.0	17.4+	57.1+	-	-
253/34B	4949 9692	50.9	167	4.8	15.7	-	-	-	-	9.9	32.5	19.2+	63.0+	-	-
253/37	5256 9378	47.9	157	6.0	19.6	11.0	36.1	1.8	5.9	15.2+	49.9+	-	-	-	-
253/48	5110 9140	54.9	180	-	-	43.9	144.0	8.7	28.5	26.4	86.5	23.6	77.5	3.0+	10.0+
253/58	5203 9964	67.1	220	0.6	2.0	-	-	-	-	15.8	51.8	14.3+	47.0+	-	-
253/62	4876 9418	56.4	185	2.1	6.8	-	-	-	-	40.8	133.9	10.4+	34.1+	-	-
253/65	5033 9419	50.9	167	4.0	13.1	-	-	-	-	36.3+	119.1+	-	-	-	-
253/69A	5033 9500	51.5	169	4.9	16.0	-	-	-	-	32.0+	105.0+	-	-	-	-
253/69B	5021 9490	51.5	169	4.9	16.0	-	-	-	-	32.3	106.0	7.0+	23.0+	-	-
253/101	4513 9198	65.7	215	1.0	3.3	19.5	64.0	-	-	38.1	125.0	22.5	74.0	10.4+	34.0+
253/153	4952 9657	51.2	168	2.1	6.8	-	-	-	-	16.1	53.0	22.2+	73.0+	-	-
253/179	5014 9743	60.3	198	2.4	7.8	-	-	-	-	11.3	37.0	24.7	81.0	1.2+	4.0+
254/50	5382 9528	56.7	186	6.5	21.5	-	-	7.2	23.6	8.5+	27.9+	-	-	-	-
254/110	5486 9412	50.3	165	2.9	9.5	12.2	40.0	7.3+	24.0+	-	-	-	-	-	-
254/137	5478 9660	64.0	210	-	-	-	-	4.9	16.0	7.9+	26.0+	-	-	-	-
254/141	5469 9584	54.9	180	3.6	11.8	-	-	9.1+	29.9+	-	-	-	-	-	-
254/142	5341 9517	57.9	190	2.3	7.5	3.5	11.5	10.7+	35.1+	-	-	-	-	-	-
254/152	5359 9244	54.9	180	5.1	16.7	17.1+	56.1+	-	-	-	-	-	-	-	-
254/414A	5305 9609	62.5	205	0.4	1.5	-	-	5.0	16.4	40.4+	132.6+	-	-	-	-
254/414B	5341 9545	58.0	190	1.7	5.5	-	-	16.6	54.5	23.2+	76.1+	-	-	-	-
Maximum recorded thickness						43.9	144.0	16.6	54.5	40.8	133.9	24.7	81.0	10.4	34.0
Minimum recorded thickness						3.5	11.5	1.8	5.9	7.9	26.0	7.0	23.0	1.2	4.0

and sandstone, white quartz (probably largely derived from the 'Bunter' Pebble Beds of the Midlands) with some flint, ironstone and exotic material, in a matrix of reddish brown, clayey sand (p. 19 and Figure 10).

To account for the presence of the far-travelled erratics Sandford (1929) postulated a depositional process whereby icebergs in a Pleistocene sea rafted material from as far afield as Wales, Scotland, Cornwall, and Norway. He also reported that some of the pebbles showed parallel striations attributable to glaciation, although this observation has not been confirmed by the author.

The ill-sorted nature of the deposit suggests rapid deposition by waters, possibly draining an ice sheet, which is believed to have been not far north of the resource area. The variation about the mean in the particle size distribution of the Plateau Gravel Deposits in the boreholes is greater than in any of the terrace deposits. (see Notes on the resource blocks).

The mottled brown and reddish-brown colour of the clayey matrix may be attributed to weathering in interglacial conditions or it could have been initially red on account of its derivation from Triassic redbeds('Bunter' Pebble Beds).

Further evidence for a glacial origin is provided by the morphology of the pebbles and their imbrication in the deposit (Goudie, 1975). Within the Plateau Gravel, a channel-fill deposit was recently exposed (Goudie and Hart, 1974) near Sugworth Farm [514 008] in a cutting for the Abingdon By-pass. The channel occurs at 92 m OD, some 40 m above the present channel of the Thames, and is above the Hanborough Terrace. The deposit, which is gravelly at the base, grades upwards into quartz sand and passes into sandy, yellowish brown clay with organic remains; Bunter pebbles occur throughout. The channel, which is 180 to 200 m wide, has cut 5 to 6 m into the underlying Kimmeridge Clay; it possibly represents a former channel of the Thames, or a glacial outwash channel.

Plateau Gravel occurs as scattered patches, totalling 2.9 km^2, capping the Kimmeridge Clay, Gault and Lower Greensand in the north-east of the area. The deposit is up to 4.8 m (15.5 ft) in thickness and averages 2.8 m (9 ft).

Head

Head consists of structureless silty or sandy clay, believed to be derived by solifluction mainly from the Gault and Upper Greensand. The deposits may be pebbly as a result of the addition of material from the adjoining terraces. On the evidence available, they do not conceal any mineral deposit in the area of the resource sheet.

Head has been mapped mainly in the south and covers an area of 11 7 km^2. The largest single area (7.5 km^2) lies between Down Hill [545 917] and Woods Farm [455 902]. It is part of a continuous belt of Head lying along the length of the southern flank of the Vale of the White Horse, which conceals the Gault/Upper Greensand junction along most of its length. Smaller areas occur at Steventon Field, Sutton Courtenay, Sutton Wick, Culham and Radley

River Terrace Deposits

Four river terraces (Table 1, Figure 4) are present in the area; they were originally named by Sandford (1924; 1926). The older two terraces (Third and Fourth) lie as scattered remnants on the high ground and cover an area of only 2.1 km^2.

The First and Second terraces, being less eroded and therefore of wider extent have greater economic potential than the Third and Fourth terraces. The First Terrace is believed to be continuous beneath the Alluvium of the floodplain.

All four terraces are of Pleistocene age and are believed to have been formed in periglacial (tundra) conditions, south of the main ice front. With the exception of the unique composition of the Fourth Terrace, the terraces are of similar composition and grading (Figures 7 and 8). Unlike that of the Plateau Gravel, the gravel fraction of the Thames terraces is composed mainly of Jurassic limestones (Figure 8). The remaining 10 to 15 per cent includes ironstone, quartz, flint and a trace of quartzite. Sand constitutes 30 to 50 per cent of the deposit and silt with some clay averages 10 to 15 per cent. In parts of the valleys of the Ock and Ginge Brook (Block C) the deposits contain a higher proportion of sand and silt and a pebble population dominated by flint and soft chalk, all derived from the escarpment to the south (Dr R. J. O. Hamblin, personal communication). The Thames gravels are remarkably consistent in composition, pebble size and angularity, although localised lenses and pockets of sand and silt are to be found. At the base, cobbles of well rounded quartzite, quartz and flint are common.

The thickness of overburden is commonly less than 1 m (3.5 ft) although the presence of Alluvium, consisting of soil, peat, clay or silt, may increase the thickness to as much as 3.5 m (11.5 ft). On the Third and Fourth terraces, the overburden usually consists of dark brown to reddish brown sandy clay with scattered flint and quartz pebbles, which probably represents the weathering product of a dominantly limestone gravel, the carbonate fraction having been leached out, leaving mainly clay and siliceous pebbles. On the younger Second and First terraces, the soil is brown to dark brown or black in colour and contains weathered limestone in addition to siliceous pebbles.

Fourth Terrace (Hanborough):

Four remnants (Figure 4) of the Fourth Terrace cover an area of 0.6 km^2. One, at Hill Pond [506 961] lies at 76 m (250 ft), and three, near Radley Large Wood [520 009], occur at between 76 m (250 ft) and 82 m (270 ft) above OD. These remnants average 2.3 m (7.5 ft) in thickness, based on data from 16 boreholes. The upper part of the deposits is generally more sandy and clayey than the lower. The mineral in Borehole SP 50 SW 53 comprises about 50 per cent sand, which is dominantly medium-grained and light

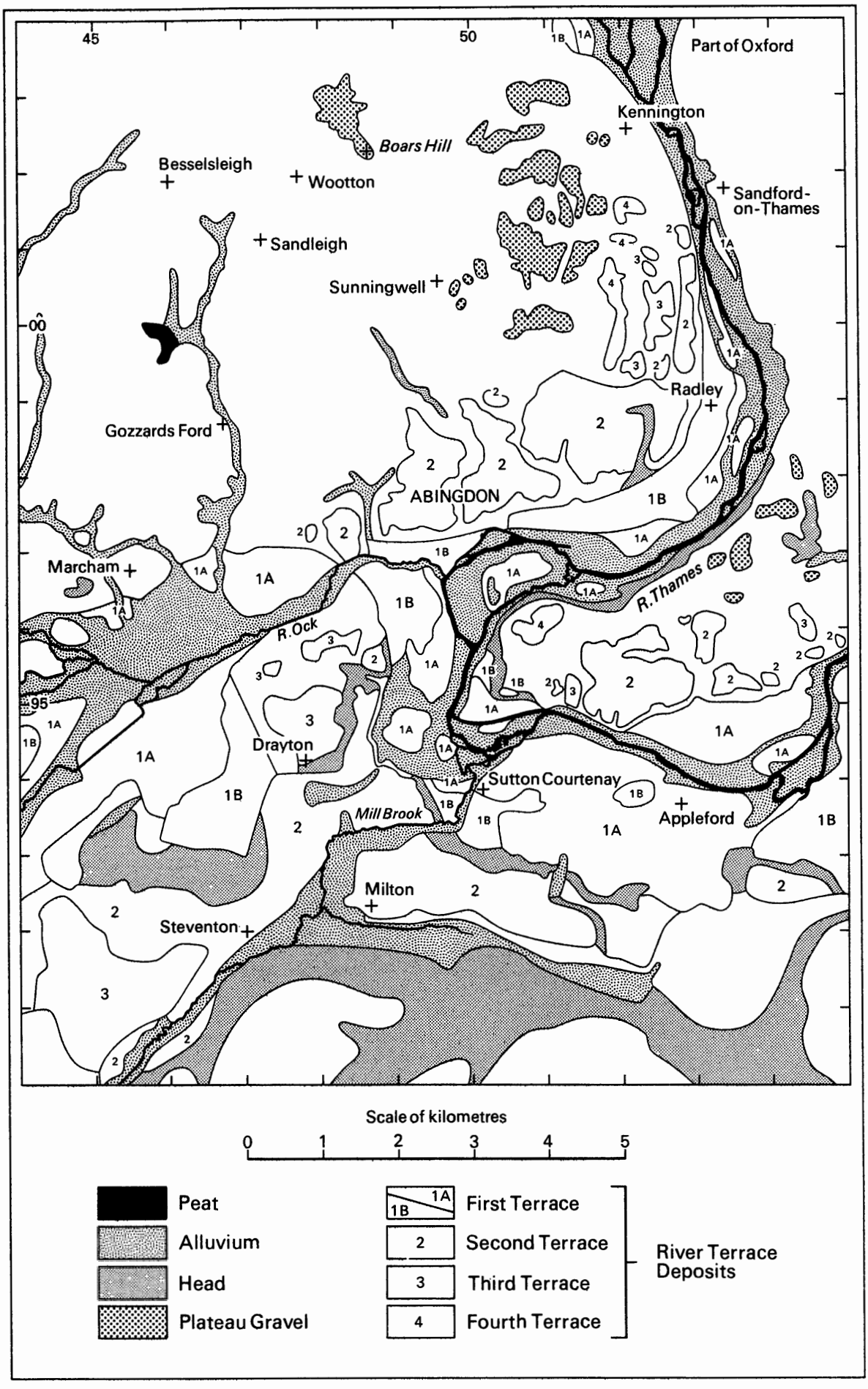


Fig. 4 Drift geology

Plate 1. A water-washed face of sand and gravel. The darkest pebbles are generally ironstone, in high concentration, with white to buff limestones. The deposit grades upwards into sand. South Radley, 1975

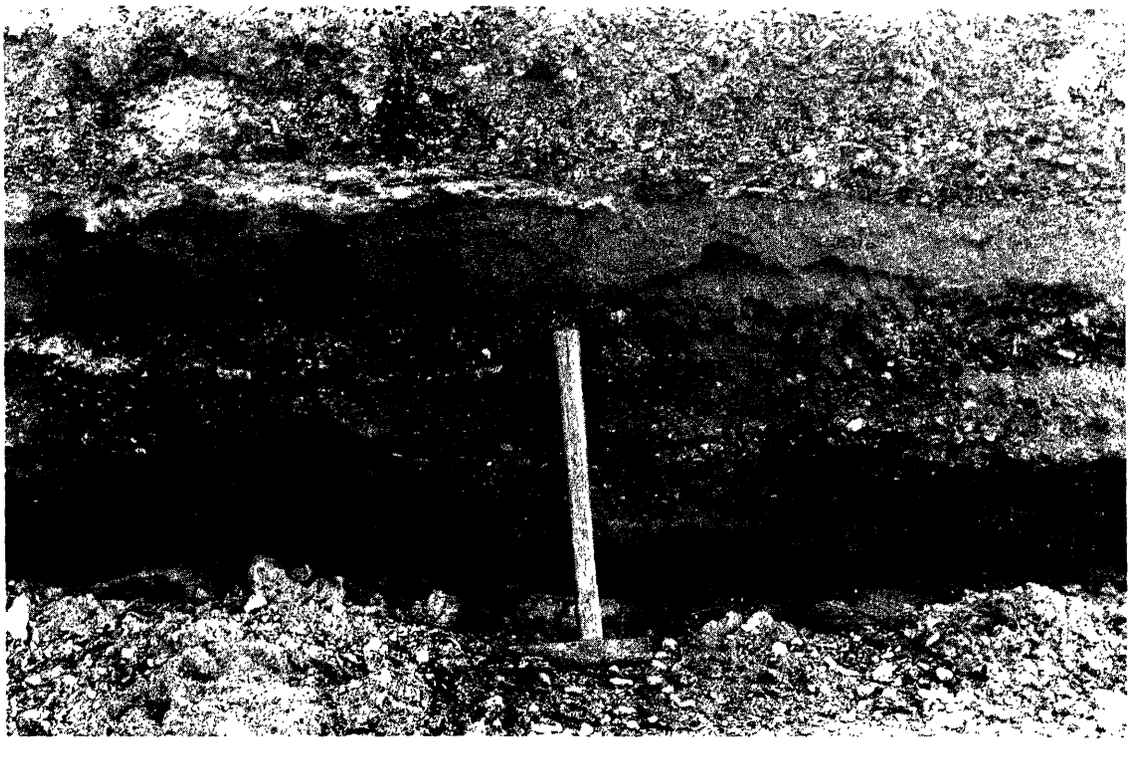


Plate 2. Working face in a gravel pit showing alternate beds of sand and gravel. South Radley, 1975.

Plate 3. Section of a 3-m high face showing cross bedding in a limestone gravel channel-fill. The darker colour of the bed in the middle of the deposit is caused by black manganese staining. South Radley, 1975

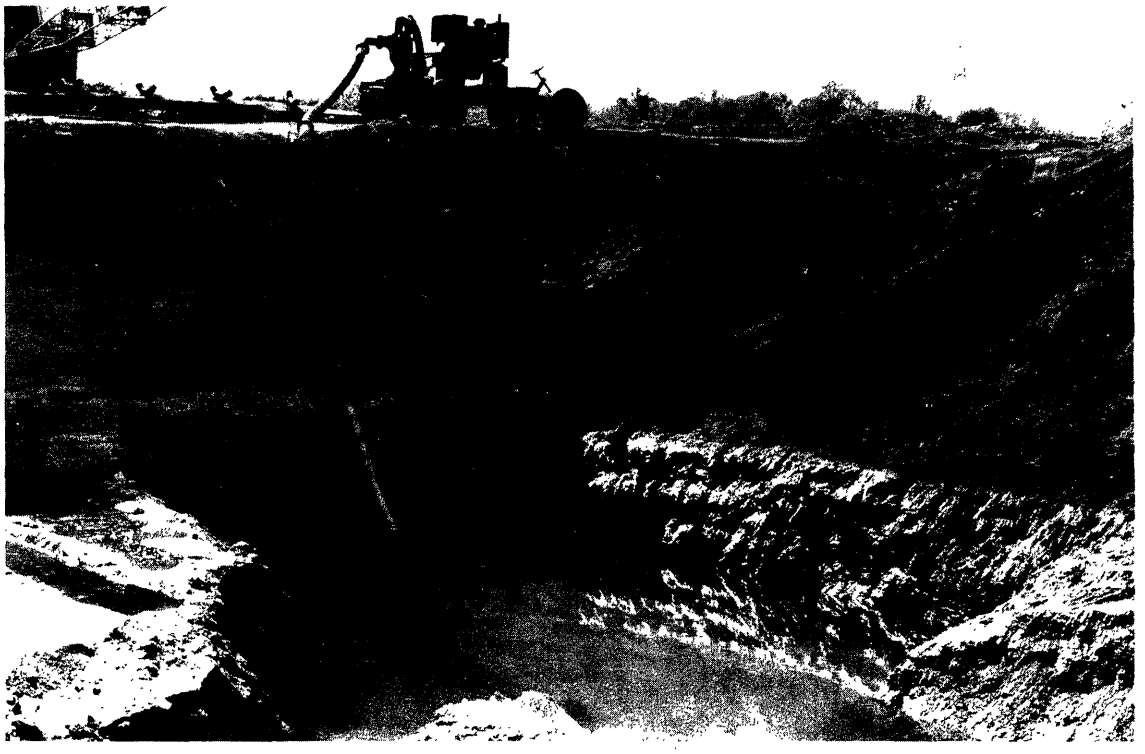


Plate 4. Quarry being pumped dry from a sump dug into the Kimmeridge Clay. About 2 m of sand and gravel overlies the clay. South Radley, 1975

brown; the gravel (about 35 per cent) is composed of fine to coarse eroded and worn flint, with chert, some quartz and quartzite and a trace of ironstone, limestone and igneous rocks. Much of this material is probably reworked Plateau Gravel material (Figure 10, and p.19). The scarcity of limestone could be attributed to decalcification during weathering of the terrace.

Third Terrace (Wolvercote):
Remnants of the Third Terrace are scattered throughout the area. The largest (2.7 km^2) is a terrace of the Ginge Brook, south-west of Steventon [460 915], where it has an average thickness of 2.8 m (9 ft) based on data from three IMAU boreholes, and ranges in height from 63 m (207 ft) to 73 m (240 ft) above OD. The mineral in the north-eastern part of the terrace thins towards the south-west and passes into clay.

At Sutton Wick [478 947] three patches lie at between 61 and 64 m (200 to 210 ft) above OD. The deposits consist mainly of light brown to grey, sandy clay with flint and limestone gravel, except south-west of Caldecott [486 964], where 1.6 m (5 ft) of sand and gravel was proved in borehole SU 49 NE 136. Other remnants of the Third Terrace are near Culham College [514 955] and Park Farm, Radley [523 998]

The average thickness of the Third Terrace, based on data from eight boreholes is 2.2 m, whilst the average thickness of the mineral, based on three IMAU boreholes, is 1.5 m. The gravel component consists dominantly of Jurassic limestone with a trace of ironstone and flint. (Figure 10 and p. 19). The terrace at Park Farm [523 998] differs in that it contains some quartzite which was probably washed in from the adjoining, older, higher-lying deposits.

The history of deposition of this terrace is complicated by the presence of a river-cut channel, the Wolvercote Channel (Arkell, 1947), whose relationship to the adjoining terrace gravels has not been finally established; on mainly faunal evidence the channel fill has been variously interpreted as lying below the terrace (Bishop, 1958), incised into the terrace (Sandford, 1924), younger than both the Wolvercote and Summertown-Radley terraces (Sandford, 1932) and finally contemporaneous with the upper Summertown-Radley Terrace (Briggs and others, 1976).

Second Terrace (Summertown-Radley):
This widespread terrace paralleling the present rivers occurs mainly in a dissected belt, extending from Sandford-on-Thames in the north, through Abingdon and Steventon, to near Didcot in the south. In addition, patches of the terrace lie across the gap at Drayton [480 938], in the vicinity of the Ginge and Mill brooks and north of the Thames at Culham and Clifton Hampden. The terrace covers an area of 10.2 km^2; its elevation is variable but averages about 60 m (196 ft) above OD, generally about 9 m (30 ft) above the present rivers. The terraces all slope towards the axes of the valleys.

Within the terrace, the mineral has a mean thickness of 2.1 m (7.0 ft) and ranges in the boreholes from 1.0 m (3.5 ft) to 5.4 m (17.5 ft). The gravel component is mainly Jurassic limestone with some flint, quartz and ironstone (Figure 8 and p. 19). Locally, clay and silt-filled channels have been cut into the terrace.

The only exposures of the terrace are at Drayton [479 933], where workings, were active until 1975. Former workings, now restored to agriculture, are located at Wigbald Farm [539 924] and west of Radley Station [526 988]

First Terrace (Floodplain or Northmoor):
The First Terrace deposits, which are generally widely preserved, cover 31 km^2. The terrace can be traced continuously from the upper Thames near Cirencester to Goring; it changes in composition along its length as the flint increases downstream at the expense of the limestone. The terrace forms a continuous belt along the Thames and its major tributary, the Ock. The terrace can be divided into two levels (1A and 1B), which are separated by a surface height difference of 2 to 3 m (6.5 to 10.0 ft). There is no evidence of a similar difference in bedrock levels. At the Radley gravel pits [503 974] to [522 974], which are traversed by the boundary separating Terrace 1A from 1B, there is no evidence of a break in the sedimentation between the two levels. It is probable that the change of slope, which is not very distinct, is an erosional feature.

The First Terrace surface ranges in height from 56 m (185 ft) above OD in the north near Oxford, to 48 m (158 ft) above OD in the south, near Clifton Hampden. The deposits, which average 3 m (10 ft) in thickness, consist of water-laid buff to white, fine to coarse oolitic limestone gravel in a matrix of sand and silt. Secondary iron, forming a 'hard pan' is commonly found in the middle part of the deposit. Cobbles of well rounded quartz, quartzite and flint are generally present at or near the base of the terrace. Manganese staining is evident in parts (Plate 3). Boreholes indicate that there are substantial local variations on the thickness of the terrace, which can be attributed in part to the uneven, gently sloping valley floor and more significantly to the meandering river channels which have removed part, and in some instances all, of the original sand and gravel deposits and replaced them with clay and silt.

Sand constitutes about half of the deposit (Figure 7). The proportion is slightly more in the north (Block A) than in the south. The deposits grade up into almost pure sand within which there is a marked fining upwards (Plates 2 and 3); in the Radley area cross-bedding is a feature of the upper part of the deposit (Plate 3). The fines content is generally less than 20 per cent in the deposits adjacent to the Thames, but in the Ock Valley a noticeably higher average fines content was recorded (Figure 11).

The mean composition (Figure 8) and compositional variation (Figure 10) of the deposits suggests that they were largely derived from the surrounding higher ground: this view is substantiated by evidence of the accumulation at the base of erratic material and cobbles. Much of the

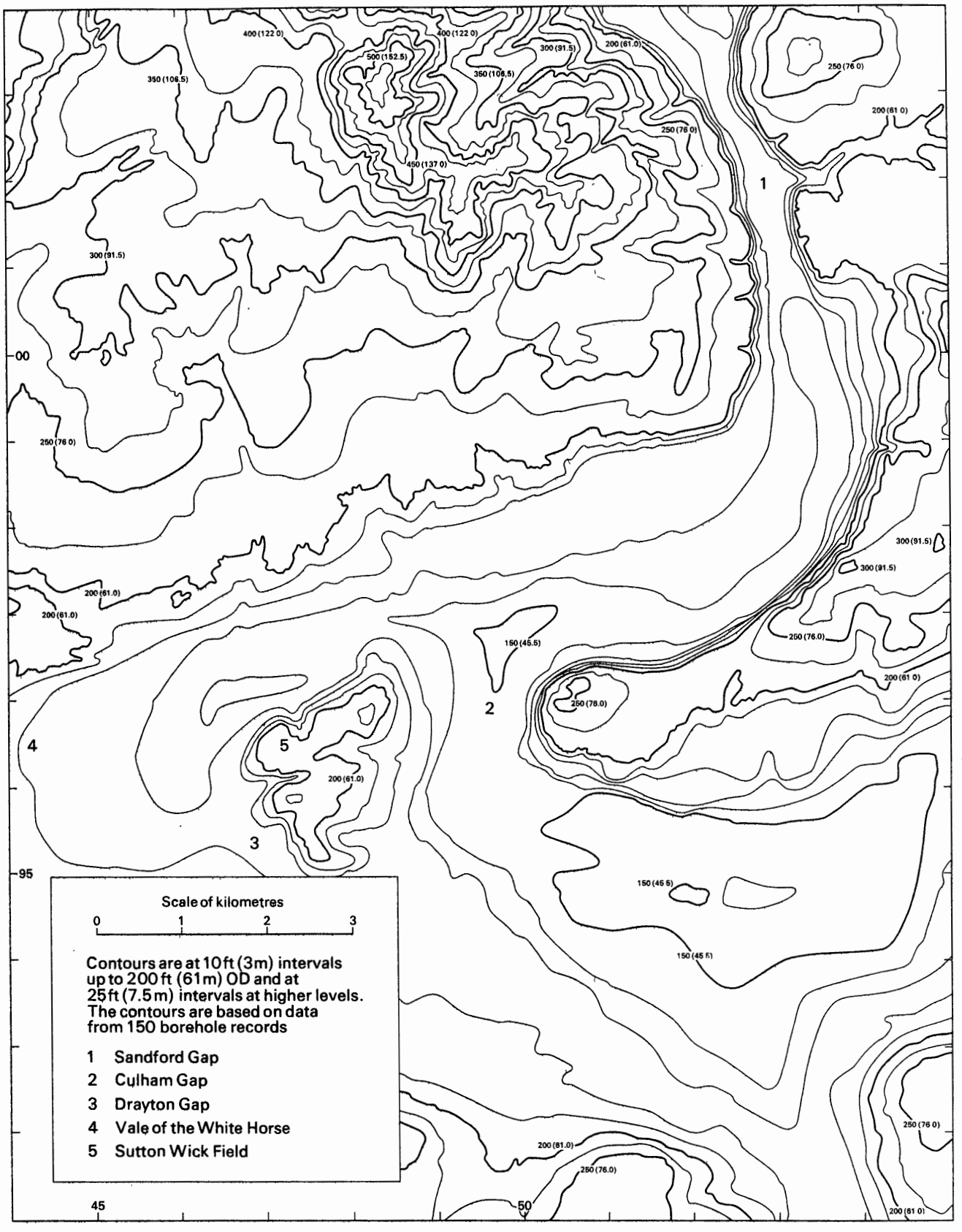


Fig. 5 Contours on the bedrock surface

material is thought to be derived from the Summertown-Radley Terrace, which was transported by a combined process of solifluction and fluvial action and worked over a long period by shifting streams. Extensive spreads of Alluvium partly overlie the terrace deposits or infill channels eroded into them, locally down to bedrock. The deposits consist of clay and silt with some peat (Dines, in Richardson and others, 1946, p. 125).

On the evidence of a molluscan fauna in the gravels, a 'warm' interglacial climate is thought to have prevailed during the deposition of much of the First Terrace deposits (Briggs and others, 1976). This is confirmed by the general absence of periglacial features (with the exception of manganese staining) in the gravels at Radley, although in the gravel pits of Sutton Courtenay, ice-wedge casts overlain by undisturbed sand and gravel have been recorded (Briggs and others, 1976). It is likely, however, that periglacial conditions existed for only short periods during the terrace formation.

All the major workings are in the First Terrace, notably south-west of Radley [535 990], east of Sutton Courtenay [501 938] and east of Abingdon.

Alluvium and Peat

The Alluvium, which covers 14.2 km^2 of the sheet area, consists of dark silt, or silty clay, with thin beds of peat and lenses of gravel or sand. Molluscan remains are locally common. In the Thames Valley, the Alluvium is up to 3.5 m (11.5 ft) in thickness and averages 1.8 m (6 ft). In the Ock Valley it is generally thinner and averages 0.9 m (3.0 ft).

