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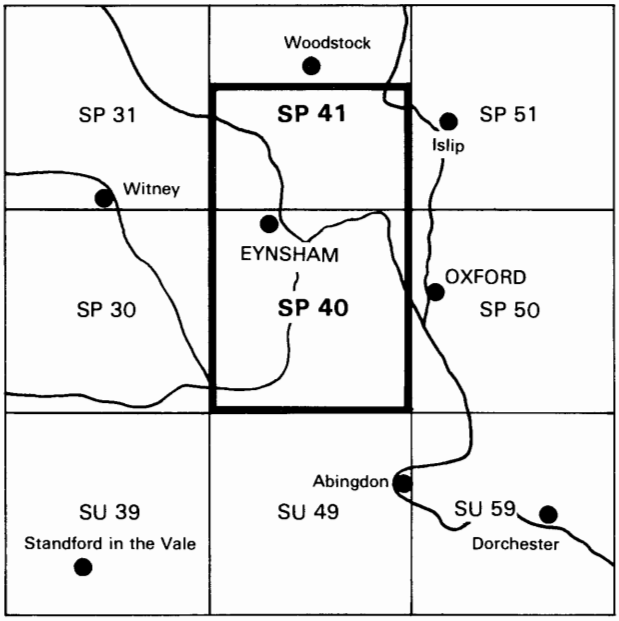

The sand and gravel resources of the country around Eynsham, Oxfordshire

Description of 1:25 000 resource sheet SP 40 and part of SP 41

W. J. R. Harries

With a contribution by M. Vincent

London Her Majesty's Stationery Office 1977

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 are appearing in the Mineral Assessment Report Series of the Institute.
Details of published reports appear at the end of this Report.

The asterisk on the front cover indicates that parts of sheets adjacent to that quoted are described in this Report.

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PREFACE

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

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

This report describes the resources of sand and gravel of 99.4 km^2 of the country around Eynsham, Oxfordshire, shown on the accompanying 1:25 000 resource map SP 40 and part of SP 41. The survey was conducted by Dr H.C. Squirrell, assisted by Mr P. Robson, Mr J.A. Gray, Mr D.J. Havard and Dr W.J.R. Harries as field officers who supervised the drilling and sampling programme. Dr Harries assisted by Mr M. Vincent compiled the report. The work is based on a geological survey at 1:10 560 in 1896-1908 by J.H. Blake and T.I. Pocock and a re-survey in 1969-73 by Dr A.W. Kemp and Messrs B.C. Coppack, D. Foster, S.R. Mills and E.G. Poole. Dr Kemp also contributed to the account of the solid and drift geology. Mr J.W. Gardner, CBE (Land Agent) has been responsible for negotiating access to land for drilling. The ready cooperation of land owners and tenants in this work is gratefully acknowledged.

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The geological maps of the Institute of Geological Sciences, pre-existing borehole information, and 78 boreholes drilled for the Mineral Assessment Unit form the basis of the assessment of sand and gravel resources in the Eynsham area, Oxfordshire.

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

The 1:25 000 map is divided into eight resource blocks containing between 3.8 and 11.2 km² of potentially workable sand and gravel. For the blocks assessed statistically 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.

Sommaire

Les sources des renseignements qui constituent les bases de l'évaluation des ressources en sable et en gravier dans la région d'Eynsham, Oxfordshire, comprennent les cartes géologiques de l'Institute of Geological Sciences, des données obtenues des trous de sonde déjà en existence, et de 78 trous de sonde forés pour le Mineral Assessment Unit.

Dans la région tous les dépôts qui pourraient être exploités pour le sable et le gravier ont été étudiés et on s'est servi d'une méthode statistique simple pour en évaluer le volume. Les évaluations de volume sont tenues d'être symétriquement à 95 pour cent exactes.

La carte 1:25 000 est divisée en huit blocs de ressource avec d'entre 3.8 à 11.2 km² de sable et de gravier. Pour les blocs évalués statistiquement on décrit la géologie des dépôts et on donne l'étendue du terrain minéralisé, l'épaisseur moyenne de recouvrement et de minéral, et le triage moyen de minéral. On présente des données détaillées des trous de sonde. La situation des trous de sonde, la géologie et les profils des blocs de ressource sont montrés sur la carte.

Zusammenfassung

Die geologischen Karten vom Institute of Geological Sciences, vorherexistierende Information über Bohrlöcher, und 78 für die Mineral Assessment Unit gebohrten Bohrlöcher, bilden den Grund für die Einschätzung der Sand- und Schottermittel im Eynsham Gebiet, Oxfordshire.

Alle Ablagerungen im Gebiet, die möglich bearbeitbar für Sand und Schotter sind, wurden untersucht, und eine einfache statistische Methode wurde benutzt, um das Volumen zu schätzen. Man gibt die Zuverlässigkeit der Volumenschatzungen mit symmetrischen 95 Prozent Vertrauensgrenzen.