Commonly, the Alluvium rests on First Terrace deposits, but in some areas it rests on bedrock, particularly adjacent to the main stream of the present rivers where the terrace deposits have been completely removed by fluvial erosion.

In the north-west, several small streams, notably the Sandford and Wildmoor brooks, rise in the vicinity of Boars Hill and flow in incised valleys over the Corallian. Alluvium forms narrow outcrops in these valleys, and consists of grey peat overlain by sandy to silty clay. These deposits vary in recorded thickness between 1 m (3.5 ft) and 2.5 m (8 ft).

HISTORY OF THE DEPOSITION OF THE TERRACE DEPOSITS

This hypothetical reconstruction of the sequence of events that led to the deposition of the Thames terrace deposits aims to explain the origins of the morphological features shown by the subdrift contours (Figure 5) and account for the differences between the thicker and more extensive deposits of the main channel of the Thames and the thinner and more clayey deposits of the Ock Valley. Dr R. J. O. Hamblin (personal communication) believes that in earlier days the Ock and its tributaries, including the Ginge, were important streams carrying large quantities of material from the hills to the south and formed the wide expanses of terrace in the Vale of the White Horse. The Ock initially joined the Thames south of Drayton, but later cut a new course to the north, leaving its former tributary - the Ginge - as a misfit stream in the old channel. The contour map (Figure 5) has been drawn on the evidence of 150 boreholes, 61 of which are IMAU boreholes, and the Institute's geological maps. The collated information, together with the inferences of the author, form the basis of the reconstructions set out in Figure 7. Contrary views, based on lithological interpretation, are held by Dr Hamblin, reference to which is made at appropriate places below.

There are three geological factors that have influenced the geomorphological history. Firstly, the low, south-easterly dip of the solid rocks. Secondly, their differing degrees of hardness and durability, for example, the Lower Greensand lies between the softer Gault and Kimmeridge clays and forms a major topographical feature. The outcrop of the Lower Greensand and its unconformable relationship with the Gault was probably an important factor in influencing the course of the Thames. Variation in hardness within the Lower Greensand was also a contributory factor, for example at Hill Farm [502 958], where coarse ferruginous sands and fine gravels are locally cemented to hard ferruginous gritstone, (Dr Hamblin, personal communication). The third factor is the dominance of one main direction of sediment supply, through the gap at Sandford.

At a later stage, in post-Second Terrace times, the River Ock and its small tributaries contributed large quantities of Alluvium which floor the downstream reaches of the Vale of the White Horse (4 on Figure 5). Minor quantities of sediments were probably derived by solifluction from the Plateau Gravel.

Fourth Terrace: Very few deposits of Fourth Terrace age remain (Figure 6a), so that speculation regarding the river's course must be hypothetical. It is probable that a river flowing in from the north broke through the Corallian limestones to create the Sandford Gap (2 on Figure 5). The river probably eroded its east bank, while depositing material on the west bank, evidence of which remains today as a few elongated terrace remnants aligned parallel to the direction of flow on the high ground in the region of Radley Large Wood [520 009].

Third Terrace: The Third Terrace (Figure 6b) was deposited at an elevation of between 60 and 73 m (200 and 240 ft) above OD, on a land surface which had been lowered by about 14 m (45 ft) below Fourth Terrace level. The river entered the area from the north through the deepened and widened Sandford Gap and left deposits which exist today as enlongated patches below and slightly south-eastwards of the Fourth Terrace at Park Farm, Radley [523 998]. The river probably followed much the same course across the area as before, but widened and deepened the valley by south-eastward (down-dip) migration. Remnants of the Third Terrace are scattered and not extensive.

A remnant in the vicinity of Lower Farm, Steventon [445 913] might imply that the course of the main channel of the river entered the Vale of the White Horse (Figure 6c) only to be sharply deflected eastwards on encountering the resistant outcrop of the Upper Greensand. The river presumably found an easier, probably meandering course over the Gault and in so doing, widened the Drayton Gap to approximately 3.2 km (2 miles). On the other hand, Dr Hamblin (personal communication) considers that the remnant is a terrace of the Ginge, not of the Thames; he believes that its composition suggests a southerly derivation and that surface levels show a fall north-eastwards, following the thalweg of the Ginge. Three remnants of the Third Terrace of the Thames in the vicinity of Sutton Wick Field [475 955] probably represent deposition on the inside of a meander as 'point bar'-type deposits. Downstream from this area the course of the river is conjectural, as little evidence of deposition exists, but the river probably meandered widely, and considerably narrowed the divide at Culham (Figure 6b).

Second Terrace: The Second Terrace (Figure 6c) deposits lie between 55 and 64 m (180 and 210 ft) above OD; they are widely distributed in broad tracts about the flanks of the Thames Valley and in the Vale of the White Horse. They were laid down by a large river flowing over an extensive floodplain, which had been lowered by about 6 m (20 ft) below Third Terrace level. The deposits consist of reworked material from the much-eroded and dissected Third and Fourth Terraces, as well as material from outside the area.

The river, flowing from the north, deepened and widened the valley at Sandford by undercutting the eastern bank, while depositing material on the western side of the valley. It followed the foot of the river cliff formed at the Lower Greensand/Kimmeridge Clay junction, which extends from south of Radley into the Vale of the White Horse. The Drayton Gap (3 on Figure 5) was now probably much narrower and the river was forced into a narrow channel, as illustrated by the contour map. At about this time, it is suggested that two meanders coalesced in the region of Andersey Island (Figure 6c) and the river established a new main course through the Culham Gap (2 on Figure 5) which gradually widened. The now isolated course of the river to the west of the gap may have remained for a while as a backwater and then as a large oxbow lake encircling the high ground at Drayton. With the continuing influx of fine sediment from the River Ock and its tributaries, the deposits acquired much of their silty and clayey character. However, Dr Hamblin doubts that the Thames flowed west of Drayton in Second Terrace times, as no Thames gravels of this age are known north or west of Drayton. Boreholes for the A34 Abingdon By-pass show that the gravels between Drayton and Steventon were indeed deposited by the Thames, but those west of Steventon he considers to have been deposited by the Ock, which at that time joined the Thames and Ginge at Steventon.

First Terrace: Soon after the formation of the Culham Gap, a further period of erosion resulted in the lowering of the land surface by 6 to 7.6 m (20 to 25 ft). The streams flowing off the Berkshire Downs, the Ock, Letcombe Mill and Ginge Brook, were now the main carriers of material into the Vale of the White Horse. They eroded and redistributed the pre-existing terrace deposits and at the same time deposited large quantities of glauconitic sands, chalk pellets and other generally fine-grained material derived from the Chalk, Upper and Lower Greensand and Gault. IMAU boreholes in the First Terrace (Figure 6d) have proved a high average fines content and a low average mineral thickness (1.5 m) for the Ock valley deposits (northern part of Block C) while the same terrace in the Lower Thames Valley has a lower average fines content and higher average mineral thickness (3.0 m). In the resource area as a whole limestone is the main gravel constituent (about 81 per cent); but differences in composition are recorded for the Ock valley where deposits contain, in addition to limestone, much chalk and flint, while the Thames Valley gravels additionally contain more quartz, quartzite and ironstone.

In this last phase the Thames further widened its valley. South of Radley, the river continued to be deflected westwards by the southerly-receding river cliff formed by the Lower Greensand and then flowed through the Culham Gap. The earlier terraces were further dissected and reduced in size. In the Mill and Ginge Brook valleys the Second Terrace received a covering of glauconite-rich Alluvium. Below the Culham Gap the river probably meandered widely over a flat plain and deposited extensive tracts of gravel in the region of Sutton Courtenay and Appleford.

The contour map (2 on Figure 5) shows several deep areas (scour pools) at the downstream end of relatively shallow areas, which may arise from differences on bedrock hardness and erosive power of the river. Following the deposition of the First Terrace, the Thames and its tributary streams - the Ock and Mill Brook - cut into the sands and gravels. From the evidence of IMAU boreholes, the stream channels are usually infilled with clays and silts, and rarely peat. They reach 6.2 m (20.5 ft) in depth in the Thames Valley and 3.5 m in the Ock Valley. In some cases the river has entirely removed the terrace deposit and eroded through to the bedrock, as shown in boreholes SU 49 SE 92 and SU 49 NE 17. In the majority of boreholes, however, the original terrace has been only partially removed before being covered by Alluvium. Numerous inliers of First Terrace (1A) gravels are found protruding through the Alluvium, as at Clifton Cut [542 943], Andersey Island [504 966], Otney [496 945] and elsewhere.

As no major erosional phase, other than that mentioned above, has followed the deposition of the First Terrace, the First Terrace deposits are, for the most part, continuous and thus of greater economic importance that the other terraces.

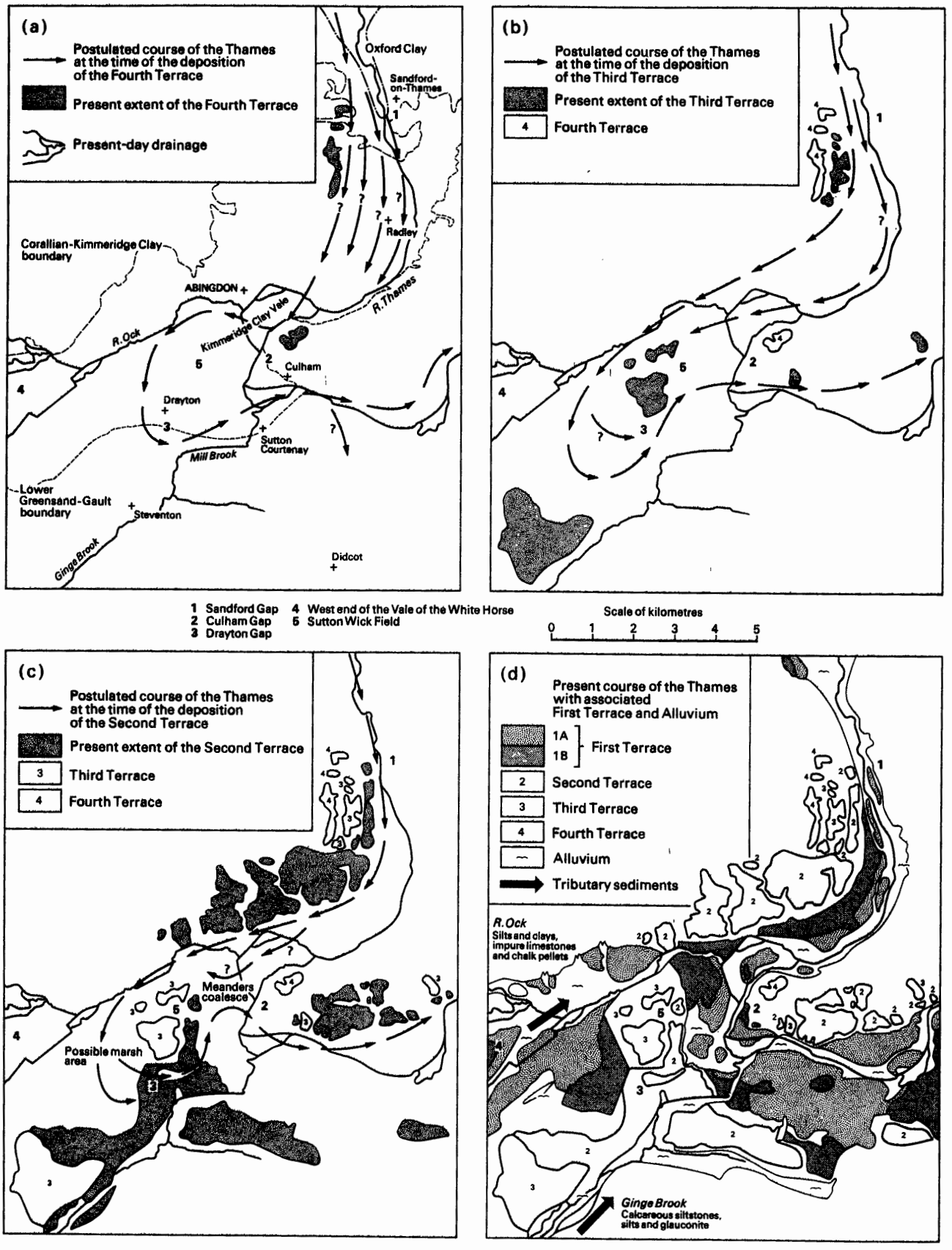


Fig. 6 Hypothetical reconstruction of the course of the Thames inferred from the bedrock contour map (Figure 5) and the present distribution of the terrace deposits

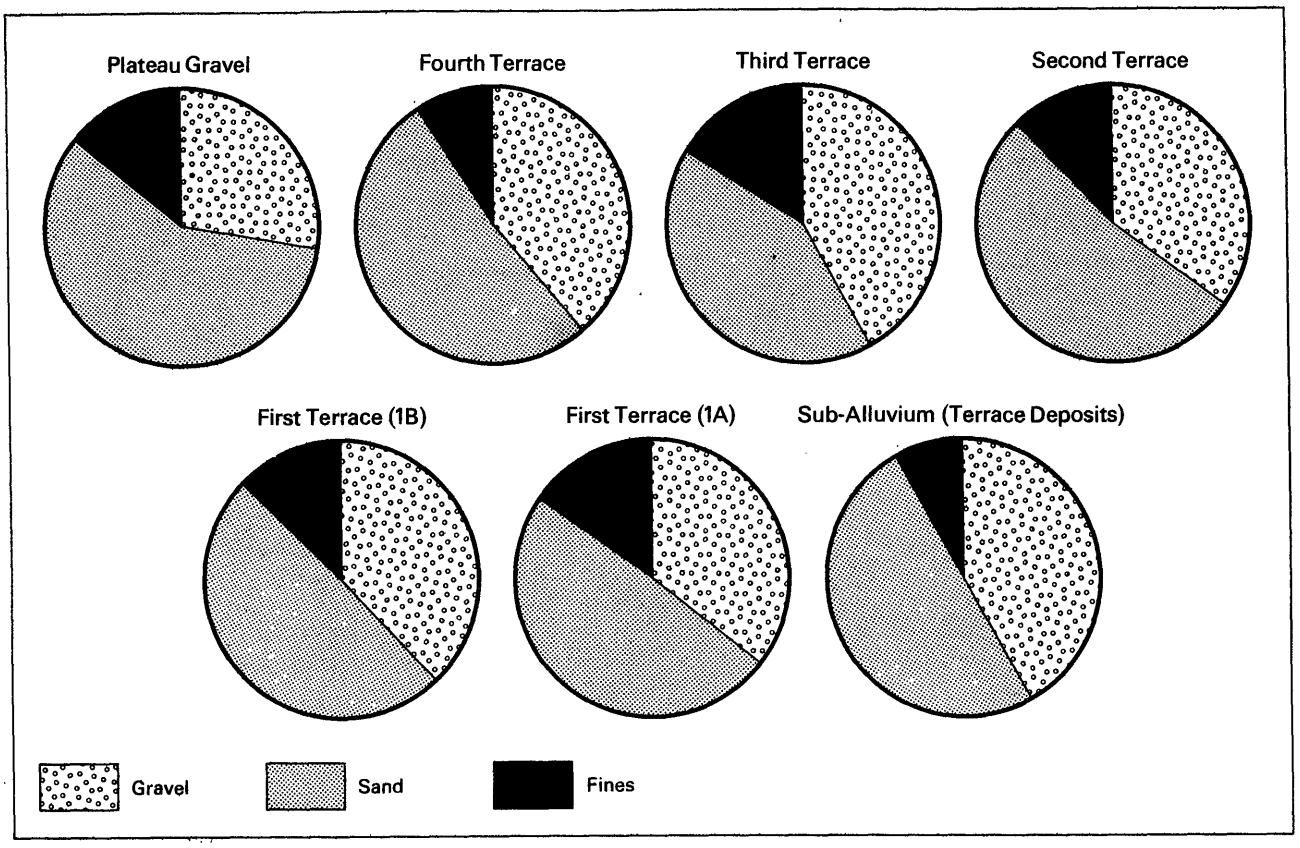


Fig. 7 Mean grading of the River Terrace Deposits and Plateau Gravel

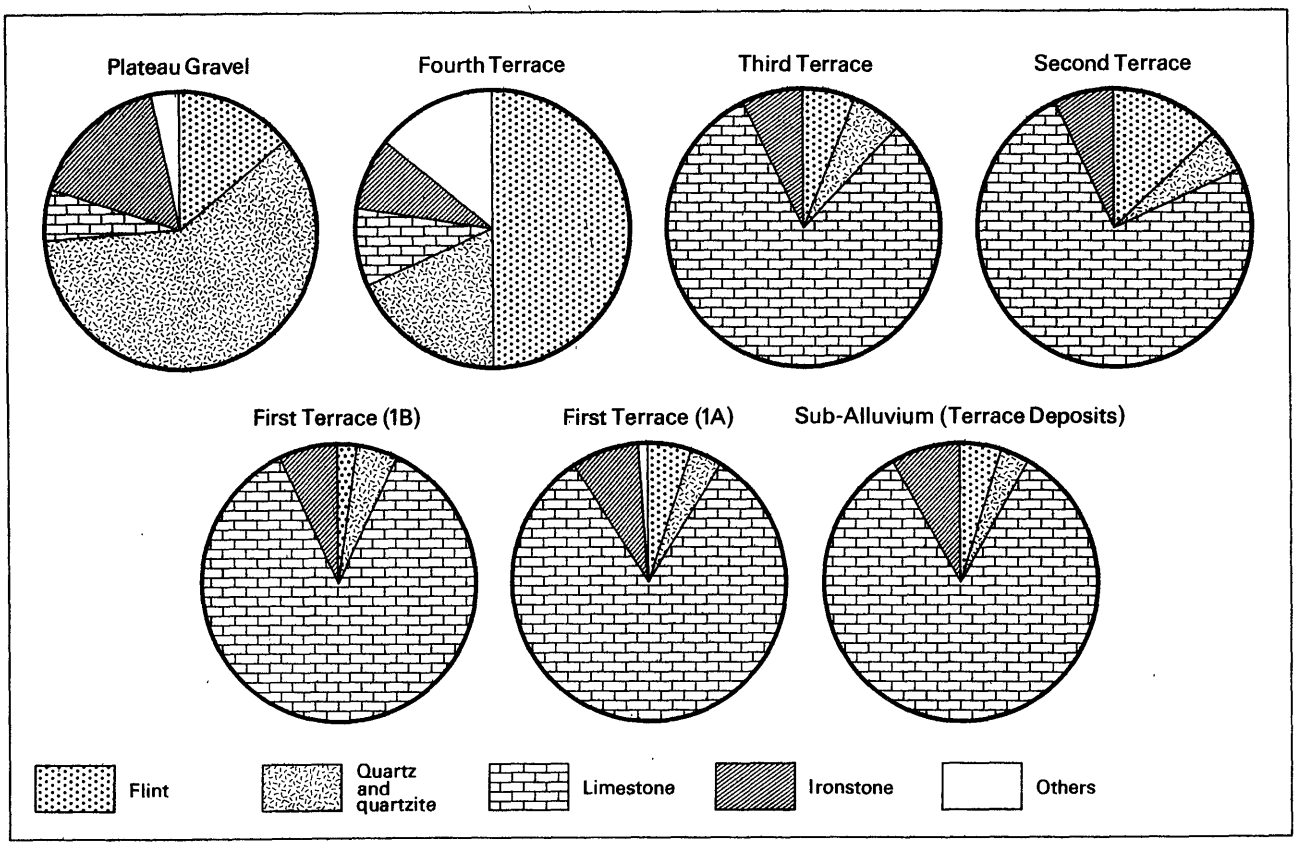


Fig. 8 Mean composition of the River Terrace Deposits and Plateau Gravel

COMPOSITION OF THE SAND AND GRAVEL DEPOSITS

There are two potentially workable mineral deposits, namely the River Terrace Deposits (some of which are overlain by Alluvium) and the Plateau Gravel. The River Terrace Deposits cover 42.1 km^2 or 93.6 per cent of the mineral-bearing area. The Plateau Gravel covers only 2.9 km^2 or 6.4 per cent, of the mineral-bearing area; it has a patchy distribution, the largest patch being only 0.4 km^2, and it varies rapidly in composition, both vertically and laterally. The differences in the grading of the Plateau Gravel and River Terrace Deposits are illustrated in Figures 11, 12 and 13.

River Terrace Deposits

Although all four Thames terraces are mineral-bearing, the bulk of the resources are found in the First and Second terraces.

The mean grading analyses (Figure 7) of the terraces show a consistent pattern. The mean grading for the blocks shows that the sand content of the First and Second terraces increases downstream (compare Blocks A and B Figure 11). The fines content is higher in the Ock Valley (Block C, Figure 11) than in the Thames Valley.

The gravel fraction in the First, Second and Third terraces consists of usually buff to grey, well sorted, fine to coarse, subrounded, platy and tabular pebbles of Jurassic limestone some of which is oolitic. Subordinate amounts of tabular brown ironstone pebbles are commonly found in a thin bed near the base of the deposit. There are small amounts of subangular to subrounded flint (see Note 19, Appendix D), well rounded to ovoid, brown and reddish brown quartzite (see Note 18, Appendix D), rounded to well rounded white or colourless quartz and worn shells and coral fragments. Also, there are scattered cobbles of subangular to subrounded tabular limestone, well rounded to ovoid, red and reddish brown quartzite, some well rounded, whitish quartz and a trace of flint. In the First Terrace the cobbles commonly occur near the base of the deposit. Erratics (see Note 20, Appendix D), which include sandstone and igneous and metamorphic rocks are found in small amounts (Sandford, 1929) and are thought to have been derived from the Plateau Gravel. The sand fraction, which usually constitutes between 40 and 50 per cent of the deposit (by weight), consists mainly of subrounded, oolitic limestone with lesser amounts of subangular to well rounded quartz and some ironstone. Minor constituents include dark-green glauconite, and fragments of shells, crinoids, corals and other debris. As mentioned before, the deposits of the upper Ock and Ginge valleys differ in containing dominantly chalk and flint clasts.

The Fourth Terrace differs from the three lower terraces in that it contains as much as 50 per cent of flint, with significant amounts of quartz, quartzite and exotic rocks and only a small amount of limestone (see Notes 18-20, Appendix D). This composition suggests that the Fourth Terrace deposits were derived mainly from the Plateau Gravel, possibly by solifluction

Plateau Gravel

The deposit is ill-sorted, with a high mean sand content, usually in excess of 50 per cent. The gravel content ranges between 15 and 30 per cent and the fines between 9 and 22 per cent. The deposits are characterised by a high proportion of quartz, quartzite and sandstone, mostly derived from the 'Bunter' Pebble Beds of the English Midlands, substantial amounts of flint, reportedly striated (Sandford, 1926, p. 106) exotic pebbles, probably derived from a wide area in Britain and Scandinavia, and only trace amounts of limestones. Exceptions to this are at Boars Hill, where a small area [487 022] of Plateau Gravel contains 94 per cent of quartz and quartzite (in borehole SP 40 SE 2) and near Spring Copse [514 031], where borehole SP 50 SE 50 proved the gravel fraction of the deposit to contain 30 per cent of limestone. The channel-fill at Sugworth Lane was found (Goudie and Hart, 1974; Briggs and others, 1976) to be a river channel-fill having certain physical affinities with the terrace deposits, but compositionally similar to the Plateau Gravels.

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 boundaries show the best available interpretation of the information available at the time of survey. However, it is inevitable that local irregularities or discrepancies will be revealed by some boreholes (for example, clay-filled channels are revealed in the Second Terrace by boreholes SU 49 SE 88 and 86, and in the Alluvium by boreholes SU 49 SE 92 and SU 49 NE 17). These are taken into account in the assessment of resources (see below and Appendix B). Borehole data, which include the stratigraphic relations and mean particle size distribution of the sand and gravel samples collected during the assessment survey, are also shown.

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 the areas where it is present in continuous (or almost continuous) spreads beneath overburden. The mineral is identified as 'exposed' where the overburden, commonly consisting only of soil and subsoil averages less than 1.0 m (3.5 ft) in thickness. Beneath overburden the mineral may be continuous or discontinuous. As potentially

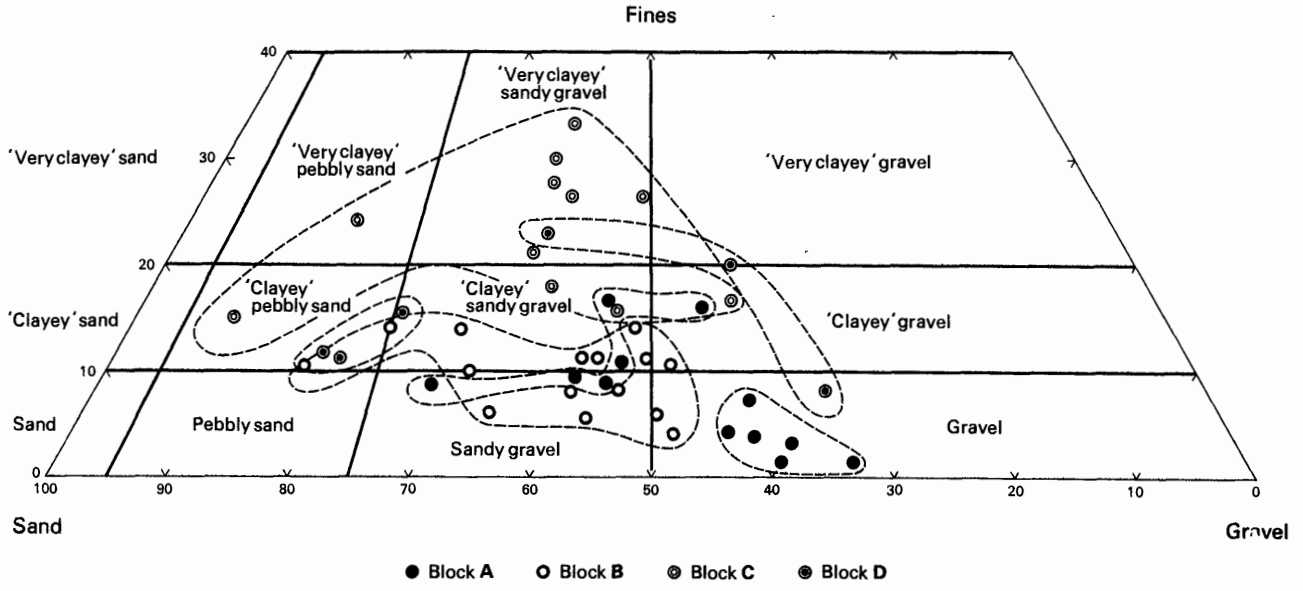


Fig. 9 The mean grading of the mineral in Industrial Minerals Assessment Unit boreholes plotted on the mineral classification diagram and grouped by block

workable sand and gravel was proved in 85 per cent of the boreholes drilled through overburden, the mineral is regarded as continuous. Areas where bedrock crops out and where sand and gravel does not satisfy the definition of 'mineral' are uncoloured on the map. In such areas it has been assumed that mineral is absent except in infrequent and relatively minor patches that can neither be outlined nor assessed quantitatively in the context of this survey. Areas of unassessed sand and gravel, for example, built-up areas, are indicated by a red stipple.

The area of the exposed sand and gravel is measured from the mapped geological boundary lines. The whole of this area is considered as mineral, although it may include small areas where sand and gravel is not present or is not potentially workable. Inferred boundaries (for which a distinctive zigzag symbol is used) have been drawn between categories of deposits recognised. 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 of this assessment are summarised in Table 3. There are four blocks, A to D, which are assessed separately, and the data from IMAU boreholes are shown in Tables 4 to 7 respectively. For each block the mean percentage weight passing each particle size is illustrated graphically in Figure 12. For the whole area, the mean grading of the River Terrace Deposits and the Plateau Gravel is shown in Figure 7. Particle size distribution of the Terrace Deposits in Block A is shown in Figure 13.