Man teilt die 1:25 000 Karte in 8 Mittelsblöcke, die zwischen 3.8 und 11.2 km² von Sand und Schotter umfassen. Man beschreibt die Geologie der Ablagerungen für die statistisch bewerteten Blöcke. Das mineralhaltige Gebiet, die mittlere Dicke von Überlastung und Mineral, und die mittlere Klassifizierung von Mineral werden bestimmt Ausführliche Bohrlöcherdaten werden auch gegeben. Die Geologie, die Lage der Bohrlöcher und die Skizzen der Blöcke werden auf der Begleitkarte gezeigt.

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

Description of 1:25 000 resource sheet SP 40 and part of SP 41

W. J. R. HARRIES

Introduction

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

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

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

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

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

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

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

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

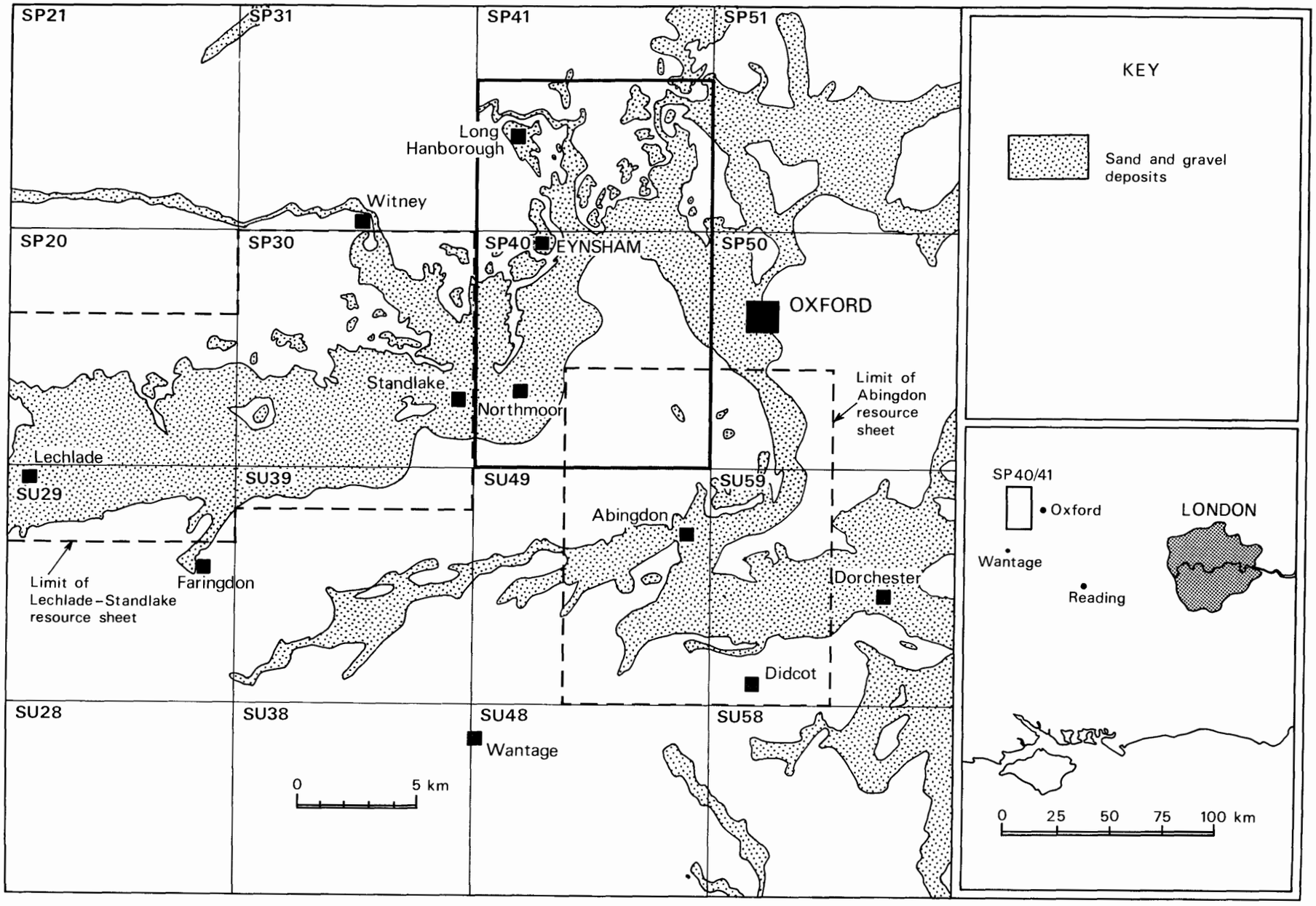


Fig. 1. Location of the resource sheet and of others nearby, in the Thames Valley

Description of Resource Sheet

The area assessed on this resource sheet (Fig. 1) amounts to 99.4 km^2 of which 59 km^2 is mineral bearing. The main built-up areas and the remnant sand and gravel deposits south of the Thames Valley have not been assessed. The Thames Valley has been an important source of aggregate for many years and an estimated 6.7 million m^3 of sand and gravel has been extracted from the area covered by the resource sheet.