Supplemantary information has been obtained from the Hydrogeological Department records and records provided by the sand and gravel industry, many of which are held in confidence.

The resource survey has been carried out using 1054 sample points. For methods of resource assessment, see Appendix B.

Accuracy of results

For the four resource blocks A–D, which include River Terrace Deposits and Plateau Gravel, the limits of error of the results at the symmetrical 95 per cent probability level vary between 8 per cent and 53 per cent (that is, it is probable that nineteen times out of twenty the true volume present lies 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, ten boreholes) were used in the calculation. Thus, if closer limits are needed for the quotation of reserves of part of a block, it can be expected that data from more than ten sample points will be required, even if the area is quite small. This point can be illustrated by considering the whole of the potentially workable sand and gravel on this sheet. The volume (94.5 million m^3) can be estimated to limits of $\pm$ 15 per cent at the 95 per cent probability level, by a calculation based on the data from 1054 sample points spread across the four resource blocks.

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

Table 3 Statistical assessment of the sand and gravel resources

BLOCK	Area				Mean thickness				Volume of mineral				Mean grading percentages					
	Block	Mineral		Worked out	Overburden		Mineral		million m^3	million yd^3	Limits at the 95% confidence level		Fines	Sand			Gravel	
		River Terrace Deposits	Plateau Gravel										silt and clay	Fine	Medium	Coarse	Fine	Coarse
					ft	m	ft	m			± %	± Volume million m^3	-1/16 mm	+1/16-¼ mm	+¼-1 mm	+1-4 mm	+4-16 mm	+16 mm
	km^2	km^2	km^2	km^2														
A	17.2	11.2	-	1.1	4.5	1.3	7.0	2.2	24.1	31.6	19	4.6	9	4	23	17	33	14
B	27.7	20.0	-	2.2	4.5	1.3	6.5	2.0	40.0	52.4	8	3.2	9	4	29	19	32	7
C	11.4	10.9	-	0.2	2.5	0.7	6.0	1.8	19.6	25.7	20	3.9	23	9	23	15	25	5
D	26.5	-	2.9	0.0	2.5	0.7	7.5	2.3	6.5	8.5	53	3.3	19	11	35	9	13	13
A-D	82.8	42.1	2.9	3.5	3.5	1.0	6.8	2.1	94.5	123.6	15	14.2	15	7	27	15	26	10

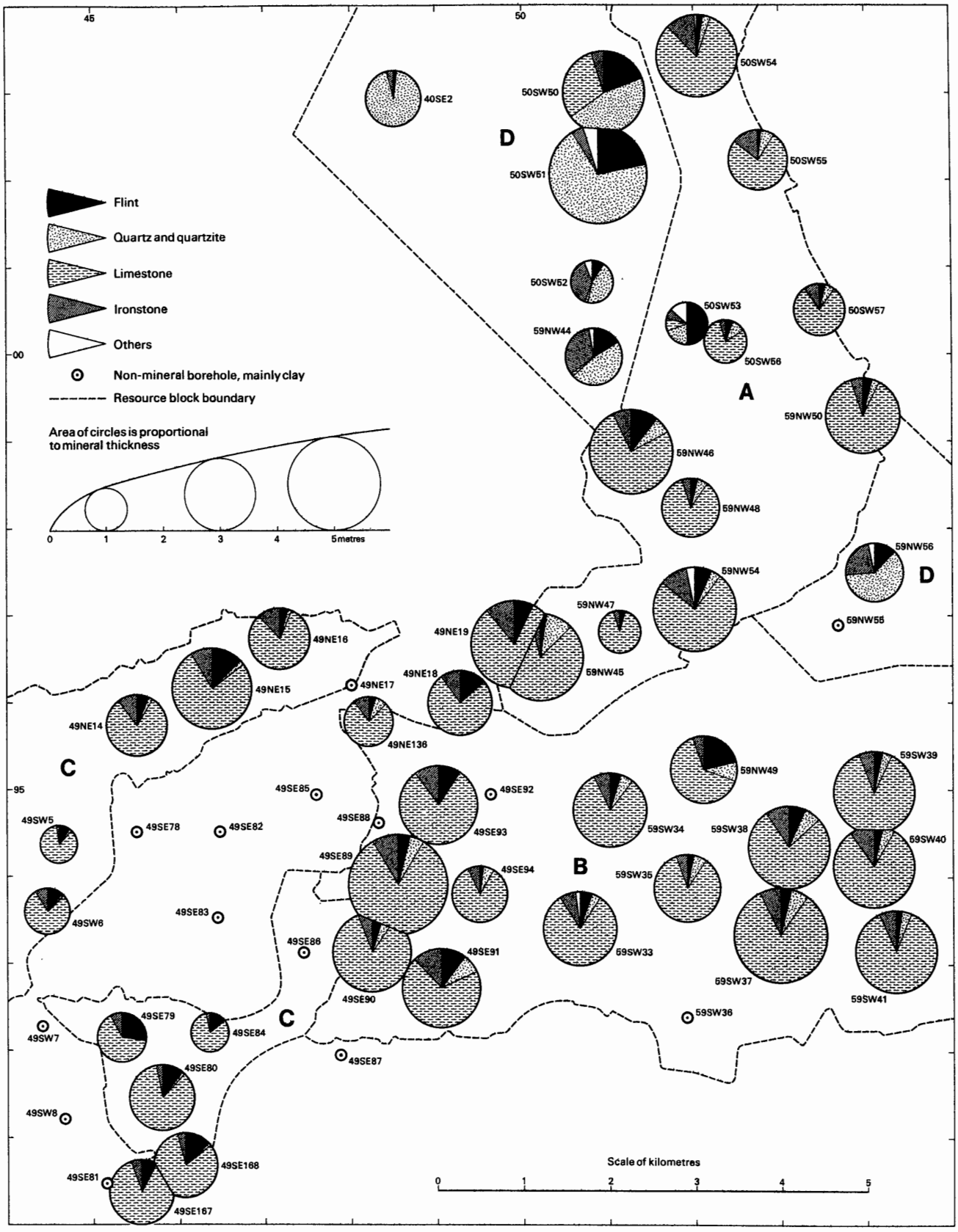


Fig. 10 Compositional variation in IMAU boreholes

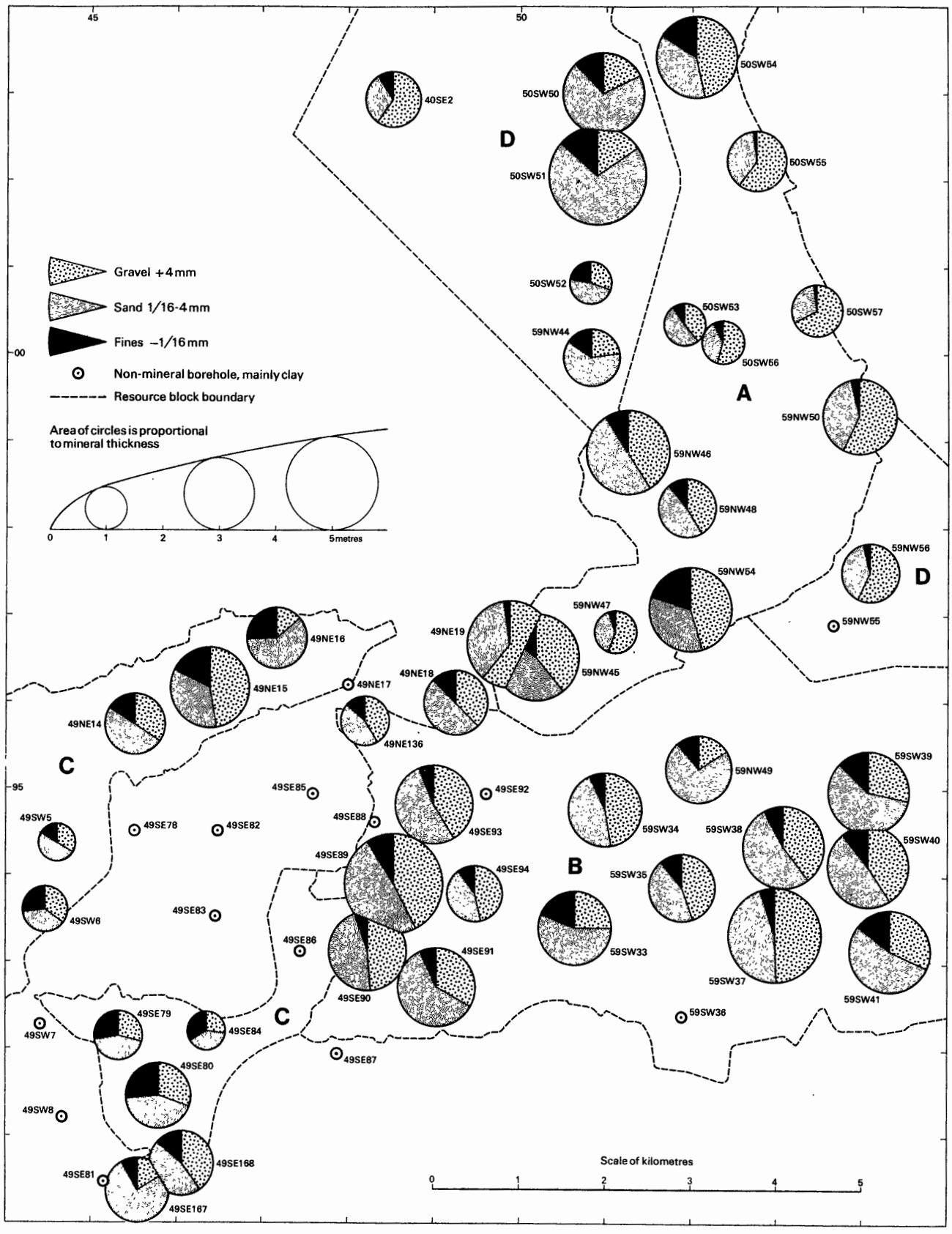
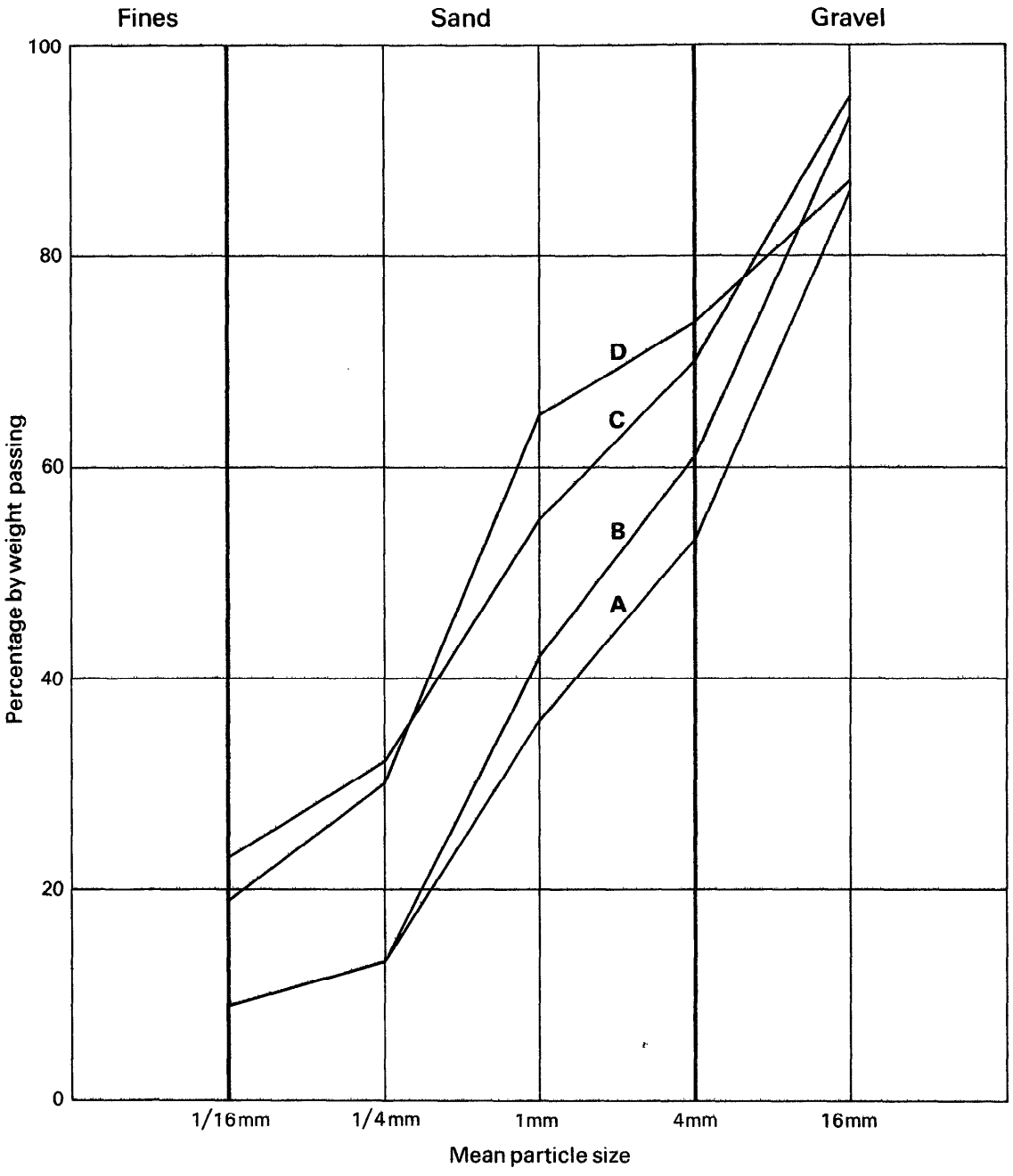


Fig. 11 Grading and mineral thickness in IMAU boreholes



Block	Percentage by weight passing				
	1/16mm	1/4mm	1mm	4mm	16mm
A	9	13	36	53	86
B	9	13	42	61	93
C	23	32	55	70	95
D	19	30	65	74	87

Fig. 12 Particle size distribution for the assessed thickness of sand and gravel in resource blocks A to D

Table 4 Data from IMAU boreholes: Block A

IMAU Borehole Number	Thickness		Mean grading percentage						Classification	
	Over-burden	Mineral	Fines (silt/clay)	Sand Fine	Sand Medium	Sand Coarse	Gravel Fine	Gravel Coarse	Drift unit	Mineral
			-1/16	$-\frac{1}{4}+1/16$	$-1+\frac{1}{4}$	-4+1	-16+4	+16		
	m	m	mm	mm	mm	mm	mm	mm		
SP 50 SW 53	1.3	1.1	9	6	31	15	27	12	Fourth Terrace	Sandy gravel
SP 50 SW 54	2.1	4.1	16	1	16	21	32	14	Alluvium/First Terrace (1A)	'Clayey' gravel
SP 50 SW 55	2.3	2.0	2	2	18	18	31	29	Alluvium/First Terrace (1A)	Gravel
SP 50 SW 56	0.9	1.0	8	6	16	16	42	12	Third Terrace	Gravel
SP 50 SW 57	2.0	1.5	1	2	17	13	37	30	Alluvium/First Terrace (1A)	Gravel
SU 49 NE 19	1.9	3.6	3	1	15	21	37	23	Alluvium/First Terrace (1A)	Gravel
SU 59 NW 45	1.2	3.7	15	3	28	15	31	8	First Terrace (1A)	'Clayey' sandy gravel
SU 59 NW 46	1.3	3.6	9	4	26	20	31	10	Second Terrace	Sandy gravel
SU 59 NW 47	3.3	1.0	5	2	14	25	38	16	Alluvium/First Terrace (1A)	Gravel
SU 59 NW 48	0.4	2.2	11	3	24	21	30	11	Second Terrace	'Clayey' sandy gravel
SU 59 NW 50	0.9	3.2	4	2	19	18	48	9	Alluvium/First Terrace (1A)	Gravel
SU 59 NW 54	0.4	3.5	9	16	39	8	23	5	First Terrace (1A)	Sandy gravel
Mean			9	4	23	17	33	14	-	Gravel

NOTES ON RESOURCE BLOCKS A TO D

Block A

This block (Table 3) includes all the river deposits in the Thames Valley between South Hinksey and Abingdon. The block area is 17.2 km^2, of which 11.2 km^2 is mineral-bearing. Alluvium overlies terrace gravels in an area of 5.5 km^2 along the length of the valley floor. A succession of elongated terraces (1A, 1B, 2, 3 and 4) rises in tiers on the west bank from 52 m (170 ft) to 79 m (260 ft) above OD. There are no terraces along the east bank, except for a small patch of the Fourth Terrace, which caps the high ground 93 m (305 ft) above OD at Hill Pond, Culham [506 961].

For the most part, the deposits lie on the Kimmeridge Clay, but, where the river has cut through the Sandford Gap, they overlie the relatively hard Corallian, and the Oxford Clay. The Fourth Terrace at Hill Pond overlies Gault.

First Terrace gravels protrude through the Alluvium, notably at Rye Farm [505 968], Back Water [512 965], Eney [536 985], North Radley [534 998] and Sandford [530 016]. Erosion by the river has reduced the thickness of the terrace gravels, particularly adjacent to the main stream and in some areas channels have been cut down to the bedrock. The river has tendency to divide and run in more than one channel. Old abandoned channels are filled with Alluvium, mainly silty clay with occasional beds of peat, for example, Abbey Stream [50 97], Back Water [51 96], Eney [53 98] and Sandford Pool [52 01] and [53 01].

The former course of one such cut-off stream, now filled with clay and peaty deposits, can be traced through a line of drainage ditches and marshy ground. This former stream flowed between Lower Farm [537 007] and Back Water, along the edge of the First Terrace (1A) deposits at Radley and skirted the inliers at Eney [53 98] and North Radley [53 99] in the east. It ran parallel to and slightly west of the present Thames for about 4 km.

Abingdon is underlain by large tracts of First (1B) and Second Terrace deposits but, as they are built over, these areas are excluded from the assessment. The Second, Third and Fourth terraces have a patchy distribution and are thinner than the First Terrace. The slight differences in the grading of the terrace deposits in Block A are illustrated in Figure 13.

The First Terrace (both 1A and 1B) is extensively worked on either side of the Oxford - Didcot railway line at Radley: worked-out areas in 1975 totalled approximately 1.3 km^2. There are some minor workings (now abandoned) in the Second Terrace west of Radley Station [526 988].

The assessment of resources is based on information from 12 IMAU boreholes and 202 other records. The mean mineral thickness is 2.2 m (7.0 ft) - a figure that disguises the large range of thickness represented by buried channel deposits and extensive thin flanking deposits. The range is from 1.0 m (3.3 ft) in Borehole SU 59 NW 47 to 4.1 m (13.5 ft) in Borehole SP 50 SW 54. The overburden has a mean thickness of 1.5 m (5 ft); it ranges from 0.4 m (1.5 ft) in Boreholes SU 59 NW 48 and 54 to 3.3 m (11.0 ft) in Borehole SU 59 NW 47. Where Alluvium covers the terrace deposits, the overburden has a mean thickness of 2.1 m (7.0 ft). The Alluvium consists of silty clays and peat.

The gravel working at Radley shows that the upper 2 m (6.5 ft) or so of the First Terrace (1A and 1B) consists of a high proportion of sand but this terrace becomes more pebbly with depth. Borehole SU 59 NW 54, for example, confirms this sequence.

The fines content of the mineral ranges from only 1 per cent in Borehole SP 50 SW 57 to 16 per cent in Borehole SP 50 SW 54. The fines (clay and silt) occurs mainly in lenses or thin layers (Plates 2 and 3).

The proportion of sand generally ranges between 38 and 48 per cent; exceptionally, it rises to 52 and 63 per cent in Borehole SP 50 SW 53 and SU 59 NW 54 respectively and falls to 32 per cent in Borehole SP 50 SW 57. The sand is predominantly medium- to coarse-grained with a trace of fine sand. The proportion of gravel, which is usually in the fine size range, usually exceeds 39 per cent, except in Borehole SU 59 NW 54, where it falls to 28 per cent.

The mean grading for the block is fines 9 per cent, sand 44 per cent, gravel 47 per cent; overall, the mineral is classified as gravel. The estimate of the total volume of the mineral is 24.1 million $m^3 \pm 19$ per cent at the 95 per cent probability level.

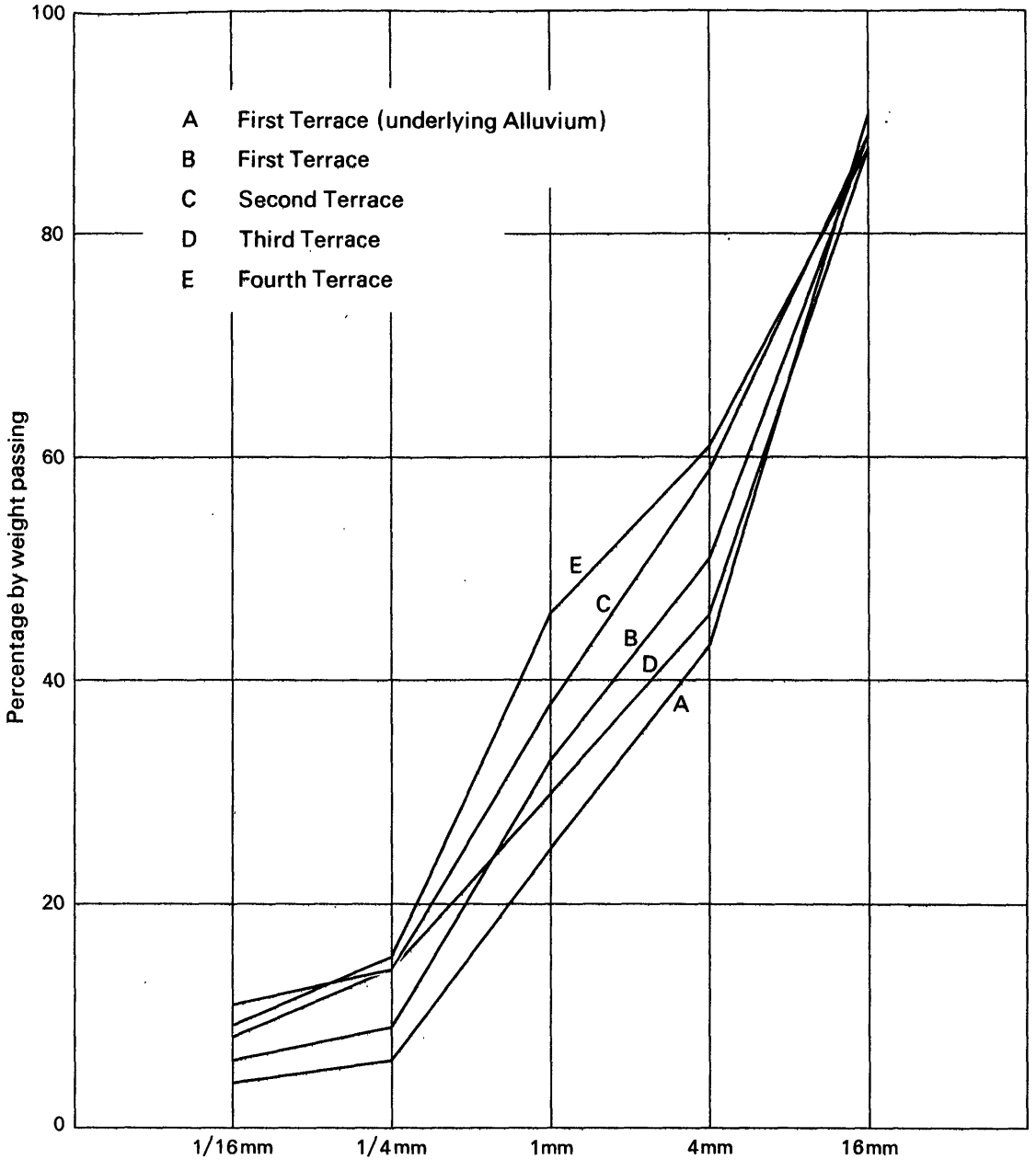
Block B

This, the largest block (Table 5), covers an area of 27.7 km^2, of which 20.0 km^2 is mineral-bearing, and 2.2 km^2 is worked out. It encloses a flat valley floor flanked by gently rising ground. The First and Second terraces make up most of the mineral area. The Third Terrace is represented only by three small patches located towards the boundary of the block.

The block shares a common boundary with blocks A and D in the north, and with Block C in the west. An inferred boundary (shown by zigzag line on the map) separates the mineral from the non-mineral deposits near Steventon, where the Alluvium-covered Second Terrace deposits pass rapidly into clay, and at Sutton Wick Field where part of the Third Terrace passes progressively into clay.

Two areas mapped as terrace deposits have not been assessed. The first is in the south where 0.9 km^2 of the Second Terrace has been sterilised by the Didcot power station and its ancillary works. The second is at Abingdon where urban development has covered about 6 km^2 of the First and Second terraces.

The assessment of the resources is based on 564 boreholes, of which 18 are IMAU boreholes, 17 are Hydrogeological Department records, 13 are Abingdon By-pass records, and 516 are records provided by the Industry and held in confidence. The mean thickness of the mineral is 2.0 m (6.5 ft); the proved range is from 1.9 m (6.0 ft) in Borehole SU 49 SE 94 to 5.5 m (18.0 ft) in Borehole SU 59 SW 37.



	Percentage by weight passing				
	1/16mm	1/4mm	1mm	4mm	16mm
First Terrace (underlying Alluvium)	4	6	25	43	91
First Terrace	6	9	33	51	89
Second Terrace	11	14	38	59	89
Third Terrace	8	14	30	46	88
Fourth Terrace	9	15	46	61	88

Fig. 13 Particle size distribution of the terrace deposits in Block A

Table 5 Data from IMAU boreholes: Block B

IMAU Borehole Number	Thickness		Mean grading percentage						Classification	
	Over-burden	Mineral	Fines (silt/clay) -1/16	Sand Fine -¼+1/16	Sand Medium -1+¼	Sand Coarse -4+1	Gravel Fine -16+4	Gravel Coarse +16	Drift unit	Mineral
	m	m	mm	mm	mm	mm	mm	mm		
SU 49 NE 18	0.7	2.7	12	5	29	16	35	3	First Terrace (1B)	'Clayey' sandy gravel
SU 49 NE 136	0.5	1.6+	14	4	26	15	37	4	Third Terrace	'Clayey' sandy gravel
SU 49 NW 49	0.2	2.7	11	5	59	9	11	5	Second Terrace	'Clayey' pebbly sand
SU 49 SE 88	-	Absent	-	-	-	-	-	-	Second Terrace	-
SU 49 SE 89	0.5	5.4	9	4	23	22	35	7	Second Terrace	Sandy gravel
SU 49 SE 90	1.4	2.3	5	5	26	15	41	8	Alluvium/Second Terrace	Gravel
SU 49 SE 91	1.8	2.8	7	5	31	24	26	7	Second Terrace	Sandy gravel
SU 49 SE 92	-	Absent	-	-	-	-	-	-	Alluvium	-
SU 49 SE 93	0.2	3.4	6	3	29	21	33	8	First Terrace (1A)	Sandy gravel
SU 49 SE 94	0.6	1.9	11	4	23	16	41	5	First Terrace (1B)	'Clayey' gravel
SU 59 SW 33	2.1	3.3	10	4	30	26	25	5	First Terrace (1A)	Sandy gravel
SU 59 SW 34	0.8	3.0	7	3	26	17	34	13	Alluvium/First Terrace (1A)	Gravel
SU 59 SW 35	1.7	2.6	12	2	24	18	37	7	First Terrace (1A)	'Clayey' sandy gravel
SU 59 SW 37	0.3	5.5	5	2	24	20	41	8	First Terrace (1A)	Gravel
SU 59 SW 38	0.5	4.1	8	5	29	19	30	9	First Terrace (1A)	Sandy gravel
SU 59 SW 39	0.6	3.2	13	6	37	16	25	3	First Terrace (1A)	'Clayey' sandy gravel
SU 59 SW 40	0.6	3.5	12	2	26	21	35	4	First Terrace (1A)	'Clayey' sandy gravel
SU 59 SW 41	1.4	3.8	15	5	29	30	24	7	First Terrace (1B)	'Clayey' sandy gravel
Mean			9	4	29	19	32	7	-	Sandy gravel

Three IMAU boreholes proved no mineral (SU 49 SE 88 and 92 and SU 59 SW 36); the first was drilled into an Alluvium-filled channel that had cut down to bedrock, the second into very clayey terrace deposits and the third into Head. Within the area of Alluvium, buried channels are present at Otney [495 945] near Oday Hill [486 951] and at Clifton Cut [54 94]. As in Block A, erosion by the Thames has, in parts, reduced the thickness of the terrace gravels. The mean thickness of the overburden is 1.3 m (4.5 ft); it ranges from 0.2 m (0.5 ft) in Boreholes SU 59 NW 49 and SU 49 SE 93 to 2.1 m (7.0 ft) in Borehole SU 59 SW 33. Where Alluvium covers River Terrace Deposits the overburden has an average thickness of more than 1 m; in the areas of mapped terrace deposits the average thickness of the overburden is less than 1m and the mineral is classified as exposed. The overburden usually consists of greyish-black soil overlying clay, with occasional pebbles and thin beds of peat.

The fines content of the mineral falls within narrower limits than in any other block. It ranges from 5 per cent in Borehole SU 49 SE90 to 15 per cent in Borehole SU 49 SW 41. The proportion of sand ranges from 44 per cent in Borehole SU 59 SW 35, to 60 per cent in Borehole SU 59 SW 33 and exceptionally to 73 per cent in Borehole SU 59 NW 49. The sand content increases downstream from 44 per cent to 52 per cent, probably due to the influx of sandier sediments from the Ock and Mill Brook streams. With the exception of boreholes SU 59 SW 49 and SU 39 SW 39 which contain 16 and 28 per cent respectively, the proportion of gravel commonly exceeds 30 per cent. In general the gravel content decreases downstream, in step with the downstream decrease in the mean grain-size of the deposit as a whole. This is possibly due to the grading by the river away from the main source of sediment supply (the Jurassic limestones).

The mean grading for the block is fines 9 per cent, sand 52 per cent and gravel 39 per cent. The grading classification for the block is sandy gravel. The estimated volume of sand and gravel is 40 million m^3 ± 8 per cent at the 95 per cent probability level.

Block C

This block (Table 6), lying in a wide semi-circle around the high ground at Drayton and Sutton Wick Fields, consists of two parts. The northern part, in the eastern end of the Ock Valley, consists exclusively of First Terrace deposits. The southern part, which comprises the Ginge and Mill Brook valleys, contains both First and Second terrace deposits. In both parts, the terrace deposits are partly overlain by Alluvium; about 60 per cent of the northern part and 5 per cent of the southern part carry overburden. The bedrock in the northern part is mainly Kimmeridge Clay with some Corallian and in the southern part it is Gault. The two parts total 11.4 km^2 of which 10.9 km^2 is mineral-bearing. The remaining 0.5 km^2 comprises an area (0.3 km^2) of Corallian and Kimmeridge Clay bedrock at Garford and the worked out area (0.2 km^2) near Drayton.

On the higher ground between the two parts of the block there are spreads of First Terrace (1A and 1B) deposits and patches of Third Terrace. These have been proved to be barren on the evidence of four IMAU boreholes, (SU 49 SE 78, 82, 83 and 85), one Hydrogeological Department record, several records from the Industry held in confidence and some hand-auger holes. South-west of Steventon the major part of the Third Terrace was proved to be clay in Boreholes SU 49 SW 7 and 8 and SU 49 SE 81; numerous hand-auger holes in the vicinity of Coldharbour Farm [455 908] accurately delineated the boundary of the mineral area. East of Steventon, the Alluvium along the foot of the scarp slope proved to be sandy, silty clay, generally less than 1m (3.5 ft) thick, as in Borehole SU 49 SE 87 and in some Abingdon By-pass borehole records.

The assessment of resources is based on 223 boreholes, of which 12 are IMAU boreholes, 53 are Abingdon By-pass records and 158 are records provided by the Industry and held in confidence. The thickness of the mineral ranges from 0.8 m (2.5 ft) in Borehole SU 49 SW 5 near East Hanney up to 3.5 m (11.5 ft) in Borehole SU 49 NE 15 near Marcham; the mean is 1.8 m. In the Ock Valley, the mineral thins gradually to the west.

The overburden ranges in thickness from 0.4 m (1.5 ft) in Boreholes SU 49 NE 16, SU 49 SW 6 and SU 49 SE 79 and 80 to 2.4 m (8.0 ft)in Borehole SU 49 SE 86; the mean is 0.7 m (2.5 ft). Boreholes SU 49 NE 17 and SU 49 SE 86 proved Alluvium-filled channels.

The fines content of the mineral ranges from 14 per cent in Borehole SU 49 SE 168 to 33 per cent in Borehole SU 49 SE 84. The high fines content, which consists of silt and chalky clay, is derived from the Gault, Upper Greensand and Lower and Middle Chalk outcrops in the middle and upper reaches of the Vale of the White Horse. The sand content varies from 40 per cent in Borehole SU 49 SE 84 to 76 per cent in Borehole SU 49 SE 167, which indicates the wide range encountered in this block. The gravel content ranges from 8 per cent in Borehole SU 49 SE 167 to 48 per cent in Borehole SU 49 NE 15. The mean grading of the block is fines 23 per cent, sand 47 per cent, gravel 30 per cent; overall, the mineral is classified as 'very clayey' sandy gravel.

The estimated volume of mineral is 19.6 million m^3 ± 20 per cent at the 95 per cent probability level.

Block D

This block (Table 7), located in the north-east, is in two unequal parts on either side of the Thames Valley. The area of the block is 26.5 km^2 of which only 2.9 km^2 is mineral-bearing. The drift deposits, Plateau Gravel, probably represent part of a previously much more extensive glacial outwash, only remnants of which remain today as cappings on the high

Table 6 Data from IMAU boreholes: Block C

IMAU Borehole Number	Thickness		Mean grading percentage						Classification	
	Over-burden	Mineral	Fines (silt/clay) -1/16	Sand Fine $-\frac{1}{4}+1/16$	Sand Medium $-1+\frac{1}{4}$	Sand Coarse -4+1	Gravel Fine -16+4	Gravel Coarse +16	Drift unit	Mineral
	m	m	mm	mm	mm	mm	mm	mm		
SU 49 NE 14	0.8	2.4	30	5	22	15	25	3	Alluvium/First Terrace (1A)	'Very clayey' sandy gravel
SU 49 NE 15	0.6	3.5	17	5	17	13	38	10	Alluvium/First Terrace (1A)	'Clayey' gravel
SU 49 NE 16	0.4	2.2	25	7	47	7	11	3	First Terrace (1A)	'Very clayey' pebbly sand
SU 49 NE 17	-	Absent	-	-	-	-	-	-	Alluvium	-
SU 49 SW 5	1.5	0.8	17	7	16	26	34	0	Alluvium	'Clayey' sandy gravel
SU 49 SW 6	0.4	1.3	26	8	14	16	32	4	First Terrace (1A)	'Very clayey' sandy gravel
SU 49 SE 79	0.4	1.5	27	8	19	17	25	4	Second Terrace	'Very clayey' sandy gravel
SU 49 SE 80	0.4	2.0	26	10	19	14	28	3	Third Terrace	'Very clayey' sandy gravel
SU 49 SE 84	0.8	1.0	33	10	21	9	21	6	Second Terrace	'Very clayey' sandy gravel
SU 49 SE 86	2.4	0.6	21	3	34	12	26	4	Second Terrace	'Very clayey' sandy gravel
SU 49 SE 167	0.5	1.8	16	12	33	31	7	1	Alluvium/Second Terrace	'Clayey' pebbly sand
SU 49 SE 168	1.0	1.8	14	21	17	8	35	5	Second Terrace	'Clayey' sandy gravel
Mean			23	9	23	15	26	4	-	'Very clayey' sandy gravel

Table 7 Data from IMAU boreholes: Block D

IMAU Borehole Number	Thickness		Mean grading percentage						Classification	
	Over-burden	Mineral	Fines (silt/clay) -1/16	Fine $-\frac{1}{4}+1/16$	Medium $-1+\frac{1}{4}$	Coarse -4+1	Fine -16+4	Coarse +16	Drift unit	Mineral
	m	m	mm	mm	mm	mm	mm	mm		
SP 40 SE 2	0.3	1.9	9	7	15	9	31	29	Plateau gravel	Gravel
SP 50 SW 50	0.2	3.6	12	9	52	9	9	9	Plateau gravel	'Clayey' pebbly sand
SP 50 SW 57	1.7	4.8	13	14	47	10	11	5	Plateau gravel	'Clayey' pebbly sand
SP 50 SW 52	0.7	1.0	22	15	27	6	16	14	Plateau gravel	'Very clayey' sandy gravel
SU 59 NW 44	0.3	1.6	16	16	34	12	8	14	Plateau gravel	'Clayey' sandy gravel
SU 59 NW 55	0.3	1.6	60	8	14	7	8	3	Plateau gravel	(Waste)
SU 59 NW 56	0.2	1.8	20	9	17	7	11	36	Plateau gravel	'Clayey' gravel
Mean			19	11	35	9	13	13		'Clayey' sandy gravel

ground. They lie at between 85 m (280 ft) and 162 m (531 ft) above OD. In the northern part of the block the deposits overlie the Kimmeridge Clay, except for a patch at Pricketts Heath, which overlies the Lower Greensand. In the southern part, the deposit overlies the Gault.

There are twenty-two patches of Plateau Gravel ranging in size from 0.01 to 0.4 km^2. Some of the occurrences are separated by deep valleys which expose the underlying bedrock on dry valley floors. The assessment of the resources is based on information from 7 IMAU boreholes (2 of which, SU 49 NE 55 and 56, are hand-augered holes) and 34 other records. The thickness of the mineral ranges from 1.0 m (3.5 ft) in Borehole SP 50 SW 52 to 4.8 m (15.5 ft) in Borehole SP 50 SW 51; the mean is 2.8 m (9.0 ft).

The thickness of the overburden varies from 0.3 m (0.5 ft) in Borehole SP 50 SW 50 to 1.7 m (5.5 ft) in borehole SP 50 SW 51; the mean is 0.7 m (2.5 ft). The overburden is more than 1 m thick in only one borehole (SP 50 SW 51). Usually, the overburden consists of a brown, clayey soil with scattered, rounded, quartz pebbles.

The fines content of the mineral ranges from 9 per cent in Borehole SP 40 SE 2 to 22 per cent in Borehole SP 50 SW 52. The material from Borehole SU 59 NW 55 is classified as waste since it contains 60 per cent of fines. The sand content ranges from 31 per cent in Borehole SP 40 SE 2 to 71 per cent in Borehole SP 50 SW 51. The gravel content ranges from 11 per cent in Borehole SU 59 NW 55 to 60 per cent in Borehole SP 40 SE 2; this wide variation of the grading results and the thickness, together with the patchy and scattered nature of the deposits makes assessment relatively unreliable. Thus, the estimate of the volume of sand and gravel is 6.5 million $m^3 \pm 53$ per cent at the 95 per cent probability level. The mean grading of the block is fines 19 per cent, sand 55 per cent, and gravel 26 per cent; overall, the mineral is classified as 'clayey' sandy gravel.

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 co-operation of sand and gravel operators ensures that assessment 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 factors such 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 which is representative of all unconsolidated deposits encountered so that the in-situ grading can be determined, if necessary, to a depth of 30 m (100 ft) at a diameter of about 152 mm (6 in), beneath different types of overburden. The ideal machine should be reliable, quiet, mobile and relatively small (so that it can be moved to sites of difficult access). In practice shell and auger rigs satisfy these conditions most closely.

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 minimize the amount of material drawn in from outside the limits of the hole. The samples thus obtained are representative of the in situ grading, and satisfy one of the most important aims of the survey. Below the water-table the rigs are used conventionally, although this may result in the loss of some of the fines fraction and the pumping action of the bailer tends to draw unwanted material into the hole from the sides or the bottom. In the main contract drilling programme a modified shell and auger rig with 6-inch (152 mm) diameter tools was used exclusively.

At a later stage to substantiate the geological and assessment results, shallow hand augered holes were drilled by Industrial Minerals Assessment Unit officers using a simple 6-inch (152 mm) auger. Where the deposits are mainly clayey or peaty a $1\frac{3}{4}$" (45 mm) Dutch auger was found to be suitable. However, it was not possible to auger below the water table in 'clean' sand and gravel because only very little of the 'wet' sample would adhere to the flights of the auger, and without casing, material was continually being drawn in from the sides of the borehole.

A continuous series of bulk samples is taken throughout the sand and gravel. Ideally samples are composed exclusively of the whole of the material encountered in the borehole between stated depths. However, care is taken to discard, as far as possible, material which has caved or has been pumped from the bottom of the hole. A new sample is commenced whenever there is an appreciable lithological change within the sand and gravel, or at every 1 m (3.5 ft) depth. The samples each weighing between 25 and 45 kg (55 and 100 lb) are despatched in heavy duty polythene bags to a laboratory for grading. The grading procedure is based on BS 1377:1967. Random checks on the accuracy of the grading are made in the laboratories of the Institute.

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 upon application to the Head, Industrial Minerals Assessment Unit, Institute of Geological Sciences, Keyworth, Nottinghamshire NG12 5GG.

APPENDIX B: STATISTICAL PROCEDURE

Statistical Assessment

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

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

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

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

4. The above relationship may be transposed such that

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

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

$$\frac{\sum (l_{m_1} + l_{m_2} \ldots l_{m_n})}{n}$$

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

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

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 $S_A/S_{\bar{l}_m} \leq 1/3$ is assumed in all cases. It follows from equation [2] that

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

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: $L_{\bar{l}_m} \leq L_V \leq 1.05\, L_{\bar{l}_m}$

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

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

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 Figs. 15 and 16

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

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

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

15. *Note on Weighting* The thickness of a deposit at any point may be governed solely by the position of the point in relation to a broad trend. However, most sand and gravel deposits also exhibit a random pattern of local, and sometimes considerable, variation in

thickness. Thus the distribution of sample points need be only approximately regular and in estimating the mean thickness only simple weighting is necessary. In practice, equal weighting can often be applied to thicknesses at all sample points. If, however, there is a distinctly unequal distribution of points, bias is avoided by dividing the sampled area into broad zones, to each of which a value roughly proportional to its area is assigned. This value is then shared between the data points within the zone as the weighting factor.

APPENDIX C: CLASSIFICATION AND DESCRIPTION OF SAND AND GRAVEL

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

The terminology commonly used by geologists when describing sedimentary rocks (Wentworth, 1922) is not entirely satisfactory for this purpose. For example, Wentworth proposed that a deposit should be described as a 'gravelly sand' when it contains more sand than gravel and there is at least 10 per cent of gravel, provided that there is less than 10 per cent of material finer than sand (less than $\frac{1}{16}$ 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 Fig. 16). The procedure is as follows:

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

For example, a deposit grading 11 per cent gravel, 70 per cent sand and 19 per cent fines is classified as 'clayey' pebbly sand. This short description is included in the borehole log (see Note 11, p. 37).

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 8), which is used in this Report.

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

The size distribution of borehole samples is determined by sieve analysis, which is presented by the laboratory as logarithmic cumulative curves (see, for example, British Standard 1377: 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 types, 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 8 Classification of gravel, sand and fines

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

Block Calculation 1:25 000 Block } Fictitious

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

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

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

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

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

Sample point	Weighting w	Overburden l_o	Overburden wl_o	Mineral l_m	Mineral wl_m	Remarks
SE 14	1	1.5	1.5	9.4	9.4	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	Hydrogeological Dept 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		$\bar{l}_o = 2.5$		$\bar{l}_m = 6.5$		

Calculation of confidence limits

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

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

$n = 8$

$t = 2.365$

L_V is calculated as

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

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

$$= 20.3$$

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

Fig. 14 Example of resource block assessment: calculations and results

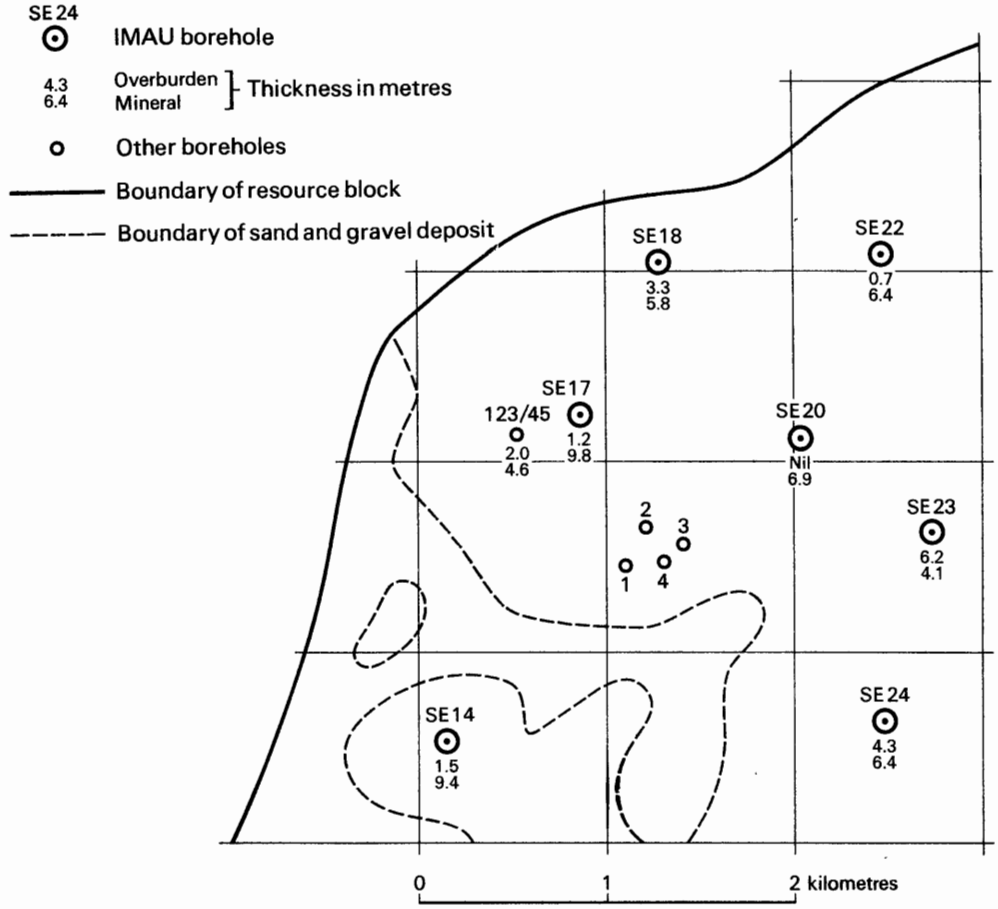


Fig. 15 Example of resource block assessment: map of a fictitious block

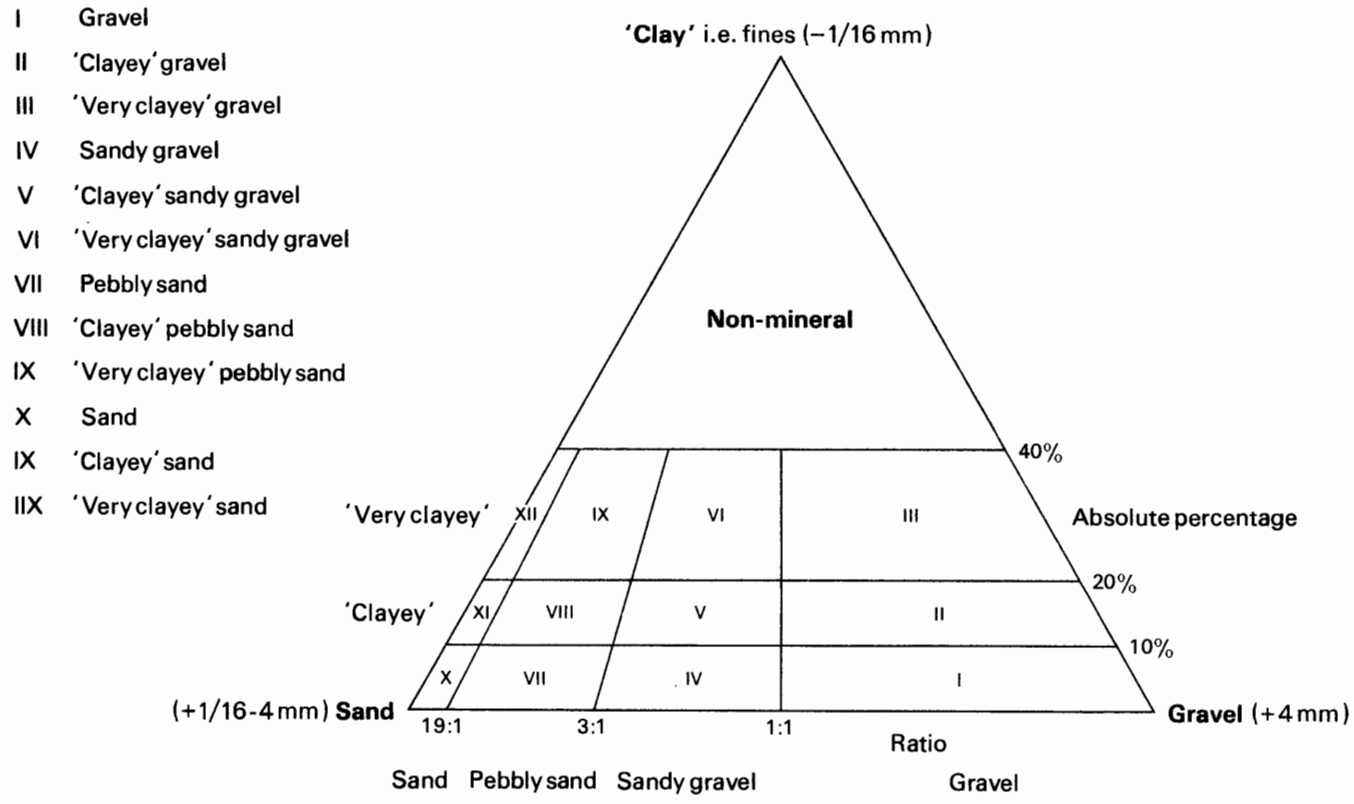


Fig. 16 Diagram to show the descriptive categories used in the classification of sand and gravel

APPENDIX D: EXPLANATION OF THE BOREHOLE RECORDS

Annotated Example

SU 49 SE 94[1] 4958 9377[2] Near Drop Short[3], Sutton Courtenay Block B

Surface level (+54.6 m) +179 ft[4]
Water struck at (+53.2 m)[5]
Shell and auger (modified), 6 inch (152 mm) diam.[6]
September 1971

[7]Overburden 0.6 m (2.0 ft)
Mineral 1.9 m (6.0 ft)
Bedrock 0.5 m + (1.5 ft +)[9]

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth[8] m	Depth[8] (ft)
	Soil, sandy and pebbly: dark brown	0.3	(1.0)	0.3	(1.0)
River Terrace deposits[10] (Terrace 1B)	Clay, silty with pebbles of quartz, quartzite and flint; light brown	0.3	(1.0)	0.6	(2.0)
	[11] 'Clayey' gravel Gravel: fine to medium with coarse, dominantly well rounded to sub-rounded, buff to brown, occasionally shelly limestone with brownish black ironstone and well rounded reddish brown quartzite and traces of clear to white well rounded quartz and angular to subangular flint, rare ammonite fragments and Gryphaea shells Sand: medium amd coarse with trace of fine, dominantly limestone with quartz; brown	1.9	(6.0)	2.5	(8.0)
Kimmeridge Clay	Clay, stiff, with occasional fragile iridescent ammonite; dark grey with a bluish hue	0.5+	(1.5+)	3.0	(10.0)

GRADING

Mean for Deposit				Bulk Samples			
	%	mm	%	Depth below surface (m)	Percentages[13] Fines	Sand	Gravel
[15] Gravel	46	+16	5				
		-16 + 4	41				
		-4 + 1	16				
Sand	43	-1 + $\frac{1}{4}$	23				
		-$\frac{1}{4}$ + 1/16	4				
Fines	11	-1/16	11				
				[12] [14] [16] 0.6 - 1.6	8	45	47
				[16] 1.6 - 2.5	16	39	45

[17] COMPOSITION

Depth below Surface (m)	[19] Flint	[18] Quartz and Quartzite	Limestone and Chalk	Ironstone	[20] Others
0.6 - 1.6	[21] 1	6	85	9	
1.6 - 2.5	3	8	84	4	
[22] Mean	2	6	85	7	

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

1. Borehole Registration Number.
Each Industrial Minerals Assessment Unit (IMAU) borehole is identified by a Registration Number. This consists of two statements.
1) The number of the 1:25 000 sheet on which the borehole lies, for example SU 49
2) The quarter of the 1:25 000 sheet on which the borehole lies and its number in a series for that quarter, for example SE 94.
Thus the full Registration Number is SU 49 SE 94

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

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

4. Surface Level
The surface level at the borehole site is given in metres and feet above Ordnance Datum. Measurements were made in feet except on 6" map SP 40 SE in which they were made in metres; approximate conversions are given in brackets.

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

6. Type of Drill and Date of Drilling
One type of drilling machine has been used in this survey, a modified shell and auger rig. In addition, some boreholes were augered by members of the Industrial Mineral Assessment Unit using two types of hand auger. The type of machine, or type of hand auger used, the external diameter of the hole, and the month and year of completion of the borehole are stated.

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

8. Thickness and Depth
Although most measurements were made in metres, some were recorded in feet; the conversions appear in brackets. Metric conversions of measurements of the thickness of beds and the depth from the surface of their bases have been rounded off to the nearest 0.1 m because quotation to two places of decimals would imply a higher order of accuracy than could be justified by the original figures. Similarly, Imperial conversions have been rounded off to the nearest 0.5 ft. Where figures have been rounded in this way there may be a discrepancy between the sum of the thicknesses and the recorded depths.

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

10. Geological Classification
The geological classification is given whenever possible. When mineral occurs beneath Alluvium it is assumed to be a terrace deposit.

11. Lithological Description
When sand and gravel is recorded a general description based on the mean grading characteristics (for details, see Appendix C) is followed by more detailed particulars. The description of other rocks is based on visual examination, in the field.

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

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

14. If, exceptionally, grading results are not available, an attempt is made to give grading information by comparing the grading and field descriptions of adjacent samples with the

samples in question. Such estimates are shown in brackets.

15. Mean Grading
The grading of the full thickness of the mineral horizon identified in the log is the mean of the individual sample gradings weighted by the thicknesses representated, if these vary. The classification used is shown in Table 8.
Fully representative sampling of sand and gravel is difficult to achieve, particularly where groundwater levels are high. Comparison between boreholes and adjacent exposures suggests that in borehole samples the proportion of sand may be higher and the proportions of fines and coarse gravel (+16 mm) may be lower.

16.. Bailed Samples
Samples obtained by the bailing technique (that is from deposits below the water table) are indicated by an asterisk.

17. Composition
Details are given of the composition on a percentage by weight basis of each of the constituents in the +4 -16 mm (fine gravel) fraction for each of the original bulk samples.

18. Occasionally, this component includes Jurassic cherts, but they rarely exceed 10 per cent of the total.

19. Occasionally, this component includes chalk fragments, but generally the percentage is small.

20. Others include igneous, metamorphic and sedimentary rocks foreign to the resource sheet.

21. If, exceptionally, composition results are not available, no attempt has been made to infer the result.

22. Mean Composition
The composition of the full thickness of the mineral horizon identified in the log is the mean of the individual samples weighted with respect to thickness and sample weight.