TOPOGRAPHY

The area is dominated by the River Thames which flows in a broad S-shaped course eastwards from Northmoor to Oxford (Fig. 2). The Thames Valley has a very shallow gradient gradually falling from 64 m (210 ft) in the west to 57 m (187 ft) in the east. South of the river, the most prominent features are Wytham Hill [459 083][1] rising to 164 m (539 ft), Hurst Hill [477 041] rising to 158 m (520 ft) and Pickett's Heath [484 030] rising to over 160 m (525 ft). The tops of these hills are the remnants of a plateau now concealed by a thin veneer of Glacial Sand and Gravel. Numerous gently incised small streams and brooks drain Hurst Hill in a radial pattern and give the land an undulating character. North of the Thames the topography is more subdued, with well defined terraces in the Thames Valley rising to 100 m (330 ft), and beyond a remnant plateau at a height between 100 m (330 ft) and 120 m (394 ft), on which rests a veneer of Glacial Sand and Gravel. Three south-flowing tributaries of the Thames, namely the Windrush in the west, the Evenlode in the north and the Cherwell in the east, dissect the terraces and accentuate the width of the Thames Valley at each confluence, so providing the most favourable sites for the preservation of sand and gravel deposits.

GEOLOGY

The following account is based on information and field notes provided by the Institute's Field Staff, particularly Dr A. W. Kemp.

The solid rocks consist of gently dipping beds (3° to 5° south-east) ranging in age from the Stonesfield Slate of the Middle Jurassic to the Lower Greensand of the Cretaceous (Fig. 3). These beds are concealed in places by drift deposits, comprising Glacial Sand and Gravel, River Terrace Deposits, Head and Alluvium (Fig. 4). The thicknesses and lithologies of the solid and drift deposits are shown in Table 1. The relationship of topography to the underlying geology is seen in the Thames Valley where the Oxford Clay vale contrasts markedly with the Corallian escarpment to the south (Fig. 5). Valley bulging was developed in the Evenlode Gorge and cambering occurred on Wytham and Seacourt Hills during the Pleistocene.

[1]National Grid References in this publication lie within the 100 kilometre square SP

Great Oolite 'Series'

The Great Oolite 'Series' is subdivided into four formations, namely, the Stonesfield Slate Beds, the Taynton Stone, the Hampen Marly Beds and the White Limestone. Stonesfield Slate Beds were seen at the tip of a meander in the River Evenlode south of Lower Westfield Farm [400 151]. The beds, 2 m of which are exposed, consist of dark grey, thinly bedded limestone with silty partings. The overlying Taynton Stone, about 5 m thick, is cream to yellow weathering, flaggy, cross-bedded oolitic limestones exposed [413 151] west of Grintley Hill. The Hampen Marly Beds, consisting of medium grey clays with bands of shell debris, range in thickness from 3 to 5 m. The junction of the White Limestone with the underlying Hampen Marly Beds is exposed in the Grintley Hill railway cutting [409 153], where water percolating downwards through the limestone forms a strong spring line. The White Limestone ranges from cream coloured, massive, fine grained porcellanous limestone to fine and medium grained oolitic limestone 10 to 13 m thick, with thin marly partings. There is a sparse fauna of bivalves, gastropods, brachiopods and sponges.

Forest Marble

The Forest Marble ranges in thickness from 5 to 12 m and consists of cross-bedded shelly oolitic limestone interbedded with bluish grey clay. The limestones are variable in appearance, ranging from massively bedded oolitic limestone in the Hanborough Station cutting [430 145], to thinly laminated sandy limestone, as in Tolleys New Quarry, Bladon [450 150].

Cornbrash

The Cornbrash consists of shelly rubbly limestone, forming gently inclined upland flats with reddish brown stone brash soil. The sequence mainly comprises the Lower Cornbrash, the Upper Cornbrash being less than 0.5 m thick.

Kellaways Beds

The Kellaways Beds range in thickness from 5 to 15 m and comprise Kellaways Clay overlain by Kellaways Sand. They are seldom exposed, but the basal beds are visible in Hanborough Quarry [417 145] where the Cornbrash is succeeded by unfossiliferous blue clay. The Kellaways Sand is a bluish grey, clayey, fine sand weathering yellowish brown.

Oxford Clay

Oxford Clay, which is up to 105 m thick, forms the bedrock in the central part of the area. The main outcrops are along the Thames Valley and the lower reaches of the Windrush and Evenlode valleys. The Oxford Clay is a bluish grey clay with occasional siltstone bands; it is exposed at Browns Gravel Pit, Stanton Harcourt [419 043], where pyritic fossils, including ammonites and bivalves, have been found.