APPENDIX E: BOREHOLES USED IN THE ASSESSMENT OF RESOURCES

Industrial Minerals Assessment Unit Boreholes

Borehole No. by sheet quadrants	Grid Reference	Page No.
SP 40 SE 2	SP 4853 0287	43
SP 50 SW 50	SP 5092 0293	44
51	5087 0205	45
52	5079 0078	46
53	5195 0029	47
54	5231 0390	48
55	5273 0216	49
56	5242 0013	50
57	5338 0048	51
SU 49 NE 14	SU 4552 9571	52
15	4641 9615	53
16	4714 9671	54
17	4806 9631	55
18	4929 9584	56
19	4988 9661	57
136	4824 9578	58
138	4615 9987	59
139	4683 9754	59
140	4942 9905	60
SU 49 SW 5	SU 4459 9432	61
6	4451 9356	62
7	4448 9240	63
8	4472 9122	63
SU 49 SE 78	SU 4553 9453	64
79	4544 9211	65
80	4585 9141	66
81	4521 9046	67
82	4652 9449	67
83	4647 9353	68
84	4641 9218	69
85	4767 9489	70
86	4749 9311	71
87	4793 9202	72
88	4840 9459	72
89	4857 9381	73
SU 49 SE 90	SU 4826 9312	74
91	4900 9267	75
92	4961 9490	76
93	4907 9472	77
94	4958 9377	78
167	4563 9043	79
168	4612 9069	80
SU 59 NW 44	SU 5086 9990	81
45	5020 9648	82
46	5125 9886	83-84
47	5113 9678	85
48	5198 9820	86
49	5212 9523	87
50	5391 9922	88
54	5200 9706	89
55	5364 9693	90
56	5398 9751	91
SU 59 SW 33	SU 5071 9334	92-93
34	5104 9471	94
35	5196 9386	95
36	5197 9237	96
37	5298 9338	97
38	5306 9442	98
39	5410 9490	99
40	5404 9414	100
41	5434 9316	101

Other Boreholes (details not quoted in this report)

(a) Hydrogeological Department records (18)
237/45
253/37, 62, 63, 65, 68, 69a, 69b.
254/14, 50, 108, 109, 110, 141, 142, 152, 414b.

(b) Wimpey & Co: Motorway A34(T) Abingdon By-pass (89)
SP 50 SW 86-91, 96-104, 147-152.
SU 49 NE 59-69, 101-104, 110-123.
SU 49 SE 8-23, 50-56, 109-114, 118-125, 132, 133.

(c) Records from the Sand and Gravel Industry (888)

Records made available by gravel companies are held in confidence.

APPENDIX F: INDUSTRIAL MINERALS ASSESSMENT UNIT BOREHOLE RECORDS

SP 40 SE 2 | 4853 0287 | Pickett's Heath Farm, Wootton | Block D

Surface level (+161.8 m) +531 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
March 1974

Overburden 0.3 m (1.0 ft)
Mineral 1.9 m (6.0 ft)
Waste 2.5 m (8.0 ft)
Bedrock 1.0 m+ (3.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil	0.3	(1.0)	0.3	(1.0)
Plateau Gravel	Gravel Gravel: fine to coarse, rounded quartzite and occasional subrounded to rounded quartz, with traces of flint and ironstone Sand: medium with fine and coarse, subangular to subrounded quartz and quartzite; slightly clayey; orange-brown	1.9	(6.0)	2.2	(7.0)
	Clay, soft, dark grey, becoming mottled brown with occasional fine to coarse pebbles of quartz and flint; some iron staining in parts	2.5	(8.0)	4.7	(15.5)
Lower Greensand	Sand, with some clay and a few rounded pebbles of flint; reddish white	1.0+	(3.5+)	5.7	(18.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	60	+ 16	29
		- 16 + 4	31
Sand	31	- 4 + 1	9
		- 1 + ¼	15
		- ¼ + 1/16	7
Fines	9	- 1/16	9

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.3 - 1.3	8	32	60
1.3 - 2.2	10	31	59

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.3 - 1.3	2	96		2	
1.3 - 2.2	1	90		9	
Mean	2	94		4	

SP 50 SW 50 5092 0293 Woodside, South Hinksey Block D

Surface level (+109.4 m) +359 ft
Water struck at (+107.9 m)
Shell and auger (modified), 6 inch (152 mm) diam.
February 1974

Overburden 0.2 m (0.5 ft)
Mineral 3.6 m (12.0 ft)
Bedrock 1.0+ (3.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil	0.2	(0.5)	0.2	(0.5)
Plateau Gravel	'Clayey' pebbly sand Gravel: fine to coarse, rounded to subangular vein quartz and quartzite, chert, and limestone with occasional ironstone and siltstone; some well rounded quartzite cobbles near the base Sand: predominantly medium with some fine and coarse, subangular to subrounded quartz, quartzite, flint and chert; clayey throughout, decreasing in amount with depth; light brown to brown	3.6	(12.0)	3.8	(12.5)
Kimmeridge Clay	Clay, dark greyish black	1.0+	(3.5+)	4.8	(15.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	18	+ 16	9
		- 16 + 4	9
		- 4 + 1	9
Sand	70	- 1 + $\frac{1}{4}$	52
		- $\frac{1}{4}$ + 1/16	9
Fines	12	- 1/16	12

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.2 - 1.2	16	61	23
*1.2 - 2.2	13	80	7
*2.2 - 3.1	12	78	10
*3.1 - 3.8	8	60	32

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.2 - 1.2	2	96	0	2	
1.2 - 2.2	24	35	37	4	
2.2 - 3.1	0	100	0	0	
3.1 - 3.8	No Sample				
Mean	20	46	30	4	

SP 50 SW 51 5087 0205 Bagley Wood, Kennington Block D

Surface level (+111.9 m) +367 ft
Water struck at (+107.1 m)
Shell and auger (modified), 6 inch (152 mm) diam.
March 1974

Overburden 1.7 m (5.5 ft)
Mineral 5.0 m (16.5 ft)
Bedrock 0.8 m+ (2.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil	0.3	(1.0)	0.3	(1.0)
Plateau Gravel	Clay, sandy with some subangular to subrounded pebbles of flint, chert, quartz and quartzite; yellowish brown and occasionally mottled dark brown	1.4	(4.5)	1.7	(5.5)
	'Clayey' pebbly gravel, with a light grey clay band between 5.6 and 5.7 m; sand content increases with depth Gravel: fine to coarse subrounded to rounded quartz, quartzite, flint and chert with a trace of ironstone Sand: predominantly medium with some fine and coarse, subangular to subrounded flint, chert and quartz; yellowish brown	5.0	(16.5)	6.7	(22.0)
Kimmeridge Clay	Clay, dark to light grey	0.8+	(2.5+)	7.5	(24.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	16	+ 16	5
		- 16 + 4	11
		- 4 + 1	10
Sand	71	- 1 + $\frac{1}{4}$	47
		- $\frac{1}{4}$ + 1/16	14
Fines	13	- 1/16	13

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
1.7 - 2.3	26	54	20
2.3 - 3.7	12	74	14
3.7 - 4.8	12	71	17
*4.8 - 5.6	15	78	7
*5.6 - 5.7	Clay		
*5.7 - 6.7	5	71	24

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
1.7 - 2.3	16	55		13	16
2.3 - 3.7	31	62		5	2
3.7 - 4.8	21	64		6	9
4.8 - 5.6	16	46		23	15
5.7 - 6.7	23	65		12	0
Mean	22	69		5	4

SP 50 SW 52 5079 0078 Near Sunningwell House, Kennington Block D

Surface level (+92.4 m) +303 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
March 1974

Overburden 0.7 m (2.5 ft)
Mineral 1.0 m (3.5 ft)
Waste 0.2 m (0.5 ft)
Bedrock 2.6 m+ (8.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil	0.4	(1.5)	0.4	(1.5)
Plateau Gravel	Clay, pale brown, mottled dark brown	0.3	(1.0)	0.7	(2.5)
	'Very clayey' sandy gravel Gravel: fine to coarse rounded to subrounded vein quartz, quartzite and chert Sand: medium with fine and some coarse; rather clayey throughout; light brown	1.0	(3.5)	1.7	(5.5)
	Clay, sandy, orange brown with grey mottling	0.2	(0.5)	1.9	(6.0)
Kimmeridge Clay	Clay, light grey with some mottling to dark grey, becoming darker with depth	2.6+	(8.5+)	4.5	(15.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	30	+ 16	14
		- 16 + 4	16
Sand	48	- 4 + 1	6
		- 1 + ¼	27
		- ¼ + 1/16	15
Fines	22	- 1/16	22

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.7 - 1.7	22	48	30

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.7 - 1.7	9	47	1	38	5

SP 50 SW 53 5195 0029 Radley Little Wood, Radley Block A

Surface level (+79.6 m) +261 ft
Water struck at (+77.9 m)
Shell and auger (modified), 6 inch (152 mm) diam.
April 1974

Overburden 1.3 m (4.5 ft)
Mineral 1.1 m (3.5 ft)
Bedrock 2.6 m+ (8.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, sandy and pebbly	0.4	(1.5)	0.4	(1.5)
Fourth Terrace deposits	Clay, sandy, with pebbles of subangular to subrounded flint, chert and quartz; brown	0.9	(3.0)	1.3	(4.5)
	'Sandy' gravel, with clay between 1.5 and 1.6 m Gravel: fine to coarse subangular to subrounded flint with subrounded to rounded quartz and quartzite, some limestone, ironstone and chert Sand: medium with some coarse and trace of fine, subangular to subrounded flint, chert and quartz; light brown	1.1	(3.5)	2.4	(8.0)
Kimmeridge Clay	Clay, silty; bluish grey, weathered to greyish brown at top	2.6+	(8.5+)	5.0	(16.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	39	+ 16	12
		- 16 + 4	27
Sand	52	- 4 + 1	15
		- 1 + ¼	31
		- ¼ + 1/16	6
Fines	9	- 1/16	9

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
1.3 - 1.7	11	57	32
*1.7 - 2.4	9	52	39

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
1.3 - 1.7	48	22	11	9	10

SP 50 SW 54 5231 0390 Iffley Lock, Littlemore Block A

Surface level (+55.2 m) +181 ft
Water struck at (+53.1 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1972

Overburden 2.1 m (7.0 ft)
Mineral 4.1 m (13.5 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil; dark brown	0.2	(0.5)	0.2	(0.5)
Alluvium	Clay, silty, soft; brownish grey to blue	1.9	(6.0)	2.1	(7.0)
First Terrace deposits (Terrace 1A)	'Clayey' gravel, with fines content increasing with depth Gravel: fine with coarse, predominantly subrounded, platy to tabular, brown, cream and grey oolitic to sandy, shelly, limestone with some subangular brownish black ironstone, trace of well rounded brown and purple quartzite, well rounded white quartz, chert, corals, belemnites and shell fragments Sand: medium and coarse with a trace of fine oolitic limestone, quartz and hematite; yellowish brown	4.1	(13.5)	6.2	(20.5)
Oxford Clay	Clay, stiff, bluish grey	0.5+	(1.5+)	6.7	(22.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	46	+ 16	14
		- 16 + 4	32
		- 4 + 1	21
Sand	38	- 1 + ¼	16
		- ¼ + 1/16	1
Fines	16	- 1/16	16

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
*2.1 - 3.1	8	40	52
*3.1 - 4.1	24	37	39
*4.1 - 5.1	No sample		
*5.1 - 6.2	No sample		

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
2.1 - 3.1	2	6	83	8	1
3.1 - 4.1	1	2	85	12	0
4.1 - 5.1	3	2	81	13	1
5.1 - 6.2	No sample				
Mean	2	3	83	11	1

SP 50 SW 55 5273 0216 North of Sandford Pool, Kennington Block A

Surface level (+54.2 m) +178 ft
Water struck at (51.8 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 2.3 m (7.5 ft)
Mineral 2.0 m (6.5 ft)
Bedrock 1.7 m+ (5.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil; brown	0.2	(0.5)	0.2	(0.5)
Alluvium	Clay, silty in parts, firm to very soft with white gastropod shells; mottled light brown and grey	0.7	(2.5)	0.9	(3.0)
	Silty clay, carbonaceous with occasional fragile white gastropod shells; bluish grey becoming greyish blue	1.2	(4.0)	2.1	(7.0)
	Clay, firm; greenish blue to greyish brown	0.2	(0.5)	2.3	(7.5)
First Terrace deposits (Terrace 1A)	Gravel, clayey in top 0.3 m Gravel: fine to coarse, dominantly tabular and platy subrounded and rounded oolitic limestone with trace of brown to buff shelly limestone, brownish black ironstone, red and brown well rounded quartzite, white and cream well rounded quartz, flint and worn belemnite fragments Sand: medium and coarse with trace of fine, dominantly limestone, with some quartz and ironstone; greyish brown	2.0	(6.5)	4.3	(14.0)
Oxford Clay	Clay, soft and silty in upper 0.2 m becoming firm; bluish grey to bluish black	1.7+	(5.5+)	6.0	(19.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	60	+ 16	29
		- 16 + 4	31
Sand	38	- 4 + 1	18
		- 1 + ¼	18
		- ¼ + 1/16	2
Fines	2	- 1/16	2

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
*2.3 - 3.3	0	36	64
*3.3 - 4.3	3	42	55

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
2.3 - 3.3	1	9	77	13	
3.3 - 4.3	2	1	81	16	
Mean	1	8	77	14	

SP 50 SW 56 | 5242 0013 | North Close Copse, Radley | Block A

Surface level (+66.8 m) +219 ft
Water struck at (+65.9 m)
Shell and auger (modified), 6 inch (152 mm) diam.
February 1974

Overburden 0.9 m (3.0 ft)
Mineral 1.0 m (3.5 ft)
Bedrock 2.1 m+ (7.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, pebbly and sandy	0.2	(0.5)	0.2	(0.5)
Third Terrace deposits	Clay, sandy, brown	0.7	(2.5)	0.9	(3.0)
	Gravel Gravel: fine with coarse, rounded to subrounded brownish grey limestone with rounded reddish brown quartzites and white quartz, flint, chert and brownish black ironstone Sand: medium and coarse with some fine, limestone, flint and quartz; yellowish brown	1.0	(3.5)	1.9	(6.0)
Kimmeridge Clay	Clay, firm, greyish black	2.1+	(7.0+)	4.0	(13.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	54	+ 16	12
		- 16 + 4	42
Sand	38	- 4 + 1	16
		- 1 + ¼	16
		- ¼ + 1/16	6
Fines	8	- 1/16	8

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
*0.9 - 1.9	8	38	54

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.9 - 1.9	5	10	79	6	

SP 50 SW 57 5338 0048 Lower Farm, Sandford-on-Thames Block A

Surface level (+52.1 m) +171 ft
Water struck at (+50.1 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 2.0 m (6.5 ft)
Mineral 1.5 m (5.0 ft)
Bedrock 0.2 m+ (0.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil; dark brown	0.1	(0.5)	0.1	(0.5)
Alluvium	Clay, soft, silty; mottled light brown and grey	0.2	(0.5)	0.3	(1.0)
	Peat, silty, soft and spongy; dark brown	1.7	(5.5)	2.0	(6.5)
First Terrace deposits (Terrace 1A)	Gravel Gravel: fine to coarse, dominantly subrounded to platy buff brown oolitic and shelly limestone with some brownish black ironstone, brown quartzite white quartz, traces of subangular flint, and worn Gryphaea fragments Sand: medium and coarse with fine, buff-brown limestone, trace of quartz and ironstone; light brown	1.5	(5.0)	3.5	(11.5)
Lower Calcareous Grit	Limestone, very hard, shelly and sandy; bluish grey	0.2+	(0.5+)	3.7	(12.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	67	+ 16	30
		- 16 + 4	37
		- 4 + 1	13
Sand	32	- 1 + ¼	17
		- ¼ + 1/16	2
Fines	1	- 1/16	1

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
*2.0 - 3.0	0	31	69
*3.0 - 3.5	1	35	64

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
2.0 - 3.0	3	6	80	11	
3.0 - 3.5	0	5	85	10	
Mean	3	6	81	10	

Surface level (+55.5 m) +182 ft
Water struck at (+53.6 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 0.8 m (2.5 ft)
Mineral 2.4 m (8.0 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, brown	0.1	(0.5)	0.1	(0.5)
Alluvium	Clay, silty, with occasional pebbles; light brown	0.7	(2.5)	0.8	(2.5)
First Terrace deposits (Terrace 1A)	'Very clayey' sandy gravel, very silty in lower 1.4 m Gravel: fine to coarse, subangular to subrounded greyish-white limestone with some subrounded flint, well rounded quartz, ironstone, chalk pellets and traces of subrounded to rounded green sandstone Sand: medium with coarse and some fine; light brownish grey	2.4	(8.0)	3.2	(10.5)
Kimmeridge Clay	Clay, firm, bluish grey	0.4+	(1.5+)	3.6	(12.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	28	+ 16	3
		- 16 + 4	25
Sand	42	- 4 + 1	15
		- 1 + $\frac{1}{4}$	22
		- $\frac{1}{4}$ + 1/16	5
Fines	30	- 1/16	30

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.8 - 1.8	15	50	35
*1.8 - 3.2	41	37	22

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.8 - 1.8	6	2	83	9	
1.8 - 3.2	11	4	75	10	
Mean	7	2	82	9	

SU 49 NE 15 4641 9615 Meadow Farm, Marcham Block C

Surface level (+53.0 m) +174 ft
Water struck at (+51.3 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 0.6 m (2.0 ft)
Mineral 3.5 m (11.5 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m		Depth m	
	Made ground	0.2	(0.5)	0.2	(0.5)
Alluvium	Clay, silty, pebbly; light brown	0.4	(1.5)	0.6	(2.0)
First Terrace deposits (Terrace 1A)	'Clayey' gravel, very clayey in upper metre decreasing to base; gravel content increases towards base Gravel: fine to coarse with some cobbles, subrounded to rounded limestone with some subangular to rounded flint, ironstone and traces of quartz Sand: medium to coarse with fine limestone and flint; yellowish-buff to grey	3.5	(11.5)	4.1	(13.5)
Kimmeridge Clay	Clay, stiff, uniform texture; medium grey	0.4+	(1.5+)	4.5	(15.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	48	+ 16	10
		- 16 + 4	38
		- 4 + 1	13
Sand	35	- 1 + ¼	17
		- ¼ + 1/16	5
Fines	17	- 1/16	17

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.6 - 1.6	37	31	32
*1.6 - 2.6	12	42	46
*2.6 - 3.6	7	31	62
*3.6 - 4.1	8	35	57

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.6 - 1.6	9	3	76	12	
1.6 - 2.6		No sample			
2.6 - 3.6	14	2	78	6	
3.6 - 4.1	15		78	7	
Mean	13	2	77	8	

SU 49 NE 16 4714 9671 Abingdon Common, Abingdon Block C

Surface level (+54.0 m) +177 ft
Water struck at (+52.5 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 0.4 m (1.5 ft)
Mineral 2.2 m (7.0 ft)
Waste 2.0 m (6.5 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil	0.1	(0.5)	0.1	(0.5)
First Terrace deposits (Terrace 1A)	Clay, silty; brown	0.3	(1.0)	0.4	(1.5)
	'Very clayey' pebbly sand with upper 1.5 m containing only a trace of gravel and a high fines content Gravel: mainly confined to lower 0.7 m, fine to coarse with occasional flint and shelly limestone cobbles, subrounded to rounded limestone with some ironstone and minor amounts of green sandstone, well rounded white and brown quartz and subangular to subrounded flint Sand: predominantly medium with minor amounts of coarse and fine; limestone and quartz; orange brown	2.2	(7.0)	2.6	(8.5)
	Silt, carbonaceous and soft; grey black	1.8	(6.0)	4.4	(14.5)
	Sand: with some grey subangular to subrounded flint and minor amounts of green sandstone, occasional soft buff limestone, bone fragments and shells	0.2	(0.5)	4.6	(15.0)
Kimmeridge Clay	Clay, stiff, with some shells; grey	0.4+	(1.5+)	5.0	(16.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	14	+ 16	3
		- 16 + 4	11
Sand	61	- 4 + 1	7
		- 1 + ¼	47
		- ¼ + 1/16	7
Fines	25	- 1/16	25

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.4 - 0.8	30	67	3
*0.8 - 1.9	30	67	3
*1.9 - 2.6	13	49	38

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.4 - 0.8	No Sample				
0.8 - 1.9	5	5	81	9	
1.9 - 2.6	3	2	83	12	
Mean	4	4	82	10	

SU 49 NE 17 4806 9631 South East of Abingdon Common Block C

Surface level (+53.3) +175 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Waste 3.0 m (10.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Made ground, friable, silty and clayey; dark brown	0.6	(2.0)	0.6	(2.0)
Alluvium	Clay, silty, occasional pebbles and mollusc shells; brownish grey	2.1	(7.0)	2.7	(9.0)
	Silt, soft, sandy, with occasional small pebbles; greyish blue	0.3	(1.0)	3.0	(10.0)
Kimmeridge Clay	Clay, stiff, with occasional shells; dark grey	0.5+	(1.5+)	3.5	(11.5)

SU 49 NE 18 4929 9584 South of Caldecott, Abingdon Block B

Surface level (+50.6 m) +166 ft
Water struck at (+48.1 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 0.7 m (2.5 ft)
Mineral 2.6 m (8.5 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil; brown	0.1	(0.5)	0.1	(0.5)
First Terrace deposits (Terrace 1B)	Clay, stiff, silty and slightly pebbly; dark brown	0.6	(2.0)	0.7	(2.5)
	'Clayey' sandy gravel Gravel fine with a trace of coarse and some cobbles; dominantly tabular subrounded to rounded limestone with some subangular flint and brownish black ironstone, traces of reddish brown quartzite, well rounded quartz Sand: medium to coarse with fine, limestone, with some quartz, quartzite and flint; light brown	2.6	(8.5)	3.3	(11.0)
Kimmeridge Clay	Clay, stiff, greyish blue	0.4+	(1.5+)	3.7	(12.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	38	+ 16	3
		- 16 + 4	35
Sand	50	- 4 + 1	16
		- 1 + ¼	29
		- ¼ + 1/16	5
Fines	12	- 1/16	12

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.7 - 1.7	10	54	36
1.7 - 2.7	10	49	41
*2.7 - 3.3	16	48	36

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.7 - 1.7	11		78	11	
1.7 - 2.7	17		76	7	
2.7 - 3.3	20		74	6	
Mean	14		77	9	

SU 49 NE 19 4988 9661 The Causeway, Andersey Island, Near Abingdon
Block A

Surface level (+50.3 m) +165 ft
Water struck at (+48.4 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 1.9 m (6.0 ft)
Mineral 3.6 m (12.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Made ground	0.1	(0.5)	0.1	(0.5)
Alluvium	Clay, soft, silty; dark grey	0.7	(2.5)	0.8	(2.5)
	Silt, soft, carbonaceous, with thin layers of peat and occasional pebbles; dark grey to bluish black	1.1	(3.5)	1.9	(6.0)
First Terrace deposits (Terrace 1A)	Gravel, more sandy in lower 2 m with a silty layer between 4.3 and 4.7 m Gravel: fine to coarse with occasional cobbles, predominantly rounded to subrounded grey to buff tabular limestone with some brownish black ironstone, subangular to rounded flint, traces of rounded to well rounded reddish brown quartzite, whitish brown quartz, rare brown sandstone, occasional worn Gryphaea fragments and belemnites Sand: medium to coarse with trace of fine, limestone with some ironstone and quartz; greyish brown	3.6	(12.0)	5.5	(18.0)
Kimmeridge Clay	Clay, stiff, dark grey	0.5+	(1.5+)	6.0	(19.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	60	+ 16	23
		- 16 + 4	37
		- 4 + 1	21
Sand	37	- 1 + ¼	15
		- ¼ + 1/16	1
Fines	3	- 1/16	3

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
*1.9 - 2.9	4	20	76
*2.9 - 3.9	0	34	66
*3.9 - 4.9	6	51	43
*4.9 - 5.5	3	46	51

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
1.9 - 2.9	10		83	7	
2.9 - 3.9	5		84	11	
3.9 - 4.9	3		88	9	
4.9 - 5.5	10		80	10	
Mean	7		84	9	

SU 49 NE 136 4824 9578 North East of Sutton Wick Field, Drayton Block B

Surface level (+64.6 m) +212 ft
Water struck at (+62.9 m)
Hand auger, 6 inch (152 mm) diam.
December 1974

Overburden 0.5 m (1.5 ft)
Mineral 1.6 m+ (5.0 ft)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, pebbly; brown	0.5	(1.5)	0.5	(1.5)
Third Terrace deposits	'Clayey' sandy gravel; clay content decreasing with depth Gravel: predominantly fine; some coarse with trace of cobbles; mainly subrounded to subangular whitish grey or buff limestone, some brownish black ironstone, well rounded reddish white quartzite and white quartz, occasional flint Sand: medium with coarse and some fine, mainly limestone with some ironstone, flint, and quartz; yellowish brown	1.6+	(5.0+)	2.1	(7.0)
	Bedrock not struck				

GRADING

Mean for Deposit

	%	mm	%
Gravel	41	+ 16	4
		- 16 + 4	37
Sand	45	- 4 + 1	15
		- 1 + ¼	26
		- ¼ + 1/16	4
Fines	14	- 1/16	14

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.5 - 1.5	20	39	41
*1.5 - 2.1	4	55	41

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.5 - 1.5	4	10	74	12	
1.5 - 2.1	4	3	85	8	
Mean	4	8	78	10	

SU 49 NE 138 4615 9987 Parsonage Moor, Near Cothill, Besselsleigh

Surface level (+76.5 m) +251 ft
Water struck at (+76.0 m)
Hand auger, 1.5 inch (38 mm) diam.
December 1974

Waste 2.1 m (7.0 ft)
Bedrock (struck but not penetrated)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
Alluvium	Peat	0.5	(1.5)	0.5	(1.5)
	Silt, peaty, with sandy clay, trace of fine limestone gravel; greenish black	0.4	(1.5)	0.9	(3.0)
	Silt, becoming very sandy, clayey; greenish black	1.2	(4.0)	2.1	(7.0)
Coral Rag	Limestone, very hard	not penetrated			

SU 49 NE 139 4683 9754 West of Barrow Farm, Marcham

Surface level (+59.7 m) +196.0 ft
Water struck at (+58.2 m)
Hand auger, 1.5 inch (38 mm) diam.
December 1974

Waste 2.8 m (9.0 ft)
Bedrock (struck but not penetrated)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
Alluvium	Peat	1.4	(4.5)	1.4	(4.5)
	Clay, silty; black	0.1	(0.5)	1.5	(5.0)
	Silt, with yellowish green sand becoming dark greenish grey and clayey; occasional fine quartz and limestone pebbles	1.3	(4.5)	2.8	(9.0)
Coral Rag	Limestone, very hard	not penetrated			

SU 49 NE 140 4942 9905 Near Dunmore Farm, St. Helen Without

Surface level (+64.0 m) +210 ft
Water not struck
Hand auger, 1.5 inch (38 mm) diam.
December 1974

Waste 1.0 m (3.5 ft)
Bedrock (struck, but not penetrated)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, peaty and clayey; black	0.1	(0.5)	0.1	(0.5)
Alluvium	Clay, slightly sandy and silty; brown to darkish brown	0.5	(1.5)	0.6	(2.0)
	Clay, sandy and silty with occasional fine fragments of limestone, flint, quartz and quartzite; greenish white to yellowish brown	0.4	(1.5)	1.0	(3.5)
Coral Rag	Limestone, very hard	not penetrated			

SU 49 SW 5 | 4459 9432 | Landmead Farm, East Hanney | Block C

Surface level (+57.0 m) +187 ft
Water struck at (+55.5 m)
Shell and auger (modified), 6 inch (152 mm) diam, September 1971

Overburden 1.5 m (5.0 ft)
Mineral 0.8 m (2.5 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, with occasional subangular to subrounded flint pebbles; dark brown	0.3	(1.0)	0.3	(1.0)
Alluvium	Clay, firm to soft, silty, with some fragile shells; light greyish-brown	0.6	(2.0)	0.9	(3.0)
	Clay, sandy and gravelly in parts; light greyish green. The gravel comprises subangular to subrounded flint, subrounded chalk pellets, occasional subangular to subrounded, tabular, light green siltstone and traces of grey tabular limestone; the sand comprises fine to coarse limestone and quartz with some chalk and glauconite	0.6	(2.0)	1.5	(5.0)
First Terrace deposits (Terrace 1A)	'Clayey' sandy gravel Gravel: fine to coarse, subangular to subrounded grey limestone and subrounded chalk pellets, with some subangular to subrounded flint, trace of light green sandstone, siltstone and ironstone Sand: medium to coarse with fine, mainly flint and chalk with black glauconite; light greenish white	0.8	(2.5)	2.3	(7.5)
Kimmeridge Clay	Clay, stiff, with shells; dark brown	0.4+	(1.5+)	2.7	(9.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	34	+ 16	0
		- 16 + 4	34
Sand	49	- 4 + 1	26
		- 1 + $\frac{1}{4}$	16
		- $\frac{1}{4}$ + 1/16	7
Fines	17	- 1/16	17

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
*1.5 - 2.3	17	49	34

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
1.3 - 2.3	10	1	88	1	

SU 49 SW 6 4451 9356 North of Cow Common, Drayton Block C

Surface level (+59.1 m) +194 ft
Water struck at (+57.6 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 0.4 m (1.5 ft)
Mineral 1.3 m (4.5 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, friable, dark brown	0.2	(0.5)	0.2	(0.5)
First Terrace deposits (Terrace 1A)	Clay, firm to soft, silty, with some pebbles of flint; light greenish brown	0.2	(0.5)	0.4	(1.5)
	'Very clayey' sandy gravel, very sandy between 1.5 and 1.7 m Gravel: fine to coarse, subangular to subrounded, tabular grey limestone, with some subrounded chalk pellets, subangular to subrounded flint and ironstone and a trace of rounded red quartzite Sand: fine to coarse, flint, limestone chalk, some glauconite; light greyish green	1.3	(4.5)	1.7	(5.5)
Kimmeridge Clay	Clay, firm to hard, weathered reddish brown at top, dark brown below	0.5+	(1.5+)	2.2	(7.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	36	+ 16	4
		- 16 + 4	32
Sand	38	- 4 + 1	16
		- 1 + ¼	14
		- ¼ + 1/16	8
Fines	26	- 1/16	26

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.4 - 1.7	26	38	36

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.4 - 1.7	11	1	80	8	

SU 49 SW 7 4448 9240 South West of Mud Cottage, Steventon

Surface level (+63.1 m) +207 ft
Water struck at (+61.3 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Waste 2.6 m (8.5 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, occasional flint pebbles; dark brown	0.1	(0.5)	0.1	(0.5)
Third Terrace deposits	Clay, soft to firm, silty, with pebbles of subrounded flint, chalk and limestone; dark brown to grey brown	0.8	(2.5)	0.9	(3.0)
	Clay, sandy and gravelly, gravel dominantly subangular to subrounded flint, subrounded light grey limestone, chalk pellets, local concentrations of glauconite; light greyish green	1.5	(4.5)	2.4	(8.0)
	Gravel, sandy, dominantly flint and pale grey limestone, some chalk pellets, rare light grey sandstone, occasional ironstone, some glauconite	0.2	(0.5)	2.6	(8.5)
Gault	Clay, firm but malleable; dark grey	0.4+	(1.5+)	3.0	(10.0)

SU 49 SW 8 4472 9122 Lower Farm, East Hendred

Surface level (+68.0 m) +223 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Waste 3.4 m (11.0 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, clayey, with small scattered flint and trace of red quartzite; dark brown	0.2	(0.5)	0.2	(0.5)
Third Terrace deposits	Clay, silty, stiff, some subangular to subrounded flint, subrounded chalk and occasional rounded red quartzite; medium brown	0.1	(0.5)	0.3	(1.0)
	Clay, silty with occasional pebbles of flint; light greenish brown	0.6	(2.0)	0.9	(3.0)
	Clay, gravelly and sandy; gravel decreases with depth and consists of flint, limestone and chalk, some glauconite; light greyish green	2.0	(6.5)	2.9	(9.5)
	Clay, silty and soft, with glauconite; light greyish-brown and speckled	0.5	(1.5)	3.4	(11.0)
Gault	Clay, firm to hard; brown to dark grey	0.4+	(1.5+)	3.8	(12.5)

SU 49 SE 78 4553 9453 South of Marcham Mill, Drayton

Surface level (+54.9 m) +180 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Waste 2.0 m (6.5 ft)
Bedrock 0.8 m+ (2.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, clayey; dark brown	0.1	(0.5)	0.1	(0.5)
First Terrace deposits (Terrace 1A)	Clay, friable and silty; dark brown becoming light brown with depth	0.8	(2.5)	0.9	(3.0)
	Clay, with fine to coarse pebbles of subangular to subrounded flint and some subrounded chalk, sandy and silty in parts; light brown	1.1	(3.5)	2.0	(6.5)
Kimmeridge Clay	Clay, soft becoming firm, shelly; bluish brown to dark grey	0.8+	(2.5+)	2.8	(9.0)

SU 49 SE 79 4544 9211 South of Steventon Field, Steventon Block C

Surface level (+64.0 m) +210 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 0.4 m (1.5)
Mineral 1.5 m (5.0)
Bedrock 0.6 m+ (2.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, clayey and gravelly; brown	0.4	(1.5)	0.4	(1.5)
Second Terrace deposits	'Very clayey' sandy gravel Gravel: fine to coarse with occasional cobbles, rounded to subrounded brown to buff tabular and platy limestone with light grey, subangular flint, subrounded chalk and brownish black ironstone, traces of well rounded quartz and quartzite Sand: medium and coarse with fine, clayey and silty in parts, some dark green glauconite grains; greyish brown	1.5	(5.0)	1.9	(6.0)
Gault	Clay, stiff, with occasional fragile shells, some limestone concretions; light brown becoming dark brown with streaks of dark bluish grey	0.6+	(2.0+)	2.5	(8.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	29	+ 16	4
		- 16 + 4	25
Sand	44	- 4 + 1	17
		- 1 + ¼	19
		- ¼ + 1/16	8
Fines	27	- 1/16	27

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.4 - 1.9	27	44	29

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.4 - 1.9	26		66	8	

SU 49 SE 80 4585 9141 North West of Hill Farm, Steventon Block C

Surface level (+65.5 m) +215 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 0.4 m (1.5 ft)
Mineral 2.0 m (6.5 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, clayey and silty with occasional pebbles	0.4	(1.5)	0.4	(1.5)
Third Terrace deposits	'Very clayey' sandy gravel Gravel: fine with some coarse, light grey rounded to subrounded limestone, some subangular flint and subrounded soft chalk pebbles, traces of brownish black ironstone and whitish brown quartz Sand: medium with fine and coarse, glauconitic; greyish green and brown	2.0	(6.5)	2.4	(8.0)
Gault	Clay, soft, dark bluish grey	0.4+	(1.5+)	2.8	(9.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	31	+ 16	3
		- 16 + 4	28
		- 4 + 1	14
Sand	43	- 1 + ¼	19
		- ¼ + 1/16	10
Fines	26	- 1/16	26

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.7 - 1.7	26	43	31

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.7 - 1.7	10	1	86	3	

SU 49 SE 81 4521 9046 North West of Woods Farm, East Hendred

Surface level (+70.1 m) +230 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Waste 1.8 m (6.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, clayey, silty, with occasional subrounded flint and rounded reddish brown quartzite; dark brown	0.3	(1.0)	0.3	(1.0)
Second Terrace deposits	Clay, stiff with occasional subrounded flint and chalk; brownish grey becoming light greyish green	0.2	(0.5)	0.5	(1.5)
	Clay, gravelly throughout, sandy in lower 0.8 m; gravel comprises subangular to subrounded flint, subrounded weathered light grey limestone and chalk, localised concentration of green glauconite, some rare red brown quartz and occasional cobble-size flint; brownish-grey becoming orange brown	1.3	(4.5)	1.8	(6.0)
Gault	Clay, firm, light grey, slightly mottled pale yellowish brown	0.5+	(1.5+)	2.3	(7.5)

SU 49 SE 82 4652 9449 North of Drayton Field, Drayton

Surface level (+56.7 m) +186 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Waste 1.7 m (5.5 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, pebbly; dark brown	0.1	(0.5)	0.1	(0.5)
First Terrace deposits (Terrace 1A)	Clay, stiff, silty and pebbly; dark brown	0.8	(2.5)	0.9	(3.0)
	Clay, very gravelly and sandy; gravel component comprises fine with some coarse, light green subangular to subrounded tabular flint, subrounded soft chalk pellets, trace of brownish green siltstone and fine tabular subrounded limestone; sand component comprises fine to coarse flint and chalk; light greenish brown	0.8	(2.5)	1.7	(5.5)
Kimmeridge Clay	Clay, stiff, weathered reddish brown surface layer, in association with black carbonaceous patches; dark blue grey	0.5+	(1.5+)	2.2	(7.0)

SU 49 SE 83 4647 9353 Whitehorn's Barn, Drayton

Surface level (+59.1 m) +194 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Waste 1.4 m (4.5 ft)
Bedrock 0.6 m+ (2.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil; dark brown	0.2	(0.5)	0.2	(0.5)
First Terrace deposits (Terrace 1B)	Clay, firm, silty, with occasional subangular to subrounded flint and limestone pebbles; brown	0.4	(1.5)	0.6	(2.0)
	Clay, gravelly and sandy; gravel comprises fine to coarse, light grey limestone and subangular to subrounded flint, with traces of weathered green siltstone and rounded quartz; abundant dark green to black glauconite; light greenish grey	0.8	(2.5)	1.4	(4.5)
Gault	Clay, stiff, dark bluish grey to dark brown, streaked reddish brown in parts	0.6+	(2.0+)	2.0	(6.5)

SU 49 SE 84 4641 9218 Views Farm, Steventon Block C

Surface level (+62.5 m) +205 ft
Water struck at (+60.8 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 0.8 m (2.5 ft)
Mineral 1.0 m (3.5 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil; dark brown	0.2	(0.5)	0.2	(0.5)
Second Terrace deposits	Clay, firm, silty, with flint and limestone pebbles; light brownish grey	0.4	(1.5)	0.6	(2.0)
	Clay, pebbly and silty; light greenish grey	0.2	(0.5)	0.8	(2.5)
	'Very clayey' sandy gravel, more sandy in lower 0.7 m Gravel: fine with some coarse and cobbles dominantly subrounded partly weathered light grey tabular limestone, with some subangular flint, and brownish black ironstone, trace of light green siltstone Sand: medium with fine and coarse, local concentrations of dark green glauconite, some iron staining in parts; light greyish green	1.0	(3.5)	1.8	(6.0)
Gault	Clay, firm with small micaceous flakes; very dark grey with reddish brown weathered surface	0.5+	(1.5+)	2.3	(7.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	27	+ 16	6
		- 16 + 4	21
		- 4 + 1	9
Sand	40	- 1 + ¼	21
		- ¼ + 1/16	10
Fines	33	- 1/16	33

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.8 - 1.8	33	40	27

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.8 - 1.8	14		83	3	

SU 49 SE 85 4767 9489 South of Sutton Wick Field, Drayton Block C

Surface level (+64.0) +210 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Waste 1.6 m (5.0 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, with occasional limestone, flint and quartz pebbles; dark brown	0.4	(1.5)	0.4	(1.5)
Third Terrace deposits	Clay, firm, silty, with pebbles of limestone, flint and quartz; light brown	0.4	(1.5)	0.8	(2.5)
	'Very clayey' sandy gravel Gravel: fine with occasional coarse, mainly subrounded to rounded limestone with sub-angular to subrounded flint and brownish black ironstone, occasional well rounded to rounded reddish brown and purple quartzite and trace of quartz Sand: medium to coarse with some fine, limestone, ironstone and quartz; orange brown	0.8	(2.5)	1.6	(5.5)
Kimmeridge Clay	Clay, very firm with a thin layer of nodular limestone; light grey with orange-brown weathered surface	0.4+	(1.5+)	2.0	(6.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	34	+ 16	3
		- 16 + 4	31
Sand	45	- 4 + 1	21
		- 1 + ¼	19
		- ¼ + 1/16	5
Fines	21	- 1/16	21

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.8 - 1.6	21	45	34

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.8 - 1.6	14	2	69	15	

SU 49 SE 86 4749 9311 West of Mill Brook, Drayton Block C

Surface level (+60.4) +198 ft
Water struck at (+57.7 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Waste 4.4 m (14.5 ft)
Bedrock 0.3 m+ (1.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil; dark brown	0.3	(1.0)	0.3	(1.0)
Second Terrace deposits	Silt, firm, compact, very slightly clayey with occasional pebbles of rounded red quartzite and sub-rounded flint; brown	1.7	(5.5)	2.0	(6.5)
	Clay, very silty and pebbly throughout, soft; yellowish green becoming bluish grey	0.4	(1.5)	2.4	(8.0)
	'Very clayey' sandy gravel Gravel: fine with occasional coarse, mainly rounded to subrounded limestone with subangular to subrounded flint, some rounded white quartz and reddish brown quartzite, brownish black ironstone with occasional worn shells Sand: medium with coarse and trace of fine; yellowish orange	0.6	(2.0)	3.0	(10.0)
	Silt, soft, sandy, with pebbles of quartzite, quartz, limestone and siltstone in lower 0.3 m; light greyish brown	1.4	(4.5)	4.4	(14.5)
Gault	Clay, stiff, dark grey	0.3+	(1.0+)	4.7	(15.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	30	+ 16	4
		- 16 + 4	26
Sand	49	- 4 + 1	12
		- 1 + ¼	34
		- ¼ + 1/16	3
Fines	21	- 1/16	21

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
*2.4 - 3.0	21	49	30

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
2.4 - 3.0	17	10	66	7	

SU 49 SE 87 4793 9202 Ginge Brook, Milton

Surface level (+60.7 m) +199 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Waste 1.3 m (4.5 ft)
Bedrock 1.2 m+ (4.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, clayey, dark brown becoming black	0.3	(1.0)	0.3	(1.0)
Alluvium	Clay, soft, silty; light grey with white speckles	0.5	(1.5)	0.8	(2.5)
	Clay, soft and pebbly with small subrounded flint pebbles; light grey becoming greenish grey	0.3	(1.0)	1.1	(3.5)
	Silt, with fine to coarse flint and chalk gravel, glauconitic, soft, light grey with darkish green speckles	0.2	(0.5)	1.3	(4.5)
Gault	Clay, mottled light brownish grey becoming dark grey	1.2+	(4.0+)	2.5	(8.0)

SU 49 SE 88 4840 9459 East of Sutton Wick Village, Drayton Block B

Surface level (+56.7 m) +186 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Waste 3.8 m (12.5 ft)
Bedrock 0.2 m+ (0.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, pebbly; dark brown	0.1	(0.5)	0.1	(0.5)
Second Terrace deposits	Clay, silty, with pebbles of subrounded to rounded limestone, quartzite and quartz; dark brown becoming light brown	1.2	(4.0)	1.3	(4.5)
	Clay, stiff containing limestone concretions in upper 1.4 m, becomes silty and soft in lower 1.1 m; mottled brown to bluish grey	2.5	(8.0)	3.8	(12.5)
Kimmeridge Clay	Clay, stiff, silty, with fragile iridescent ammonite shells; dark bluish grey	0.2+	(0.5+)	4.0	(13.0)

SU 49 SE 89 4857 9381 South of Gilbourn's Farm, Drayton Block B

Surface level (+58.8 m) +193 ft
Water struck at (+55.8 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 0.5 m (1.5 ft)
Mineral 5.4 m (17.5 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, pebbly and silty; brown	0.5	(1.5)	0.5	(1.5)
Second Terrace deposits	Sandy gravel Gravel: fine with some coarse, some cobbles, dominantly rounded to subrounded, tabular buff and brown; limestone with some brownish black ironstone, reddish brown rounded quartzite, traces of very well rounded white quartz and chalk Sand: medium to coarse with trace of fine, limestone, quartz; yellowish brown	5.4	(17.5)	5.9	(19.5)
Kimmeridge Clay	Clay, firm with occasional fragile shells; reddish brown becoming bluish grey	0.4+	(1.5+)	6.3	(20.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	42	+ 16	7
		- 16 + 4	35
		- 4 + 1	22
Sand	49	- 1 + ¼	23
		- ¼ + 1/16	4
Fines	9	- 1/16	9

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.5 - 1.5	9	52	39
1.5 - 2.5	12	48	40
*2.5 - 3.5	10	53	37
*3.5 - 4.5	8	37	55
*4.5 - 5.9	5	55	40

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.5 - 1.5	2	4	90	4	
1.5 - 2.5		No sample			
2.5 - 3.5	6	10	73	11	
3.5 - 4.5	4	3	83	9	1
4.5 - 5.9	4	7	80	9	
Mean	4	5	83	7	1

Surface level (+56.4 m) +185 ft
Water struck at (+55.0 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 1.4 m (4.5 ft)
Mineral 2.3 m (7.5 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, dark brown	0.2	(0.5)	0.2	(0.5)
Alluvium	Clay, soft, with gastropod shells, becoming increasingly silty and glauconitic with depth, brown with reddish brown streaks and pockets; mottled light brown becoming light yellowish grey	1.2	(4.0)	1.4	(4.5)
Second Terrace deposits	Gravel Gravel; fine with some coarse dominantly buff subrounded to rounded limestone with occasional brownish black ironstone, rounded red brown quartzite and flint, traces of worn belemnite fragments Sand: medium with coarse and rare fine, limestone, flint and quartz, trace of ironstone; brown	2.3	(7.5)	3.7	(12.0)
Gault	Clay, stiff, pebbly; dark brown	0.5+	(1.5)	4.2	(14.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	49	+ 16	8
		- 16 + 4	41
Sand	46	- 4 + 1	15
		- 1 + ¼	26
		- ¼ + 1/16	5
Fines	5	- 1/16	5

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
*1.4 - 2.4	6	40	54
*2.4 - 3.7	4	51	45

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
1.4 - 2.4	No sample				
2.4 - 3.7	4	5	85	6	

SU 49 SE 91 4900 9267 Milton North Field, Milton Block B

Surface level (+58.8 m) +193 ft
Water struck at (+56.1 m)
Shell and auger (modified), 6 inch (152 mm) diam.
November 1971

Overburden 1.8 m (6.0 ft)
Mineral 2.8 m (9.0 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, with occasional subangular flint and red-brown rounded quartzite; dark brown	0.1	(0.5)	0.1	(0.5)
Second Terrace deposits	Clay, silty with occasional pebbles of flint, limestone and quartzite; medium brown to reddish brown	0.9	(3.0)	1.0	(3.5)
	Clay, chalky; chalk pellets and glauconite grains increasing with depth; light reddish brown becoming greyish white locally mottled pale olive green	0.8	(2.5)	1.8	(6.0)
	Sandy gravel, with an increased gravel content between 2.8 and 3.8 m **Gravel**: fine with **coarse**, **dominantly subrounded limestone**, with some subangular to angular flint, subrounded brownish black ironstone and rounded red-brown quartzite, traces of rounded quartz and belemnite fragments Sand: medium to coarse with a trace of fine, quartz, ironstone and limestone; orange brown	2.8	(9.0)	4.6	(15.0)
Gault	Clay, stiff, thinly layered and locally streaked reddish brown; greyish blue	0.4+	(1.5+)	5.0	(16.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	33	+ 16	7
		- 16 + 4	26
		- 4 + 1	24
Sand	60	- 1 + ¼	31
		- ¼ + 1/16	5
Fines	7	- 1/16	7

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
1.8 - 2.8	12	64	24
*2.8 - 3.8	3	44	53
*3.8 - 4.6	5	74	21

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
1.8 - 2.8	11	11	68	10	
2.8 - 3.8		Not available			
3.8 - 4.6	10	3	72	15	
Mean	10	7	71	12	

SU 49 SE 92 4961 9490 North of Otney, Culham Block B

Surface level (+49.4 m) +162 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Waste 3.2 m (10.5 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, dark brown	0.2	(0.5)	0.2	(0.5)
Alluvium	Clay, soft, silty; mottled light greyish-brown	0.4	(1.5)	0.6	(2.0)
	Clay, soft, very silty with occasional black carbonaceous patches; pale greenish blue	1.8	(6.0)	2.4	(8.0)
	Silt, very dark grey-black, soft and sandy with pockets of dark brownish black peat	0.8	(2.5)	3.2	(10.5)
Kimmeridge Clay	Clay, firm with buff white fragile shells; dark grey with bluish hue	0.5+	(1.5+)	3.7	(12.0)

SU 49 SE 93 4907 9472 Near Oday Hill, Drayton Block B

Surface level (+50.6 m) +166 ft
Water struck at (+48.2 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 0.2 m (0.5 ft)
Mineral 3.4 m (11.0 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, slightly pebbly; dark brown becoming reddish brown	0.2	(0.5)	0.2	(0.5)
First Terrace deposits (Terrace 1A)	Sandy gravel Gravel: fine with coarse and rare cobbles, dominantly subrounded to rounded tabular buff limestone with some irregular brownish black ironstone and angular to subangular flint, occasional well rounded white clear quartz and rounded to well rounded brown quartzite Sand: medium to coarse with a trace of fine, mostly limestone and quartz; brown	3.4	(11.0)	3.6	(12.0)
Kimmeridge Clay	Clay, stiff, slightly silty; dark grey with a bluish hue	0.4+	(1.5+)	4.0	(13.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	41	+ 16	8
		- 16 + 4	33
		- 4 + 1	21
Sand	53	- 1 + $\frac{1}{4}$	29
		- $\frac{1}{4}$ + 1/16	3
Fines	6	- 1/16	6

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.2 - 1.2	7	53	40
1.2 - 2.2	8	60	32
*2.2 - 3.6	4	48	48

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.2 - 1.2	5		84	11	
1.2 - 2.2	8		80	12	
2.2 - 3.6	11		81	8	
Mean	9		82	9	

SU 49 SE 94 4958 9377 Near Drop Short, Sutton Courtenay Block B

Surface level (+54.6 m) +179 ft
Water struck at (+53.2 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 0.6 m (2.0 ft)
Mineral 1.9 m (6.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, sandy and pebbly; dark brown	0.3	(1.0)	0.3	(1.0)
First Terrace deposits (Terrace 1B)	Clay, silty with pebbles of quartz, quartzite and flint; light brown	0.3	(1.0)	0.6	(2.0)
	'Clayey' gravel Gravel: fine with coarse, dominantly well rounded to subrounded, buff to brown, occasionally shelly limestone with brownish black ironstone and well rounded reddish brown quartzite and traces of clear to white well rounded quartz and angular to subangular flint, rare ammonite fragments and Gryphaea shells Sand: medium and coarse with trace of fine, dominantly limestone with quartz; brown	1.9	(6.0)	2.5	(8.0)
Kimmeridge Clay	Clay, stiff, with occasional fragile iridescent ammonite; dark grey with a bluish hue	0.5+	(1.5+)	3.0	(10.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	46	+ 16	5
		- 16 + 4	41
Sand	43	- 4 + 1	16
		- 1 + $\frac{1}{4}$	23
		- $\frac{1}{4}$ + 1/16	4
Fines	11	- 1/16	11

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.6 - 1.6	8	45	47
*1.6 - 2.5	16	39	45

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.6 - 1.6	1	6	84	9	
1.6 - 2.5	3	8	85	4	
Mean	2	6	85	7	

SU 49 SE 167 4563 9043 North of Woods Farm, East Hendred Block C

Surface level (+69.2 m) +227 ft
Water struck at (+68.4 m)
Hand auger, 6 inch (152 mm) diam.
December 1974

Overburden 0.5 m (1.5 ft)
Mineral 1.8 m (6.0 ft)
Bedrock 0.2 m+ (0.5 ft)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, with occasional fine pebbles of limestone; greyish black	0.5	(1.5)	0.5	(1.5)
Alluvium	'Clayey' pebbly sand, with numerous white shells and shell fragments Gravel: mainly fine well rounded limestone and shell fragments with occasional large angular flint cobbles and some brown ironstone Sand: medium and coarse with fine, limestone and chalk pellets, occasional ironstone; chalky white	1.8	(6.0)	2.3	(7.5)
Gault	Clay, stiff, black to bluish grey	0.2+	(0.5+)	2.5	(8.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	8	+ 16	1
		- 16 + 4	7
Sand	76	- 4 + 1	31
		- 1 + ¼	33
		- ¼ + 1/16	12
Fines	16	- 1/16	16

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
*0.5 - 2.3	16	76	8

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.5 - 2.3	8		87	5	

SU 49 SE 168 4612 9069 Hill Farm, Steventon Block C

Surface level (+68.3 m) +224 ft
Water struck at (+66.5 m)
Hand auger, 6 inch (152 mm) diam.
December 1974

Overburden 1.0 m (3.5 ft)
Mineral 1.8 m (6.0 ft)
Bedrock 0.1 m+ (0.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, peaty, brownish black	0.4	(1.5)	0.4	(1.5)
Second Terrace deposits	Clay, with traces of rounded to platy limestone and occasional flint becoming more gravelly towards base; greenish brown	0.6	(2.0)	1.0	(3.5)
	'Clayey' sandy gravel, with higher clay content between 1.0 and 1.6 m Gravel: predominantly fine with some coarse and occasional cobbles, mainly greenish white rounded to subrounded platy impure limestone with some angular flint and chalk and a trace of ironstone and quartz Sand: fine and medium with coarse, limestone and glauconite, greenish brown	1.8	(6.0)	2.8	(9.0)
Gault	Clay, firm, black to bluish grey	0.1+	(0.5+)	2.9	(9.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	40	+ 16	5
		- 16 + 4	35
Sand	46	- 4 + 1	8
		- 1 + ¼	17
		- ¼ + 1/16	21
Fines	14	- 1/16	14

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
1.0 - 1.6	23	42	35
*1.6 - 2.8	11	47	42

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
1.0 - 1.6	8	0	88	4	
1.6 - 2.8	15	1	80	4	
Mean	13	1	82	4	

SU 59 NW 44 5086 9990 Near Radley Park, Radley Block D

Surface level (+86.2 m) +283 ft
Water struck at (+84.8 m)
Shell and auger (modified), 6 inch (152 mm) diam.
February 1974

Overburden 0.3 m (1.0 ft)
Mineral 1.6 m (5.0 ft)
Bedrock 2.1 m+ (7.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil	0.3	(1.0)	0.3	(1.0)
Plateau Gravel	'Clayey' sandy gravel Gravel: fine to coarse, some cobbles, rounded to subangular quartz and quartzite, flint and chert Sand: rounded to subrounded quartz and chert; clayey in parts particularly between 0.3 - 1.2 m (19%) decreasing with depth; brown to yellowish brown	1.6	(5.0)	1.9	(6.0)
Kimmeridge Clay	Clay, stiff, greyish black	2.1+	(7.0+)	4.0	(13.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	22	+ 16	14
		- 16 + 4	8
Sand	62	- 4 + 1	12
		- 1 + ¼	34
		- ¼ + 1/16	16
Fines	16	- 1/16	16

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.3 - 1.2	19	59	22
1.2 - 1.4	13	71	16
*1.4 - 1.9	11	63	26

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.3 - 1.2	17	49	0	32	2
1.2 - 1.4	No Sample				
1.4 - 1.9	14	46	2	35	3
Mean	16	48	1	33	2

SU 59 NW 45 5020 9648 Andersey Island, South East of Abingdon Block A

Surface level (+51.2 m) +168 ft
Water struck at (+48.4 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 1.2 m (4.0 ft)
Mineral 3.7 m (12.0 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil, brown	0.2	(0.5)	0.2	(0.5)
First Terrace deposits (Terrace 1A)	Clay, sandy and partly silty, dominantly quartz and limestone; reddish brown	1.0	(3.5)	1.2	(4.0)
	Gravel, with increasing amounts of coarse gravel and cobbles with depth Gravel: fine to coarse with some cobbles, tabular subrounded to rounded limestone, with some well rounded reddish brown and purple quartzite, whitish brown quartz, brownish black ironstone and traces of subangular to subrounded flint, light grey sandstone, worn Gryphaea shells and corals Sand: medium and coarse with occasional fine, dominantly quartz and limestone; reddish brown	3.7	(12.0)	4.9	(16.0)
Kimmeridge Clay	Clay, stiff, with fragile shells; light to dark bluish grey	0.4+	(1.5+)	5.3	(17.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	49	+ 16	11
		- 16 + 4	38
		- 4 + 1	18
Sand	45	- 1 + ¼	24
		- ¼ + 1/16	3
Fines	6	- 1/16	6