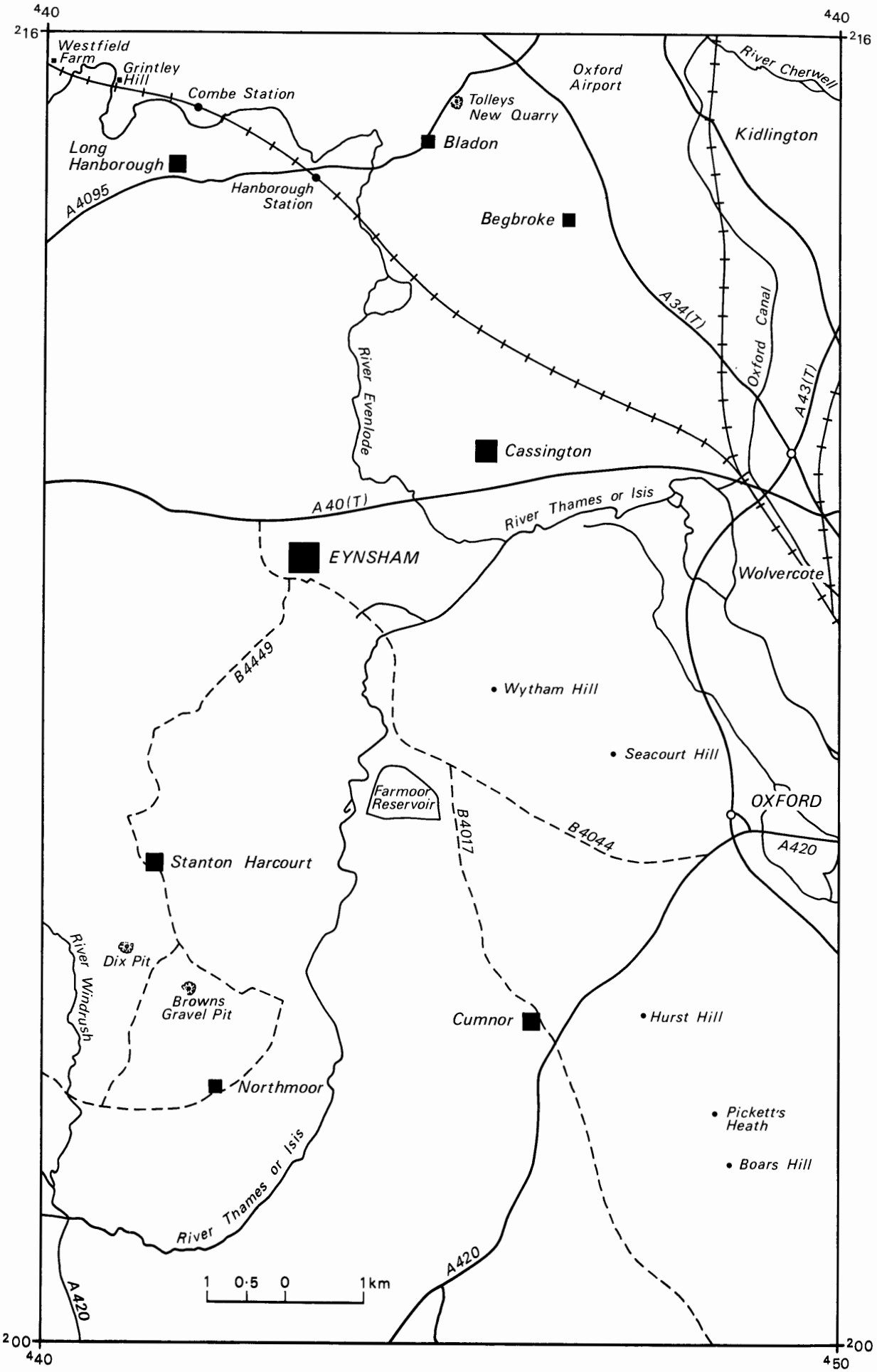


Fig. 2. Locality map

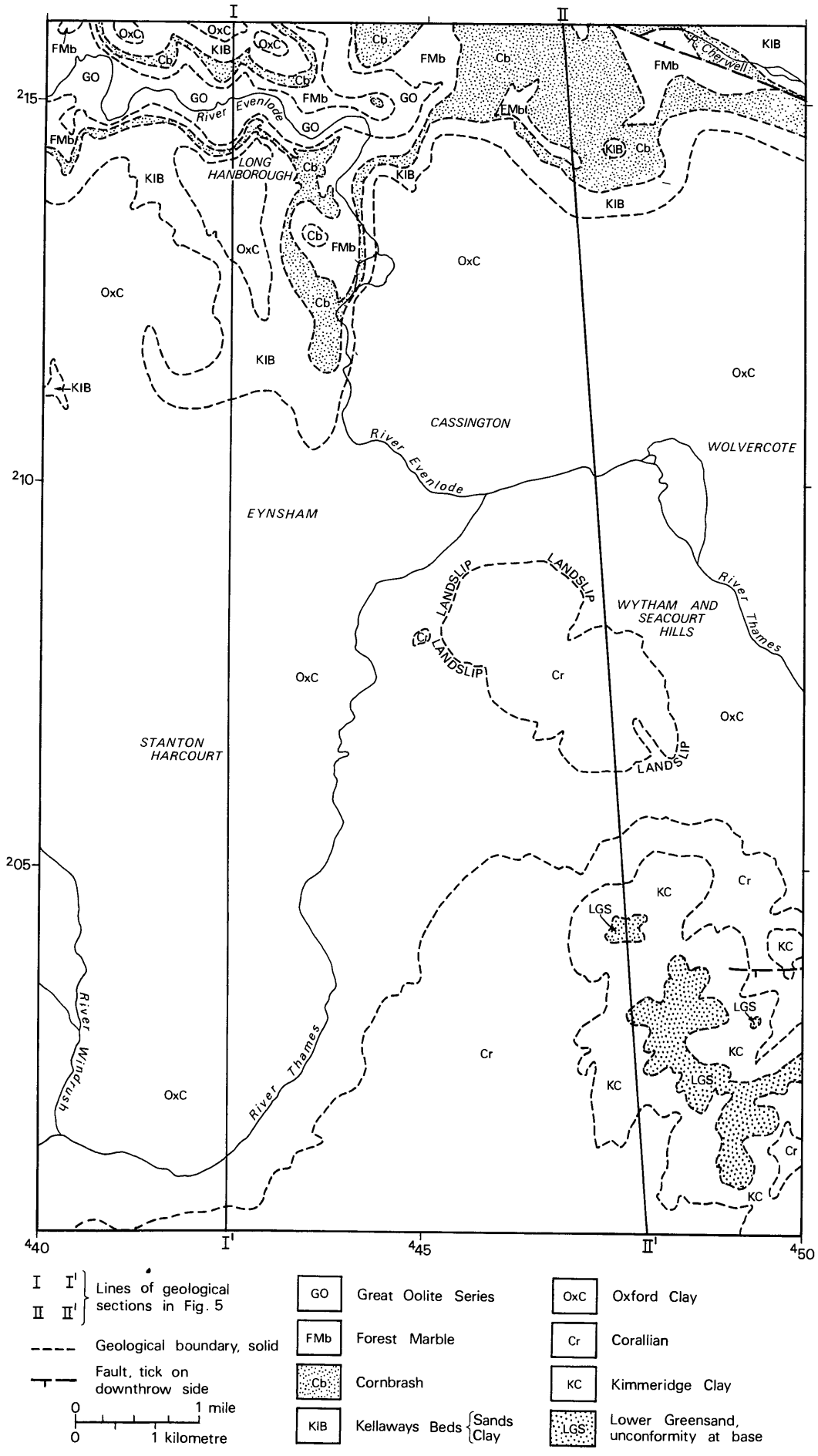


Fig. 3. Solid geology

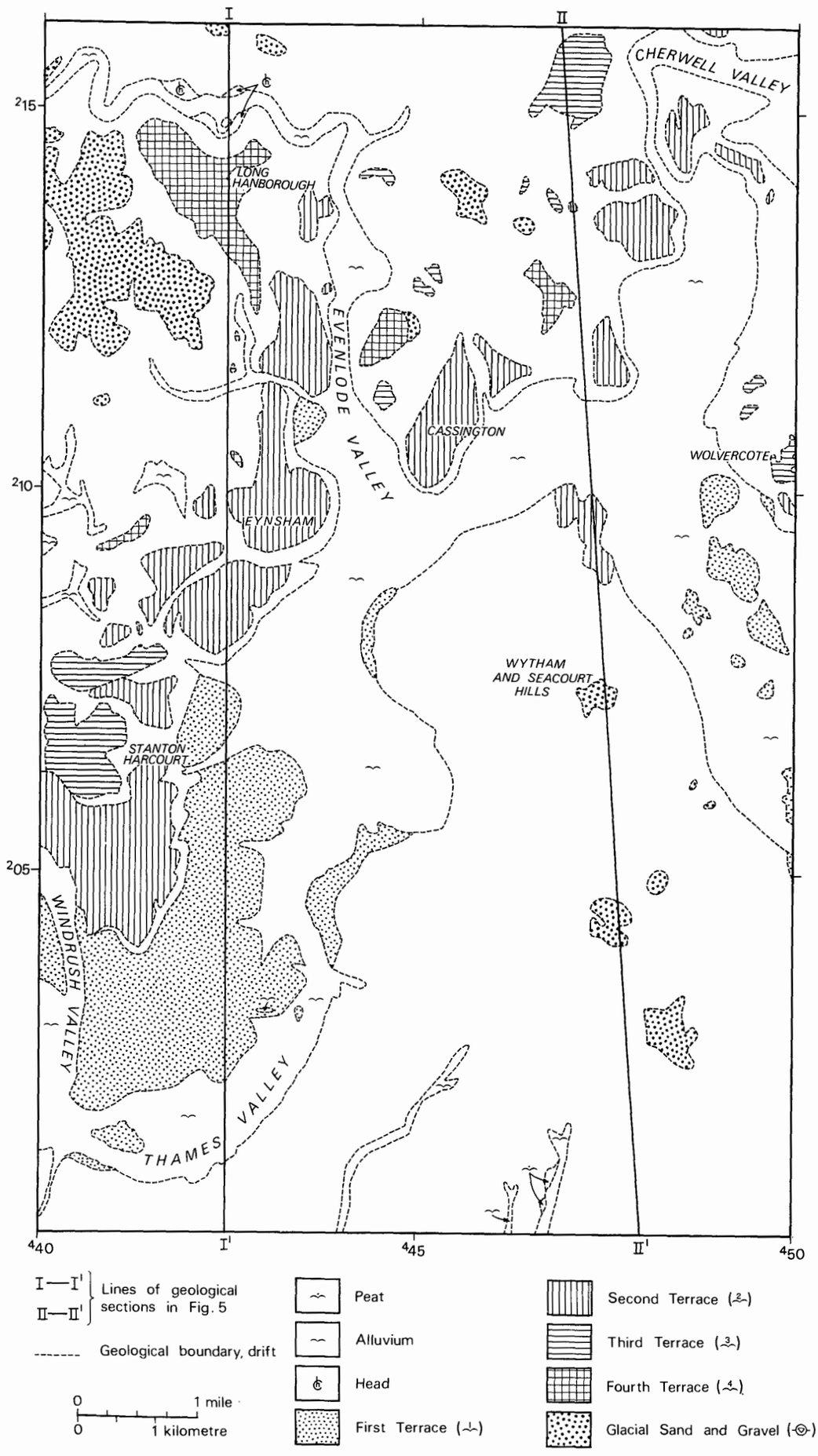


Fig. 4. Drift deposits

Table 1. Classification and thicknesses of the solid and drift deposits.

		Maximum thickness (m)
DRIFT		
Recent and Pleistocene:	Peat	not known
	Alluvium	2.5
	Head	not known
River Terrace Deposits	First Terrace (Northmoor) 1A 1B	6.6
	Second Terrace (Summertown-Radley) 2A 2B	5.1
	Third Terrace (Wolvercote)	1.5
	Fourth Terrace (Hanborough)	1.9
	Boulder Clay	not known
	Glacial Sand and Gravel	2.5
	Sand and Gravel of Unknown Age	not known
SOLID		
Cretaceous:	Lower Greensand	15.0
	Kimmeridge Clay	2.0
	Corallian	30.0
	Oxford Clay	105.0
	Kellaways Beds	15.0
	Cornbrash	3.0
	Forest Marble	12.0
Great Oolite 'Series'	White Limestone	13.0
	Hampen Marly Beds	5.0
	Taynton Stone	5.0
	Stonesfield Slate Beds	2.0+ + base not reached

Corallian

The Corallian consists of a variable series of sands, sandy, oolitic and pisolitic limestones and beds of rubbly coral rock. In this calcareous-arenaceous facies two broad subdivisions, the Lower and Upper Corallian, are recognised. The Lower Corallian is 20 m thick and forms a prominent escarpment south of the Oxford Clay vale. Lithologically, it consists of dark grey silty clay passing up into grey calcareous sandy silt and finally into the Lower Calcareous Grit, a brown to yellow calcareous sand with doggers and beds of sandstone. The Upper Corallian, or Coral Rag, which is 10 m thick, forms the crest of the Corallian escarpment and the outliers of Wytham and Seacourt Hills [473 072]. It consists of rubbly, fossiliferous, cream to white shelly limestone and hard white shell fragmental limestones with occasional sandy or clayey partings.

Kimmeridge Clay

The Kimmeridge Clay lies on the dip slope of the Corallian escarpment in the south-east and consists of dark grey, brown-weathering shaly clay up to 2 m thick.

Lower Greensand

Lower Greensand out-crops along the irregular ridge of Hurst Hill and Boar's Hill [486 023] in the south-east. The rocks, consisting of coarse, ferruginous sands up to 15 m thick, are well exposed at Chawley