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
1.2 - 2.2	12	49	39
*2.2 - 3.2	9	46	45
*3.2 - 4.2	2	41	57
*4.2 - 4.9	0	43	57

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
1.2 - 2.2	3	7	82	8	
2.2 - 3.2		7	89	4	
3.2 - 4.2	1	14	82	3	
4.2 - 4.9	5	5	83	7	
Mean	2	8	84	6	

SU 59 NW 46 5125 9886 Peach Croft Farm, Radley Block A

Surface level (+61.9 m) +203 ft
Water struck at (+57.8 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 1.3 m (4.5 ft)
Mineral 1.8 m (6.0 ft)
Waste 1.0 m (3.5 ft)
Mineral 1.8 m (6.0 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil; dark brown	0.2	(0.5)	0.2	(0.5)
Second Terrace deposits	Clay, very sandy, occasional rounded quartz and quartzite and subangular flint pebbles; reddish brown	1.1	(3.5)	1.3	(4.5)
	(a) Sandy gravel, with greyish brown sandy clay from 2.6 to 2.7 m Gravel: fine with rare coarse, dominantly tabular subrounded to rounded buff oolitic limestone, some well rounded red, brown, cream and white quartz and quartzite, brownish black ironstone and subangular flint, occasional Gryphaea debris Sand: medium with coarse and trace of fine, quartz and limestone; light brown	1.8	(6.0)	3.1	(10.0)
	Clay, sandy and silty, firm to soft with occasional pebbles; yellowish brown	1.0	(3.5)	4.1	(13.5)
	(b) Gravel Gravel: fine to coarse with some cobbles, dominantly tabular subrounded brown limestone, with some ovoid well rounded brown quartz, brown and reddish brown quartzite, subangular flint, brownish black ironstone and rare subangular tabular light greenish grey sandstone Sand: medium to coarse with some fine, limestone and quartz; yellowish brown	1.8	(6.0)	5.9	(19.5)
Kimmeridge Clay	Clay, stiff, bluish grey	0.4+	(0.5+)	6.3	(20.5)

GRADING

Mean for Deposit				Bulk Samples			
	%	mm	%	Depth below surface (m)	Percentage Fines	Sand	Gravel
(a)							
Gravel	30	+ 16	1	1.3 - 2.3	9	57	34
		- 16 + 4	29	2.3 - 3.1	7	53	40
		- 4 + 1	20				
Sand	61	- 1 + ¼	36				
		- ¼ + 1/16	5				
Fines	9	- 1/16	9				
(b)							
Gravel	51	+ 16	18	4.1 - 5.1	11	33	56
		- 16 + 4	33	5.1 - 6.0	8	46	46
		- 4 + 1	19				
Sand	40	- 1 + ¼	17				
		- ¼ + 1/16	4				
Fines	9	- 1/16	9				

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
(a)					
1.3 - 2.3	12	12	72	4	
2.3 - 3.1	12	11	73	4	
Mean	12	11	73	4	
(b)					
4.1 - 5.1	10	10	71	9	
5.1 - 6.0	5	7	79	9	
Mean	8	9	74	9	

SU 59 NW 47 5113 9678 Near Back Water, Culham Block A

Surface level (+50.9 m) +167 ft
Water struck at (+47.6 m)
Shell and auger (modified), 6 inch (152 mm) diam.
November 1971

Overburden 3.3 m (11.0 ft)
Mineral 1.0 m (3.5 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, dark brown	0.3	(1.0)	0.3	(1.0)
Alluvium	Clay, silty, with occasional pebbles of quartz, and small white gastropod shells; white-brown becoming mottled greyish brown and yellowish brown	2.5	(8.0)	2.8	(9.0)
	Peat, silty, soft and spongy with some small white fragile gastropod shells and occasional lignite fragments	0.5	(1.5)	3.3	(11.0)
First Terrace deposits (Terrace 1A)	Gravel Gravel: fine to coarse, predominantly subrounded, tabular and platy, brown limestone with trace of brownish black ironstone, well rounded reddish brown quartzite, well rounded yellowish white quartz and lignite fragments Sand: coarse and medium with some fine, limestone, quartz, some lignite and small gastropod shells; dark greyish brown	1.0	(3.5)	4.3	(14.0)
Kimmeridge Clay	Clay, stiff, with fragile pinkish iridescent shell fragments; dark brown	0.4+	(1.5+)	4.7	(15.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	54	+ 16	16
		- 16 + 4	38
Sand	41	- 4 + 1	25
		- 1 + ¼	14
		- ¼ + 1/16	2
Fines	5	- 1/16	5

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
*3.3 - 4.3	5	41	54

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
3.3 - 4.3	1	2	92	5	

SU 59 NW 48 5198 9820 Goose Acre Farm, Radley Block A

Surface level (+57.0 m) +187 ft
Water struck at (+55.7 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 0.4 m (1.5 ft)
Mineral 2.2 m (7.0 ft)
Bedrock 0.4 m (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, dark brown	0.1	(0.5)	0.1	(0.5)
Second Terrace deposits	Clay, silty, becoming sandy, with occasional pebbles of yellowish white quartz and reddish brown quartzite; brown	0.3	(1.0)	0.4	(1.5)
	'Clayey' sandy gravel Gravel: fine to coarse, dominantly subrounded and tabular brown occasionally shelly, oolitic limestone, with some subrounded to well rounded whitish brown quartz and quartzite, some brownish black ironstone, rare subangular flint, tabular subrounded green sandstone and occasional worn Gryphaea shells Sand: medium and coarse with trace of fine, quartz, limestone and some ironstone; orange brown	2.2	(7.0)	2.6	(8.5)
Kimmeridge Clay	Clay, stiff, silty, with abundant fragile iridescent ammonite shells; bluish grey	0.4+	(1.5+)	3.0	(10.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	41	+ 16	11
		- 16 + 4	30
		- 4 + 1	21
Sand	48	- 1 + ¼	24
		- ¼ + 1/16	3
Fines	11	- 1/16	11

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.4 - 1.4	16	54	30
1.4 - 2.6	8	42	50

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.4 - 1.4	4	4	87	5	
1.4 - 2.6	1	8	86	5	
Mean	3	6	86	5	

SU 59 NW 49 5212 9523 Zouch Farm, Culham Block B

Surface level (+57.9 m) +190 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
November 1971

Overburden 0.2 m (0.5 ft)
Mineral 2.7 m (9.0 ft)
Waste 0.1 m (0.5 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, dark brown	0.2	(0.5)	0.2	(0.5)
Second Terrace deposits	'Clayey' pebbly sand, silty in the upper 0.4 m Gravel: fine to coarse, brown subrounded to subangular limestone with subangular to angular flint, some reddish brown well rounded quartzite, well rounded yellowish white quartz, and brownish black ironstone Sand: dominantly medium with some coarse and trace of fine, limestone, flint and quartz; reddish brown	2.7	(9.0)	2.9	(9.5)
	Clay, stiff, pebbly; orange brown	0.1	(0.5)	3.0	(10.0)
Lower Greensand	Sand, clayey, with local lighter coloured silty bands, occasional ironstone nodules and quartz pebbles; dark brown	0.5+	(1.5+)	3.5	(11.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	16	+ 16	5
		- 16 + 4	11
Sand	73	- 4 + 1	9
		- 1 + ¼	59
		- ¼ + 1/16	5
Fines	11	- 1/16	11

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.2 - 0.7	28	65	7
0.7 - 1.7	8	84	8
1.7 - 2.9	6	67	27

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.2 - 0.7	38	36	3	23	
0.7 - 1.7	7	15	74	4	
1.7 - 2.9	26	2	70	2	
Mean	22	9	64	5	

SU 59 NW 50 5391 9922 Upper Farm, Nuneham Courtenay Block A

Surface level (+52.7 m) +173 ft
Water struck at (+51.3 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 0.9 m (3.0 ft)
Mineral 3.2 m (10.5 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil, dark brown	0.4	(1.5)	0.4	(1.5)
Alluvium	Clay, silty, with small white gastropod shells; light brown becoming mottled and streaked reddish brown	0.5	(1.5)	0.9	(3.0)
First Terrace deposits (Terrace 1A)	Gravel Gravel: fine to coarse, dominantly platy or tabular subrounded buff and brown oolitic and partly shelly limestone, some rounded quartz and quartzite, ironstone and flint, traces of light grey subangular sandstone and Gryphaea shells Sand: medium and coarse with a trace of fine, dominantly limestone with some quartz and ironstone; orange brown	3.2	(10.5)	4.1	(13.5)
Kimmeridge Clay	Clay, stiff, bluish grey	0.5+	(1.5+)	4.6	(15.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	57	+ 16	9
		- 16 + 4	48
		- 4 + 1	18
Sand	39	- 1 + ¼	19
		- ¼ + 1/16	2
Fines	4	- 1/16	4

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
*0.9 - 1.9	6	39	55
*1.9 - 2.9	0	33	67
*2.9 - 4.1	6	43	51

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.9 - 1.9	9	7	82	2	
1.9 - 2.9	2	1	91	6	
2.9 - 4.1	2	2	89	7	
Mean	4	3	88	5	

SU 59 NW 54 5200 9706 Near Thrupp House Farm, Radley Block A

Surface level (+52.6 m) +172.6 ft
Water struck at (+49.1 m)
Hand auger, 6 inch (152 mm) diam.
November 1974

Overburden 0.4 m (1.5 ft)
Mineral 3.5 m (11.5 ft)
Bedrock 0.1 m+ (0.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, sandy, brown	0.4	(1.5)	0.4	(1.5)
First Terrace deposits (Terrace 1A)	Sandy gravel, with gravel content increasing and becoming coarser with depth Gravel: fine to coarse with some cobbles; predominantly sub-rounded to rounded whitish brown to buff limestone, with brownish black tabular ironstone, some subangular flint, traces of well rounded quartz and quartzite, sandstones and shell fragments Sand: predominantly medium with fine and some coarse, mainly limestone with quartz and occasional ironstone, some cylindrical sand concretions up to 1 cm in diameter and 6 cm long; brown to light brown	3.5	(11.5)	3.9	(13.0)
Kimmeridge Clay	Clay, firm, black to bluish black	0.1+	(0.5+)	4.0	(13.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	28	+ 16	5
		- 16 + 4	23
		- 4 + 1	8
Sand	63	- 1 + $\frac{1}{4}$	39
		- $\frac{1}{4}$ + 1/16	16
Fines	9	- 1/16	9

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.4 - 1.4	26	73	1
1.4 - 2.4	3	68	29
2.4 - 3.4	2	55	43
3.4 - 3.9	1	53	46

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.4 - 1.4	58	11	18	13	0
1.4 - 2.4	4	3	82	11	0
2.4 - 3.4	2	4	77	9	8
3.4 - 3.9	2	5	80	13	0
Mean	6	4	76	11	3

Surface level (+86.0 m) +282 ft
Water not struck
Hand auger, 6 inch (152 mm) diam.
December 1974

Waste 1.5 m (5.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, pebbly; dark brown	0.2	(0.5)	0.2	(0.5)
Plateau Gravel	Clay, firm, slightly sandy at top becoming sandier below with occasional fine to coarse and cobble size pebbles of rounded reddish white quartzite, whitish quartz and angular flint; light yellowish brown	1.3	(4.5)	1.5	(5.0)
Gault	Clay, with white calcareous partings and occasionally 'rusty' streaks; light bluish grey	0.5+	(1.5+)	2.0	(6.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	13	+ 16	5
		- 16 + 4	8
Sand	29	- 4 + 1	7
		- 1 + ¼	14
		- ¼ + 1/16	8
Fines	58	- 1/16	58

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.2 - 0.7	70	12	18
0.7 - 1.6	51	38	11

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.2 - 0.7	No Sample				
0.7 - 1.6	No Sample				

SU 59 NW 56 5398 9751 Near Lock Wood, Nuneham Park Block D

Surface level (+91.9 m) +301.5 ft
Water not struck
Hand auger, 6 inch (152 mm) diam.
November 1974

Overburden 0.2 m (0.5 ft)
Mineral 1.8 m (6.0 ft)
Bedrock 0.3 m+ (1.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil	0.2	(0.5)	0.2	(0.5)
Plateau Gravel	'Clayey' gravel, clayey in upper 0.8 m, sand mainly in lower 1.0 m Gravel: fine to coarse with cobbles, quartz and quartzite, some flint and occasional ironstone Sand: medium with fine and coarse quartz with flint; yellowish brown	1.8	(6.0)	2.0	(6.5)
Gault	Clay, stiff, with a weathered brown surface; blue-grey	0.3+	(1.0+)	2.3	(7.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	47	+ 16	36
		- 16 + 4	11
		- 4 + 1	7
Sand	33	- 1 + $\frac{1}{4}$	17
		- $\frac{1}{4}$ + 1/16	9
Fines	20	- 1/16	20

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.2 - 1.2	26	16	58
1.2 - 2.0	12	53	35

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.2 - 1.2	12	71	2	12	3
1.2 - 2.0	13	49	2	36	0
Mean	12	61	1	23	3

SU 59 SW 33 5071 9334 South East of Sutton Courtenay Village Block B

Surface level (+51.5 m) +169 ft
Water struck at (+48.7 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1972

Overburden 2.1 (7.0 ft)
Mineral 3.3 m (11.0 ft)
Bedrock 0.6 m+ (2.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, clayey and pebbly; dark brown	0.4	(1.5)	0.4	(1.5)
First Terrace deposits (Terrace 1A)	Clay, silty, slightly sandy, firm, with occasional subangular flint pebbles; lower 0.2 m passes into glauconitic light green silt with scattered chalk pellets; light brown to brownish green	0.4	(1.5)	0.8	(2.5)
	Sand, very silty and clayey, very glauconitic; light brown with greenish orange streaks	0.3	(1.0)	1.1	(3.5)
	Clay, pebbly and sandy; the sand fraction comprises medium and fine with some coarse quartz and limestone, very glauconitic throughout; the gravel fraction, amounting to only 8 per cent of the sample, comprises fine with some medium subrounded oolitic limestone subangular flint and rounded quartz	1.0	(3.5)	2.1	(7.0)
	Sand, fine to medium with some coarse, limestone and quartz, glauconitic and hematitic throughout; greenish brown	0.3	(1.0)	2.4	(1.5)
	Sandy gravel, with fines decreasing with depth Gravel: fine with coarse and occasional cobbles, predominantly platy to tabular subrounded oolitic and shelly limestone with some well rounded brown quartzite, angular flint and hard white chalk pellets; trace of tabular green siltstone and hematite Sand: medium and coarse with a trace of fine, quartz, oolitic limestone, glauconite and hematite, slightly silty; light greenish brown	3.0	(10.0)	5.4	(17.5)
Gault	Clay, stiff, uniform; dark grey	0.6+	(2.0+)	6.0	(19.5)

Mean for Deposit

	%	mm	%
Gravel	30	+ 16	5
		- 16 + 4	25
Sand	60	- 4 + 1	26
		- 1 + ¼	30
		- ¼ + 1/16	4
Fines	10	- 1/16	10

GRADING

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
1.1 - 2.1	(Non-mineral)		
*2.1 - 3.1	26	73	1
*3.1 - 4.1	5	45	50
*4.1 - 5.4	1	62	37

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
1.1 - 2.1	4	7	63	6	20
2.1 - 3.1	No sample				
3.1 - 4.1	4	4	83	9	0
4.1 - 5.4	6	4	83	6	1
Mean	5	4	82	7	2

SU 59 SW 34 5104 9471 Sutton Bridge, Sutton Courtenay Block B

Surface level (+49.1 m) +161 ft
Water struck at (+46.9 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1971

Overburden 0.8 m (2.5 ft)
Mineral 3.0 m (10.0 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, silty, becoming clayey; dark brown	0.3	(1.0)	0.3	(1.0)
Alluvium	Clay, light brown, silty, becoming speckled brown in lower part; some iron concentrates and iron staining locally. The basal 5 cm contain some quartz, limestone and ironstone gravel	0.5	(1.5)	0.8	(2.5)
First Terrace deposits (Terrace 1A)	Gravel Gravel: fine to coarse, particularly coarse with some cobbles in upper 1 m, dominantly sub-rounded to rounded brown shelly limestone with some brownish black ironstone, flint, brown and red ovoid quartzite and well rounded quartz, trace of worn Gryphaea shells and greyish green siltstone Sand: medium to coarse with fine quartz and limestone, shelly in parts; brown	3.0	(10.0)	3.8	(12.5)
Kimmeridge Clay	Clay, stiff, silty, with nacreous fragile ammonite shells; dark bluish-grey	0.4+	(1.5+)	4.2	(14.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	47	+ 16	13
		- 16 + 4	34
		- 4 + 1	17
Sand	46	- 1 + ¼	26
		- ¼ + 1/16	3
Fines	7	- 1/16	7

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.8 - 1.8	10	36	54
*1.8 - 2.8	6	49	45
*2.8 - 3.8	4	53	43

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.8 - 1.8	9	4	80	7	
1.8 - 2.8	3	5	85	7	
2.8 - 3.8	4	6	82	8	
Mean	5	5	83	7	

SU 59 SW 35 5196 9386 West of Bridge Farm, Appleford Block B

Surface level (+50.0 m) +164 ft
Water struck at (+46.1 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1972

Overburden 1.7 m (5.5 ft)
Mineral 2.6 m (8.5 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil; dark brown	0.3	(1.0)	0.3	(1.0)
First Terrace deposits (Terrace 1A)	Clay, silty and sandy with occasional pebbles of rounded brown quartzite and subangular flint; light brownish grey becoming dark brown and streaked white	1.1	(3.5)	1.4	(4.5)
	Silt, firm to soft, sandy and glauconitic with small white chalk pellets; pale green	0.3	(1.0)	1.7	(5.5)
	'Clayey' sandy gravel Gravel: fine to coarse, predominantly subrounded oolitic and shelly limestone with subangular chert, rounded brown and purple quartzite rounded white and yellow quartz, subrounded brown hematite with a trace of subangular green siltstone, occasional corals, shell fragments and chalk pellets Sand: medium with coarse and a trace of fine, limestone, quartz and hematite; light brownish grey	2.6	(8.5)	4.3	(14.0)
Gault	Clay, stiff, dark bluish-grey	0.5+	(1.5+)	4.8	(16.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	44	+ 16	7
		- 16 + 4	37
		- 4 + 1	18
Sand	44	- 1 + $\frac{1}{4}$	24
		- $\frac{1}{4}$ + 1/16	2
Fines	12	- 1/16	12

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
1.7 - 2.7	14	44	42
2.7 - 3.7	12	46	42
*3.7 - 4.3	10	40	50

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
1.7 - 2.7	1	5	85	9	
2.7 - 3.7	5	5	87	3	
3.7 - 4.3	4	7	85	4	
Mean	3	6	86	5	

SU 59 SW 36 5197 9237 West of Hill Farm, Appleford

Surface level (+50.3 m) +165 ft
Water struck at (+45.3 m)
Shell and auger (modified), 6 inch (152 mm) diam.
September 1972

Waste 2.8 m (9.0 ft)
Bedrock 2.2 m+ (7.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, with quartz and quartzite, pebbles; brown	0.3	(1.0)	0.3	(1.0)
Head	Clay, sandy in parts with some well rounded quartz, flint, red quartzite and ironstone pebbles; light brown	0.2	(0.5)	0.5	(1.5)
	Clay, silty and glauconitic with pebbles of limestone, quartz and quartzite; iron stained in parts; grey to greyish green	0.3	(1.0)	0.8	(2.5)
	Clay, stiff, with rare pebbles of limestone and shells, sandy in parts; orange brown to grey occasionally mottled brown	2.0	(6.5)	2.8	(9.0)
Gault	Clay, stiff, with silty and sandy partings, some shell fragments; grey to greyish white mottled dark grey	2.2+	(7.0+)	5.0	(16.5)

SU 59 SW 37 5298 9338 Near St. Peter's Church, Appleford Block B

Surface level (+50.0 m) +164 ft
Water not struck
Shell and auger (modified), 6 inch (152 mm) diam.
September 1972

Overburden 0.3 m (1.0 ft)
Mineral 5.5 m (18.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, clayey, with occasional pebbles of quartz, limestone and flint, some hematite staining; brown	0.3	(1.0)	0.3	(1.0)
First Terrace deposits (Terrace 1A)	Gravel **Gravel:** fine with coarse predominantly rounded to sub-rounded, tabular and platy, buff to cream oolitic limestone, with some rounded red to reddish brown quartzite, well rounded white to semi-transparent quartz, and iron-stone; trace of flint, chalk pellets, shell fragments and sandstone Sand: medium to coarse with a trace of fine, quartz and limestone, glauconitic in parts; brownish white	5.5	(18.0)	5.8	(19.0)
Gault	Clay, stiff; black	0.5+	(1.5+)	6.3	(20.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	49	+ 16	8
		- 16 + 4	41
		- 4 + 1	20
Sand	46	- 1 + ¼	24
		- ¼ + 1/16	2
Fines	5	- 1/16	5

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.3 - 1.3			
1.3 - 2.3	11	61	28
2.3 - 3.3	4	50	46
3.3 - 4.3	1	34	65
4.3 - 5.3	4	39	57
5.3 - 5.8			

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.3 - 1.3	2	4	87	7	
1.3 - 2.3	2	4	87	7	
2.3 - 3.3	6	3	85	6	
3.3 - 4.3	4	8	80	8	
4.3 - 5.3	6	10	76	8	
5.3 - 5.8	No Sample				
Mean	4	6	83	7	

SU 59 SW 38 5306 9442 Fullamoor Farm, Clifton Hampden Block B

Surface level (+49.5 m) +162 ft
Water struck at (+47.0 m)
Shell and auger (modified), 6 inch (152 mm) diam.
November 1971

Overburden 0.5 m (1.5 ft)
Mineral 4.1 m (13.5 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, brown	0.1	(0.5)	0.1	(0.5)
First Terrace deposits (Terrace 1A)	Clay, sandy and stiff, with occasional reddish brown rounded quartzite, whitish quartz and subrounded to rounded flint pebbles; reddish brown	0.4	(1.5)	0.5	(1.5)
	Sandy gravel with a notable increase in gravel coarseness and decrease in fines towards base Gravel: fine to coarse, dominantly subrounded tabular brown to buff limestone with some reddish brown quartzite and a trace of rounded quartz; subangular flint and subrounded black ironstone Sand: medium to coarse with some fine, quartz, flint and limestone; buff	4.1	(13.5)	4.6	(15.0)
Gault	Clay, firm and malleable; dark greyish blue	0.4+	(1.5+)	5.0	(16.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	39	+ 16	9
		- 16 + 4	30
		- 4 + 1	19
Sand	53	- 1 + ¼	29
		- ¼ + 1/16	5
Fines	8	- 1/16	8

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.5 - 1.5	16	55	29
1.5 - 2.5	12	53	35
*2.5 - 3.5	5	56	39
*3.5 - 4.6	1	48	51

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.5 - 1.5	6	16	68	10	
1.5 - 2.5	5	2	82	11	
2.5 - 3.5	3	4	88	5	
3.5 - 4.6	8	5	77	10	
Mean	6	7	78	9	

SU 59 SW 39 | 5410 9490 | North West of Clifton Lock, Clifton Hampden | Block B

Surface level (+48.8 m) +160 ft
Water struck at (+46.2 m)
Shell and auger (modified), 6 inch (152 mm) diam.
November 1971

Overburden 0.6 m (2.0 ft)
Mineral 3.2 m (10.5 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil, silty and sandy becoming clayey; light brown	0.2	(0.5)	0.2	(0.5)
First Terrace deposits (Terrace 1A)	Clay, firm, silty and sandy; light reddish-brown	0.4	(1.5)	0.6	(2.0)
	'Clayey' sandy gravel, sand and fines content decreases with depth Gravel: fine to coarse predominantly subrounded brown to buff limestone with some rounded brown to reddish brown quartzite, occasional rounded yellow quartz, and rounded brown ironstone; trace of subangular to subrounded flint Sand: medium with some coarse and trace of fine, quartz, ironstone and limestone; light brown	3.2	(10.5)	3.8	(12.5)
Lower Greensand	Sand, ferruginous, clayey in parts with occasional small rounded quartz pebbles, locally iron-cemented; dark brown	0.5+	(1.5+)	4.3	(14.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	28	+ 16	3
		- 16 + 4	25
		- 4 + 1	16
Sand	59	- 1 + ¼	37
		- ¼ + 1/16	6
Fines	13	- 1/16	13

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
0.6 - 1.5	23	75	2
*1.5 - 2.7	16	56	28
*2.7 - 3.8	2	47	51

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.6 - 1.5	Low gravel content				
1.5 - 2.7	4	3	85	8	
2.7 - 3.8	1	5	90	4	
Mean	3	4	87	6	

SU 59 SW 40 5404 9414 Clifton Cut, Clifton Hampden Block B

Surface level (+48.2 m) +158 ft
Water struck at (+47.2 m)
Shell and auger (modified), 6 inch (152 mm) diam.
November 1971

Overburden 0.6 m (2.0 ft)
Mineral 3.5 m (11.5 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, pebbly and clayey; dark brown	0.3	(1.0)	0.3	(1.0)
First Terrace deposit (Terrace 1A)	Clay, silty and gravelly, with gravel content increasing to base; brown to orange-brown	0.3	(1.0)	0.6	(2.0)
	'Clayey' sandy gravel, very silty and clayey between 1.6 m and 2.6 m Gravel: fine to coarse, dominantly subrounded grey to buff limestone, with some ironstone, rounded reddish-brown quartzite a trace of quartz and flint Sand: medium to coarse with a trace of fine, quartz, ironstone and limestone; brown	3.5	(11.5)	4.1	(13.5)
Gault	Clay, firm, malleable; dark greyish-blue	0.4+	(1.5+)	4.5	(15.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	39	+ 16	4
		- 16 + 4	35
Sand	49	- 4 + 1	21
		- 1 + ¼	26
		- ¼ + 1/16	2
Fines	12	- 1/16	12

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
*0.6 - 1.6	11	40	49
*1.6 - 2.6	28	45	27
*2.6 - 4.1	5	55	40

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
0.6 - 1.6	3	2	87	8	
1.6 - 2.6	3	9	79	9	
2.6 - 4.1	4	4	79	13	
Mean	3	5	82	10	

Surface level (+50.9 m) +167 ft
Water struck at (+48.2 m)
Shell and auger (modified), 6 inch (152 mm) diam.
November 1971

Overburden 1.4 m (4.5 ft)
Mineral 3.8 m (12.5 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, dark brown	0.2	(0.5)	0.2	(0.5)
First Terrace deposits (Terrace 1B)	Clay, sandy, with pebbles of flint and occasional reddish quartzite; brown to light brown	1.2	(4.0)	1.4	(4.5)
	'Clayey' sandy gravel Gravel: fine to coarse, dominantly subrounded limestone, with some reddish brown rounded quartzite and brown ironstone, trace of red quartz, subangular to subrounded flint, and sandstone Sand: medium to coarse with a trace of fine, quartz, ironstone and limestone	3.8	(12.5)	5.2	(17.0)
Gault	Clay, firm, bluish grey	0.5+	(1.5+)	5.7+	(18.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	31	+ 16	7
		- 16 + 4	24
		- 4 + 1	20
Sand	54	- 1 + ¼	29
		- ¼ + 1/16	5
Fines	15	- 1/16	15

Bulk Samples

Depth below surface (m)	Percentage Fines	Sand	Gravel
1.4 - 2.4	8	56	36
*2.4 - 3.4	9	60	31
*3.4 - 4.4	22	51	27
*4.4 - 5.2	18	48	34

COMPOSITION

Depth below surface (m)	Flint	Quartz and Quartzite	Limestone and Chalk	Ironstone	Others
1.4 - 2.4	2	5	85	8	
2.4 - 3.4	3	3	84	10	
3.4 - 4.4	1	3	90	6	
4.4 - 5.2	2	6	89	3	
Mean	2	4	87	7	

APPENDIX G: LIST OF WORKINGS

There are five working quarries, four in the First Terrace deposits and one in the Second Terrace deposits. At the beginning of 1975 the worked-out area amounted to 3.2 km^2. The pits all lie in areas of high water table and are worked by dragline when wet, or by tractor-mounted grabs when pumped dry. They are backfilled using refuse from the Abingdon Urban Area and elsewhere, except for the pit south of Caldecott which it is proposed to convert into a marina linked to the Thames by a short channel. The most recently opened quarry, south of Drayton, catered specifically for the construction of the Abingdon By-pass.