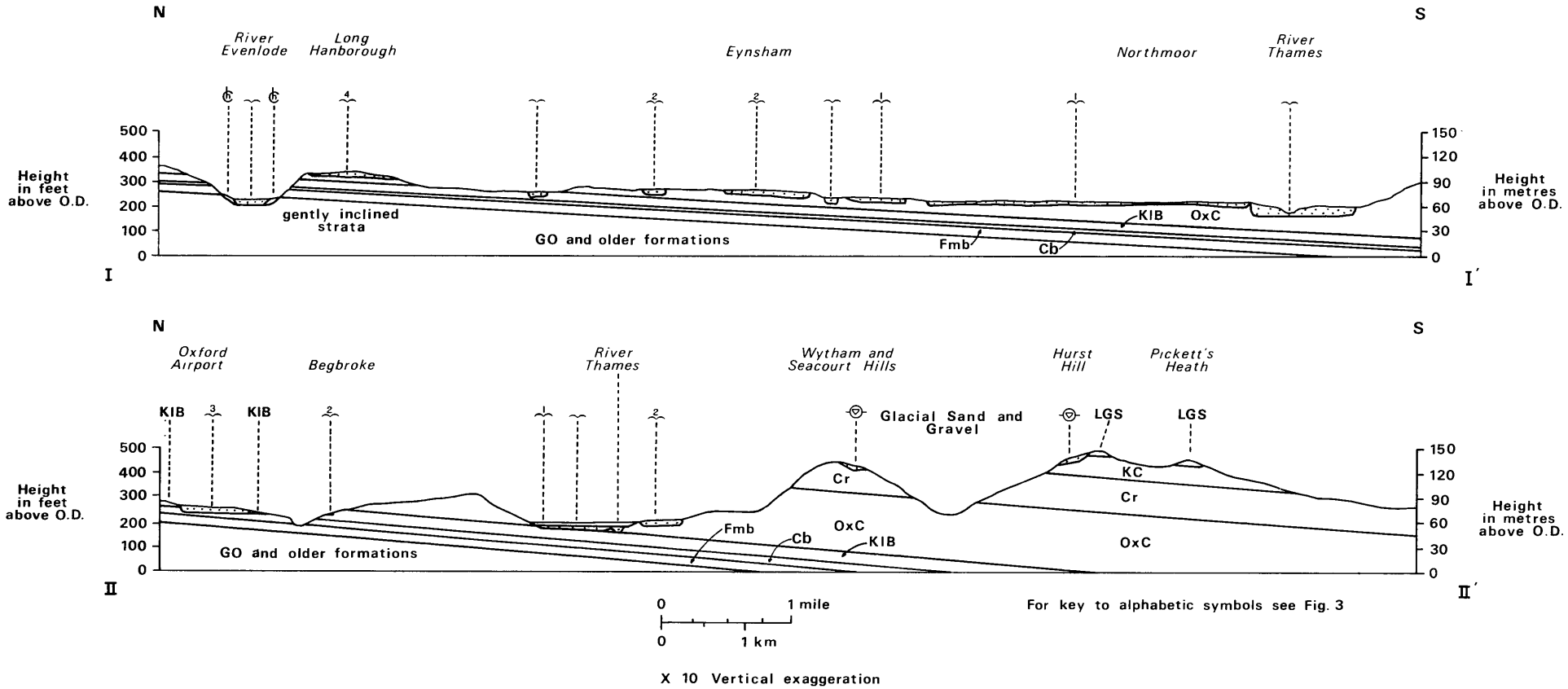


Fig. 5. Diagrammatic sections showing the the general relationship of strata in the area of the resource sheet

Brickyard [473 042] on Hurst Hill.

Sand and Gravel of Unknown Age

In the south-east, there are a few, very small patches of sand and gravel of unknown age which consist of pebbles of quartzite, quartz and flint in a sandy matrix.

Glacial Sand and Gravel

Glacial Sand and Gravel deposits, termed the Coombe and Freeland terraces by Arkell (1947), have been mapped in the area of the Evenlode Gorge lying at about 125 m, some 3 m above the level of the Fourth Terrace (Hanborough). They consist mainly of pebbles of Bunter quartzite, quartz, flint, limestone and ironstone in a matrix of silty, fine to coarse grained sand. Their thickness ranges from 1.0 m to 2.5 m; the mean is 1.6 m (Table 2). The scattered patches of Glacial Sand and Gravel in the south-east are described in the report of the resources of the adjacent Abingdon Sheet area, which overlaps onto this sheet.

Boulder Clay

Three small patches of Boulder Clay have been mapped adjacent to the south-west margin of the Glacial Sand and Gravel deposit on Pickett's Heath.

River Terrace Deposits

The terrace deposits (Figs. 5 and 6) were first described and classified by Sandford (1924) as follows:

	Height above present river level (m)
Fourth Terrace (Hanborough)	21 to 30
Third Terrace (Wolvercote)	9 to 15
Second Terrace (Summertown-Radley)	3 to 7
First Terrace (Floodplain or Northmoor)	0 to 3

As a result of recent mapping by the Institute's Field Staff, (1969-73) the upper surfaces of the First and Second terraces have been subdivided into two aggradational levels designated 1A and 1B, 2A and 2B, based on topographic expression.

Reddish brown sandy loam up to 2 m thick, not separately identified on the map, covers large areas of the Third, Second and First terraces. Its origin is uncertain, but where it is associated with the First Terrace, it may be a remnant of the Older Alluvium of Dines (Richardson and others, 1946).

Table 2. The thicknesses of sand and gravel deposits within the resource sheet area, compiled from Mineral Assessment Unit and Hydrogeological Department records.

Deposit	Boreholes No.	Thickness (m) Range	Mean
Glacial Sand and Gravel	5	1.0 - 2.5	1.6
Fourth Terrace	3	1.0 - 1.9	1.6
Third Terrace	3	1.0 - 2.0	1.5
Second Terrace	15	0.6 - 5.1	2.6
First Terrace	43	1.1 - 6.6	3.3

Fourth Terrace (Hanborough). Remnants of the Fourth Terrace lie north of the River Thames on the western and eastern flanks of the Evenlode Valley (Fig. 4). The largest area lies in the vicinity of Long Hanborough, where the terrace deposits reach a maximum recorded thickness of 4.9 m (Sandford in Pocock, 1926); Mineral Assessment Unit boreholes proved a mean mineral thickness of 1.6 m and a range of 1.0 m to 1.9 m (Table 2). The deposits consist of rounded oolitic limestone pebbles with minor amounts of quartz and flint in a locally cross-bedded sandy matrix.