Back-filled areas have been either restored to agriculture, or, for example, near Barton Court [5046 9736], are scheduled for housing development.

LIST OF ACTIVE WORKINGS IN 1975

Location	River Terrace Deposit	Grid Ref.	Approximate area worked out (km^2)
South Radley area; near Punney Farm	First Terrace	532 978	0.5
East Abingdon area; Near Thrupp House Farm	First Terrace	516 972	0.7
South Abingdon area; Near Caldecott	First Terrace	494 954	0.2
South Drayton area; North of the Mill	Second Terrace	480 925	0.2
Sutton Courtenay - Appleford area; Near Radcot Farm	First Terrace	522 928	1.6

APPENDIX H: CONVERSION TABLE: METRES TO FEET

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

REFERENCES

ALLEN, V.T. 1936. Terminology of medium-grained sediments. Rep. Natl. Res. Counc. Washington, for 1935-1936. Appendix 1, Rep. Comm. on Sedimentation, pp. 18–47.

ANON. 1948. Pp. 14-17 in Mineral & resources of the United States. Bureau of Mines and Geological Survey. (Washington D.C.: Public Affairs Press.)

——— 1967. Methods of testing sands for civil engineering purposes. British Standard No. 1377. 233 pp.

ARCHER, A.A. 1969. Background and problems of an assessment of sand and gravel resources in the United Kingdom. Proc. 9th Commonw. Min. Metall. Congr., 1969, Vol. 2 (Mining and Petroleum Geology), pp. 495-508.

——— 1970a. Standardisation of the size classification of naturally occurring particles. Geotechnique, Vol. 20, pp. 103-107.

——— 1970b. Making the most of metrication, Quarry Manager's J., Vol. 54, pp. 223-227.

ARKELL, W.J. 1933. The Jurassic System in Great Britain. (Oxford: Clarendon Press.)

——— 1936. Ammonite zones of the Upper Oxfordian of Oxford and the horizons of the Sowerby's and Buckman's types. Q.J. Geol. Soc. London, Vol. 92, pp. 146-187.

——— 1939. The ammonite succession at the Woodham Brick Company's pit, Akeman Street Station, Bucks, and its bearing on the classification of the Oxford Clay. Q.J. Geol. Soc. London, Vol. 85, pp. 135-222.

——— 1947. The geology of Oxford. (Oxford: Clarendon Press.)

ATTERBERG, A. 1905. Die rationelle Klassification der Sande und Kiese. [The rational classification of sands and gravels.] Chem. Z., Vol. 29, pp. 195-198.

BECKINSALE, R.P. 1970. Physical problems of Cotswolds rivers and valleys. Proc. Cotteswold Nat. Field Club, Vol. 35, pp. 194-205.

BISHOP, W.W. 1958. The Pleistocene geology and geomorphology of three gaps in the Midland Escarpment. Philos. Trans. R. Soc., Series B, Vol. 24, pp. 255-306.

BRIGGS, D.J. and GILBERTSON, D.D. 1972. Recent studies of Pleistocene deposits in the Oxford area. (Paper presented at the British Geomorphological Research Group Conference, Oxford, 1972) 10 pp.

——— ——— 1973. The age of the Hanborough Terrace of The River Evenlode, Oxfordshire. Proc. Geol. Assoc., Vol. 84, pp. 155-173.

——— ——— and GOUDIE, A.S. 1976. Pp. 1-16 in Field guide to the Oxford region. (Quaternary Research Association.)

——— ——— ——— OSBOURNE, P.J., OSMASTON, H.A., PETTITT, M.E., SHOTTON, F.W. and STUART, A.J. 1975. New interglacial site at Sugworth. Nature, London, Vol. 257, pp 477-479.

CALLOMON, J.H. 1968. The Kellaways Beds and the Oxford Clay. Pp. 264-290 in The geology of the East Midlands. P.C. SYLVESTER-BRADLEY and T.D. FORD (Editors). (Leicester: Leicester University Press.)

DINES, H.G. 1928. On the glaciation of the North Cotteswold area. Summ. Prog. Geol. Surv. G.B., for 1927, Part 2, pp. 66-71

——— 1933. Superficial deposits. Pp. 82-93 in The geology of the country around Cirencester. Sheet 235. L. RICHARDSON. Mem. Geol. Surv. G.B.

DOUGLAS, J.A. and ARKELL, W.J. 1928. The Stratigraphical distribution of the Cornbrash: I. The south-western area. Q.J. Geol. Soc. London, Vol. 84, p. 117-178.

——— ——— 1932. The stratigraphical distribution of the Cornbrash: II. The north-eastern area. Q.J. Geol. Soc. London, Vol. 88, p. 112-170.

——— ——— 1935. On a new section of fossiliferous Upper Cornbrash of North-eastern facies at Enslow Bridge, near Oxford. Q.J. Geol. Soc. London, Vol. 91, p. 318-322.

DUIGAN, SUZANNE L. 1955. Plant remains from the gravels of the Summerton-Radley Terrace near Dorchester, Oxfordshire. Q.J. Geol. Soc. London, Vol. 111, pp 225-228.

EVANS, P. 1970. Towards a Pleistocene time scale. Proc. Geol. Soc. London, No. 1660, pp. 374-377.

GOUDIE, A.S. and HART, M. 1974. Pleistocene events and forms in the Oxford region. In Oxford geographical studies. C.G. SMITH and D.I. SCARGILL (Editors). (Oxford: Clarendon Press.)

HARRIS, P.M., THURRELL, R.G., HEALING R.A. and ARCHER, A.A. 1974. Aggregates in Britain. Proc. R. Soc., Series A, Vol. 339, pp. 329-353.

JUKES-BROWN, A.J. and WHITE, A.J.O. 1908. The geology of the country around Henley-on-Thames and Wallingford. Mem. Geol. Surv. G.B.

LANE, E.W. and others. 1947. Report of the subcommittee on sediment Terminology. Trans. Am. Geophys. Union, Vol. 28, pp. 936-938.

MARTIN, A.F. and STEEL, R.W. 1954. Pp. 9-36 in The Oxford region. (Oxford: Oxford University Press.)

MITCHELL, G.F., PENNY, L.F., SHOTTON, F.W. and WEST, R.G. 1973. A correlation of Quaternary deposits in the British Isles. Spec. Rep. Geol. Soc. London, No. 4, 99 pp.

PETTIJOHN, F.J. 1957. Sedimentary rocks 2nd edition. (London: Harper and Row,)

RICHARDSON, L., ARKELL, W.J. and DINES, H.G. 1946. The geology of the country around Witney. Sheet 236. Mem. Geol. Surv. G.B.

ROBSON, P. 1975. The sand and gravel resources of the Thames Valley, The country around Cricklade, Wiltshire. Description of parts of 1:25 000 Resource Sheets SU 09/19, SP 00/10. Miner. Assess. Rep. Inst. Geol. Sci., No. 18, 89 pp.

SANDFORD, K. S. 1924. The river-gravels of the Oxford district. Q. J. Geol. Soc. London, Vol. 80, pp. 113-165.
——— 1926. Pleistocene deposits. Pp. 104-172 in The geology of the country around Oxford. T. I. POCOCK. Mem. Geol. Surv. G.B.
——— 1929. The erratic rocks and the age of the southern limit of glaciation in the Oxford district. Q. J. Geol. Soc. London, Vol. 85, pp. 359-388.
——— 1965. Notes on the gravels of the Upper Thames flood plain between Lechlade and Dorchester. Proc. Geol. Assoc., Vol. 76, pp. 61-75.
SHERLOCK, R. L. 1960. London and the Thames Valley. 3rd Edition. British Regional Geology. (London: H. M. S. O.)
——— and NOBLE, A. H. 1912. On the glacial origin of the Clay-with-Flints of Buckinghamshire and on a former course of the Thames. Q. J. Geol. Soc. London, Vol. 68, pp. 199-212.
SHOTTON, F. W. 1973. English Midlands. Pp. 18-22 in A correlation of Quaternary deposits in the British Isles. Spec. Rep. Geol. Soc. London, No. 4, 99 pp.
SMITH, C. G. and SCARGILL, D. I. (Editors) 1974. Oxford geographical studies. (Oxford: Clarendon Press.)
STODDART, R. 1974. Sand and gravel extraction. Pp. 30-49 in Report of the Standing Conference on London and the South-east Regional Planning. SC 93. (London: H. M. S. O.)
THURRELL, R. G. 1971. The assessment of mineral resources with particular reference to sand and gravel. Quarry Manager's J., Vol. 55, pp. 19-25.
TWENHOFEL, W. H. 1937. Terminology of the fine-grained mechanical sediments. Rep. Natl. Res. Counc. Washington, for 1936-1937, Appendix 1, Rep. Comm. Sediment, pp. 81-104.
UDDEN, J. A. 1914. Mechanical composition of clastic sediments. Bull Geol. Soc. Am., Vol. 25, pp. 655-744.
WEBSTER, R. 1966. The drifts in the Vale of White Horse of north Berkshire and Wiltshire. Proc. Geol. Assoc., Vol. 77, pp. 255-262.
WENTWORTH, C. K. 1922. A scale of grade and class terms for clastic sediments. J. Geol., Vol. 30, pp. 377-392.
——— 1935. The terminology of coarse sediments. Bull. Natl. Res. Counc. Washington, No. 98, pp. 225-246.
WILLMAN, H. G. 1942. Geology and mineral resources of the Marseilles, Ottowa and Streater quadrangles. Bull. Illinois State Geol. Surv., Vol. 66, pp. 343-344.

Dd. 595764 K8
Printed in England for Her Majesty's Stationery Office by Commercial Colour Press, London E7.

The following reports of the Institute relate particularly to bulk mineral resources

Reports of the Institute of Geodogical Sciences

Assessment of British Sand and Gravel Resources

1 The sand and gravel resources of the country south-east of Norwich, Norfolk: Resource sheet TG 20. E& F. P. Nickless.
Report 71/20 ISBN 0 11 880216 £1.15

2 The sand and gravel resources of the country around Witham, Essex: Resource sheet TL 81. H. J. E. Haggard.
Report 72/6 ISBN 0 11 880588 6 £1.20

3 The sand and gravel resources of the area south and west of Woodbridge, Suffolk: Resource sheet TM 24. R. Allender and S. E. Hollyer.
Report 72/9 ISBN 0 11 880596 7 £1.70

4 The sand and gravel resources of the country around Maldon, Essex: Resource sheet TL 80. J. D. Ambrose.
Report 73/1 ISBN 0 11 880600 9 £1.20

5 The sand and gravel resources of the country around Hethersett, Norfolk: Resource sheet TG 10.
E. F. P. Nickless.
Report 73/4 ISBN 0 11 880606 8 £1.60

6 The sand and gravel resources of the country around Terling, Essex: Resource sheet TL 71. C. H. Eaton
Report 73/5 ISBN 0 11 880608 4 £1.20

7 The sand and gravel resources of the country around Layer Breton and Tolleshunt D'Arcy, Essex: Resource sheet TL 91 and part of TL 90. J. D. Ambrose.
Report 73/8 ISBN 0 11 990614 9 £1.30

8 The sand and gravel resources of the country around Shotley and Felixstowe, Suffolk: Resource sheet TM 23.
R. Allender and S. E. Hollyer.
Report 73/13 ISBN 0 11 880625 4 £1.60

9 The sand and gravel resources of the country around Attlebridge, Norfolk: Resource sheet TG 11.
E. F. P. Nickless.
Report 73/15 ISBN 0 11 880658 0 £1.85

10 The sand and gravel resources of the country west of Colchester, Essex: Resource sheet TL 92. J. D. Ambrose.
Report 74/6 ISBN 0 11 880671 8 £1.45

11 The sand and gravel resources of the country around Tattingstone, Suffolk: Resource sheet TM 13. S. E. Hollyer.
Report 74/9 ISBN 0 11 880675 0 £1.95

12 The sand and gravel resources of the country around Gerrards Cross, Buckinghamshire: Resource sheets SU 99, TQ 08 and TQ 09. H. C. Squirrell.
Report 74/14 ISBN 0 11 880710 2 £2.20

Mineral Assessment Reports

13 The sand and gravel resources of the country east of Chelmsford, Essex: Resource sheet TL 70. M. R. Clark.
ISBN 0 11 880744 7 £3.50

14 The sand and gravel resources of the country east of Colchester, Essex: Resource sheet TM 02. J. D. Ambrose.
ISBN 0 11 880745 5 £3.25

15 The sand and gravel resources of the country around Newton on Trent, Lincolnshire: Resource sheet SK 87.
D. Price.
ISBN 0 11 880746 3 £3.00

16 The sand and gravel resources of the country around Braintree, Essex: Resource sheet TL 72. M. R. Clark.
ISBN 0 11 880747 1 £3.50

17 The sand and gravel resources of the country around Besthorpe, Nottinghamshire: Resource sheet SK 86 and part of SK 76. J. R. Gozzard.
ISBN 0 11 880748 X £3.00

18 The sand and gravel resources of the Thames Valley, the country around Cricklade, Wiltshire: Resource sheets SU 09/19 and parts of SP 00/10. P. R. Robson.
ISBN 0 11 880749 8 £3.00

19 The sand and gravel resources of the country south of Gainsborough, Lincolnshire: Resource sheet SK 88 and part of SK 78. J. H. Lovell.
ISBN 0 11 880750 1 £2.50

20 The sand and gravel resources of the country east of Newark upon Trent, Nottinghamshire: Resource sheet SK 85
ISBN 0 11 880751 X £2.75

21 The sand and gravel resources of the Thames and Kennet Valleys, the country around Pangbourne, Berkshire: Resource sheet SU 67. H. C. Squirrell.
ISBN 0 11 880752 8 £3.25

22 The sand and gravel resources of the country north-west of Scunthorpe, Humberside: Resource sheet SE 81.
J. W. C. James.
ISBN 0 11 880753 6 £3.00

23 The sand and gravel resources of the Thames Valley, the country between Lechlade and Standlake: Resource sheet SP 30 and parts of SP 20, SU 29 and SU 39. P. Robson.
ISBN 0 11 881252 1 £7.25

24 The sand and gravel resources of the country around Aldermaston, Berkshire: Parts of resource sheets SU 56 and SU 66. H. C. Squirrell.
ISBN 0 11 881253 X £5.00

25 The celestite resources of the area north-east of Bristol: Resource sheet ST 68 and parts of ST 59, 69, 79, 58, 78, 68 and 77. E. F. P. Nickless, S. J. Booth and P. N. Mosley.
ISBN 0 11 881262 9 £5.00

26 The limestone and dolomite resources of the country around Monyash, Derbyshire: Resource sheet SK 16.
F. C. Cox and D. McC. Bridge.
ISBN 0 11 881263 7 £7.00

27 The sand and gravel resources of the country west and south of Lincoln, Lincolnshire: Resource sheets SK 95, SK 96 and SK 97. I. Jackson.
ISBN 0 11 884003 7 £6.00

28 The sand and gravel resources of the country around Eynsham, Oxfordshire: Resource sheet SP 40 and part of SP 41. W. J. R. Harries.
ISBN 0 11 884012 6 £3.00

29 The sand and gravel resources of the country south-west of Scunthorpe, Humberside: Resource sheet SE 80.
J. H. Lovell.
ISBN 0 11 884013 4 £3.50

30 Procedure for the assessment of limestone resources. F. C. Cox, D. McC. Bridge and J. H. Hull.
ISBN 0 11 884030 4 £1.25

31 The sand and gravel resources of the country west of Newark upon Trent, Nottinghamshire. Resource sheet SK 75.
D. Price and P. J. Rogers.
ISBN 0 11 884031 2 £3.50

32 The sand and gravel resources of the country around Sonning and Henley. Resource sheets SU 77 and SU 78.
H. C. Squirrell.
ISBN 0 11 884032 0 £5.25

33 The sand and gravel resources of the country north of Gainsborough. Resource sheet SK 89. J. Gozzard and D. Price.
ISBN 0 11 884033 9 £4.50

34 The sand and gravel resources of the Dengie Peninsula, Essex: Resource sheet TL 90, etc. M. B. Simmons.
ISBN 0 11 884081 9 *not yet priced*

35 The sand and gravel resources of the country around Darvel: Sheets NS 53, 63, etc. E. F. P. Nickless, A. M. Aitken and A. A. McMillan.
ISBN 0 11 884082 7 £7.00

36 The sand and gravel resources of the country around Southend-on-Sea, Essex: Resource sheets TQ 78/79 etc.
S. E. Hollyer and M. B. Simmons.
ISBN 0 11 884083 5 £7.50

37 The sand and gravel resources of the country around Bawtry, South Yorkshire: Resource sheet SK 69. A. R. Clayton.
ISBN 0 11 884053 3 *not yet priced*

38 The sand and gravel resources of the country around Abingdon, Oxfordshire: Resource sheets SU 49, 59 and SP 40, 50. C. E. Corser.
ISBN 0 11 884084 3 £5.50

Reports of the Institute of Geological Sciences

Other Reports

69/9 Sand and gravel resources of the inner Moray Firth. A. L. Harris and J. D. Peacock.
ISBN 0 11 880106 6 35p

70/4 Sands and gravels of the southern counties of Scotland. G. A. Goodlet.
ISBN 0 11 880105 8 90p

72/8 The use and resources of moulding sand in Northern Ireland. R. A. Old.
ISBN 0 11 881594 0 30p

73/9 The superficial deposits of the Firth of Clyde and its sea lochs. C. E. Deegan, R. Kirby, I. Rae and R. Floyd.
ISBN 0 11 880617 3 95p

77/1 Sources of aggregate in Northern Ireland (2nd edition). I. B. Cameron.
ISBN 0 11 881279 3 70p

77/2 Sand and gravel resources of the Grampian Region. J. D. Peacock and others.
ISBN 0 11 881282 3 80p

77/5 Sand and gravel resources of the Fife Region. M. A. E. Browne.
ISBN 0 11 884004 5 60p

77/6 Sand and gravel resources of the Tayside Region. I. B. Paterson.
ISBN 0 11 884008 8 £1.40

77/8 Sand and gravel resources of the Strathclyde Region. I. B. Cameron and others.
ISBN 0 11 884028 2 £2.50

77/9 Sand and gravel resources of the Central Region, of Scotland. M. A. E. Browne.
ISBN 0 11 884016 9 £1.35

77/19 Sand and gravel resources of the Borders Region, Scotland. A. D. McAdam.
ISBN 0 11 884025 8 £1.00

77/22 Sand and gravel resources of the Dumfries and Galloway Region of Scotland. I. B. Cameron.
ISBN 0 11 884025 8 £1.20

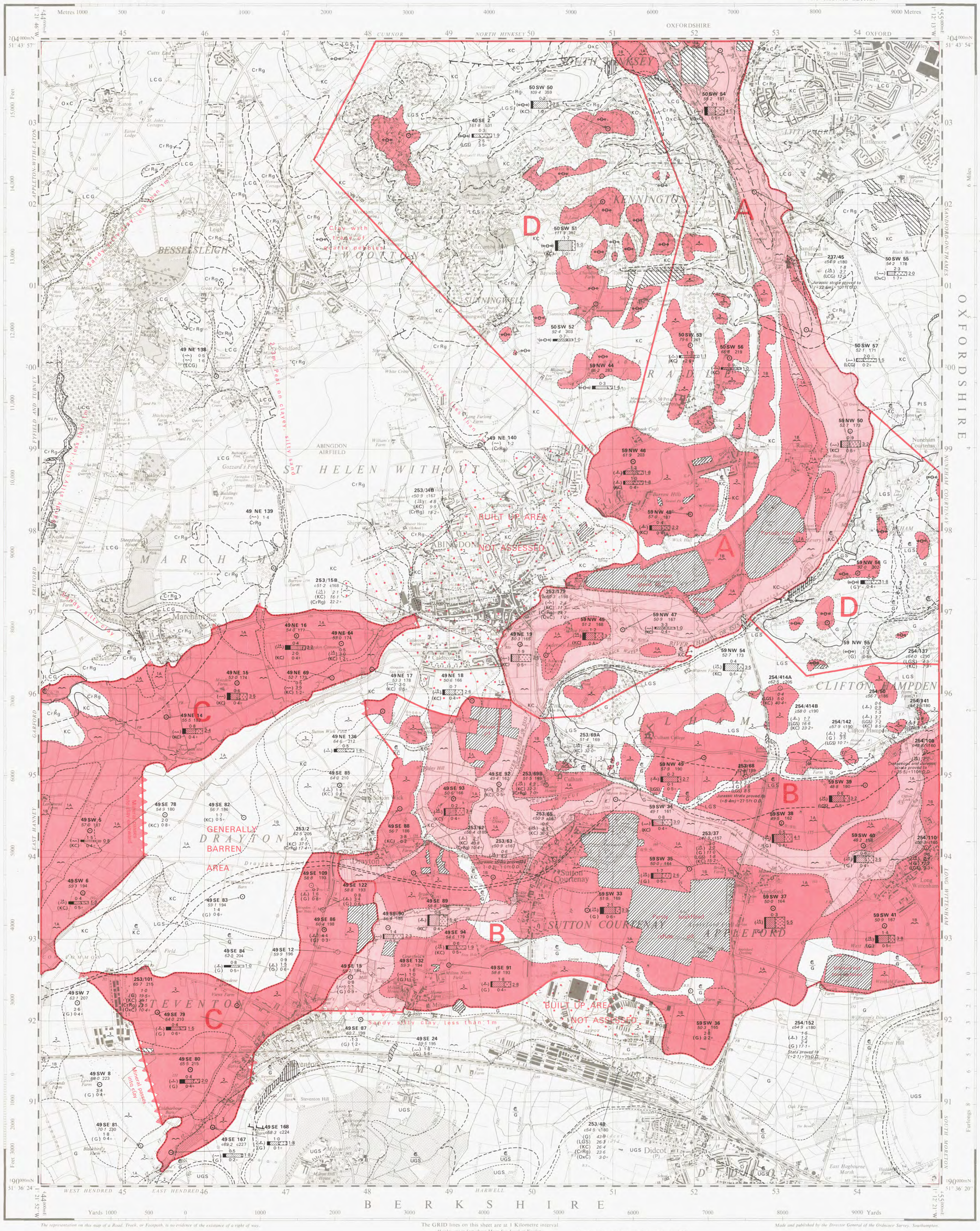
78/1 Sand and gravels of the Lothian Region of Scotland. A. D. McAdam.
ISBN 0 11 884042 8 £1.00

INSTITUTE OF GEOLOGICAL SCIENCES
INDUSTRIAL MINERALS ASSESSMENT UNIT

THE SAND & GRAVEL RESOURCES OF THE COUNTRY AROUND ABINGDON, OXFORDSHIRE
(INCORPORATING PARTS OF SHEETS SU 49, 59, & SP 40, 50)

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

ORDNANCE SURVEY
PART OF SHEETS SU 49,59 & SP 40,50
PROVISIONAL EDITION



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

38

EXPLANATION OF SYMBOLS AND ABBREVIATIONS

DRIFT

	Peat - localised accumulations of decaying moss and rushes P-3	RECENT AND PLEISTOCENE
	Alluvium - grey clay and silt A-26	
1A 1B	**1st Terrace** 1T-16 (1A 1B)	
	2nd Terrace 2T-11	
	3rd Terrace 3T-10	River Terrace Deposits - Predominantly limestone; with flint, quartz and quartzite in a matrix of locally clayey sand
	4th Terrace 4T-6	
	Head - silty and sandy grey clay with occasional flints H-18	
	Plateau Gravel - reddish-brown sandy clay and pebbles of quartz, quartzite and flint PL-M3	

SOLID

UGS	**Upper Greensand** - silty marls and green glauconitic sands	CRETACEOUS
G	**Gault** - grey, silty, micaceous, and marly clays	
LGS	**Lower Greensand** - essentially sands and sandstones locally with pebbles	
PtS	**Portland Sand** - sandy limestones, sands and shelly limestones	UPPER JURASSIC
KC	**Kimmeridge Clay** - dark grey calcareous silty clay, fissured and frequently fossiliferous	
CrRg	**Coral Rag (Upper Corallian)** - rubbly greyish white limestone, predominantly of corals	
LCG	**Lower Calcareous Grit (Lower Corallian)** - calcareous sand with 'doggers' of sandstone	
OxC	**Oxford Clay** - grey silty clay; upper part consists of layers of earthy limestone and clay	

BOUNDARY LINES

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

Broken lines denote uncertainty

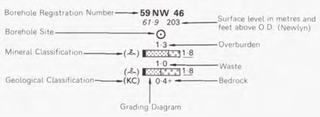
- **Made Ground** MG-2
- **Worked-out Area (sand and gravel)** WO-12
- **Landslip** L-1

BOREHOLE DATA

SITE LOCATIONS

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

I.M.A.U. BOREHOLES



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

Borehole Registration Number

Each I.M.A.U. borehole is identified by a Registration Number, eg **SW 54** The letters refer to the quarter sheet and the figures to the I.G.S. serial number for that quarter. The unique designation for the borehole **SW 54** is **SP 50 SW 54**

Grading Diagrams

Each grading diagram shows the mean particle size distribution of a deposit of sand and gravel.

The height of the diagram is proportional to the mineral thickness.

The widths of the divisions show the proportions of **Fines, Sand** and **Gravel**

OTHER BOREHOLES

The layout of information is the same as for I.M.A.U. boreholes, although data available may not be as comprehensive. They are registered in the same series, except for records in the Hydrogeological Department: for example **253/65** signifies Hydrogeological Department borehole 65 on New Series One-Inch Geological Sheet 253. The final depth of deep boreholes is given in metres above (+) or below (−) Ordnance Datum.

CATEGORIES OF DEPOSITS

- **Exposed mineral, (average thickness of overburden less than 1·0m).** CAT-E1
- **Continuous or almost continuous spreads of mineral beneath overburden (average thickness of overburden greater than 1·0m).** CAT-C3
- **Sand and Gravel either not potentially workable (see Report) or absent.** CAT-A2
- **Sand and Gravel not assessed.** CAT-N1

RESOURCE BLOCKS

For the purpose of assessment, the mineral-bearing land 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 5GQ

The representation on this map of a Road, Track, or Footpath, is no evidence of the existance 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 99·536 acres on the ground

Compiled from 6" sheets last fully revised 1910-32.
Other partial systematic revision 1936-56 has been incorporated.
Some building development revised 1965.
Some major roads revised 1968.

Made and published by the Director General of the Ordnance Survey, Southampton.

Original geological survey on the one-inch scale by W. T. Aveline, H. Banerman, J. H. Blake, F. J. Bennett, E. Hull, W. Whitaker and H. B. Woodward. Published on parts of Old Series sheets 7, 13, 34 and 45, 1859-1971.

Resurveyed on the six-inch scale by F. J. Bennett, J. H. Blake, A. J. Jukes-Brown, G. W. Lamplugh, T. I. Pocock, H. B. Woodward in 1905-1908. Published on parts of New Series sheets 236, 253, 254 and the Oxford District Sheet 1908.

Solid geology of Sheet 236 revised by H. G. Dines and L. Richardson in 1935-36, published in 1938.

Resurveyed in 1969-73 by B. C. Coppack, D. Foster, R. J. O. Hamblin, B. Kelk, A. W. Kemp and E. G. Poole; G. A. Kellaway, District Geologist. Minor amendments by C. E. Corser in 1973-75.

Sand and Gravel Survey by H. C. Squirrell, C. E. Corser, D. J. Havard, P. M. Hopson and P. Robson 1971-72 and 1974-75. R. G. Thurrell, Head, Industrial Minerals Assessment Unit.

1:25 000 Sand and Gravel Resources Sheet published 1978

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.