Third Terrace (Wolvercote). Remnants of the Third Terrace are situated to the north and west of the River Thames (Fig. 4). Mineral Assessment Unit boreholes indicate that the sand and gravel deposits (Table 2) range in thickness from 1.0 m to 2.0 m, with a mean of 1.5 m, and consist of pebbles of oolitic limestone, quartzite, quartz and flint in a predominantly sandy matrix. Sandford (1924) recognised a channel within the terrace deposit which he termed the Wolvercote Channel [498 105]; it is infilled with gravels, overlain by sand, silt and clays.

Second Terrace (Summertown-Radley). Second Terrace deposits occur on the western flanks of the Thames and Evenlode valleys and also in isolated patches along the former course of the River Cherwell, west of Kidlington and Wolvercote (Fig. 4). The sand and gravel deposits range in thickness from 0.6 m to 5.1 m and have a mean of 2.6 m (Table 2). They consist of oolitic limestone with minor amounts of quartzite, quartz and flint in a sandy matrix. Locally, the deposits are consolidated by an iron-rich cement as seen at Dix Pit [411 048], Stanton Harcourt.

First Terrace (Northmoor). First Terrace deposits border the River Thames and its tributaries, the Windrush, Evenlode and Cherwell (Fig. 4). Mineral Assessment Unit boreholes indicate that the sand and gravel deposits are continuous beneath the Alluvium of the main valley, where Sandford (1924) has shown the existence of a buried channel. These deposits range in thickness from 1.1 m to 6.6 m, with a

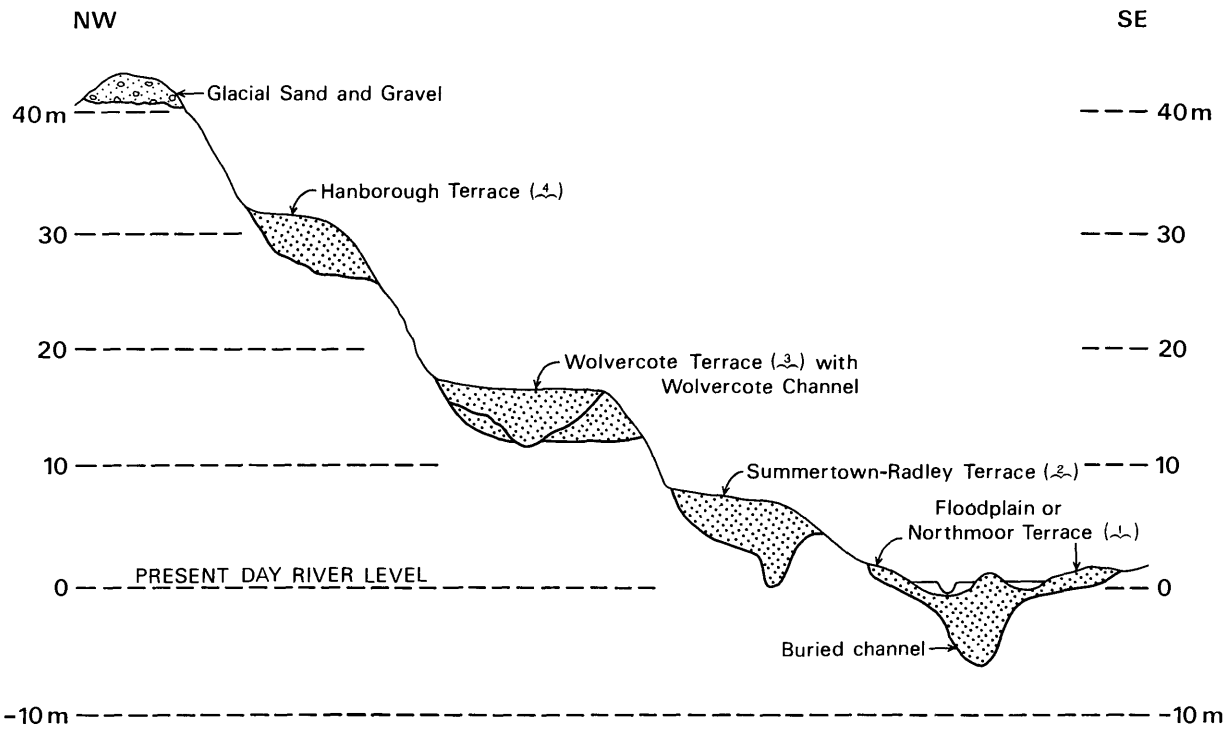


Fig. 6. Diagrammatic section of the drift deposits of the Upper Thames near Oxford (modified from Sandford, 1924)

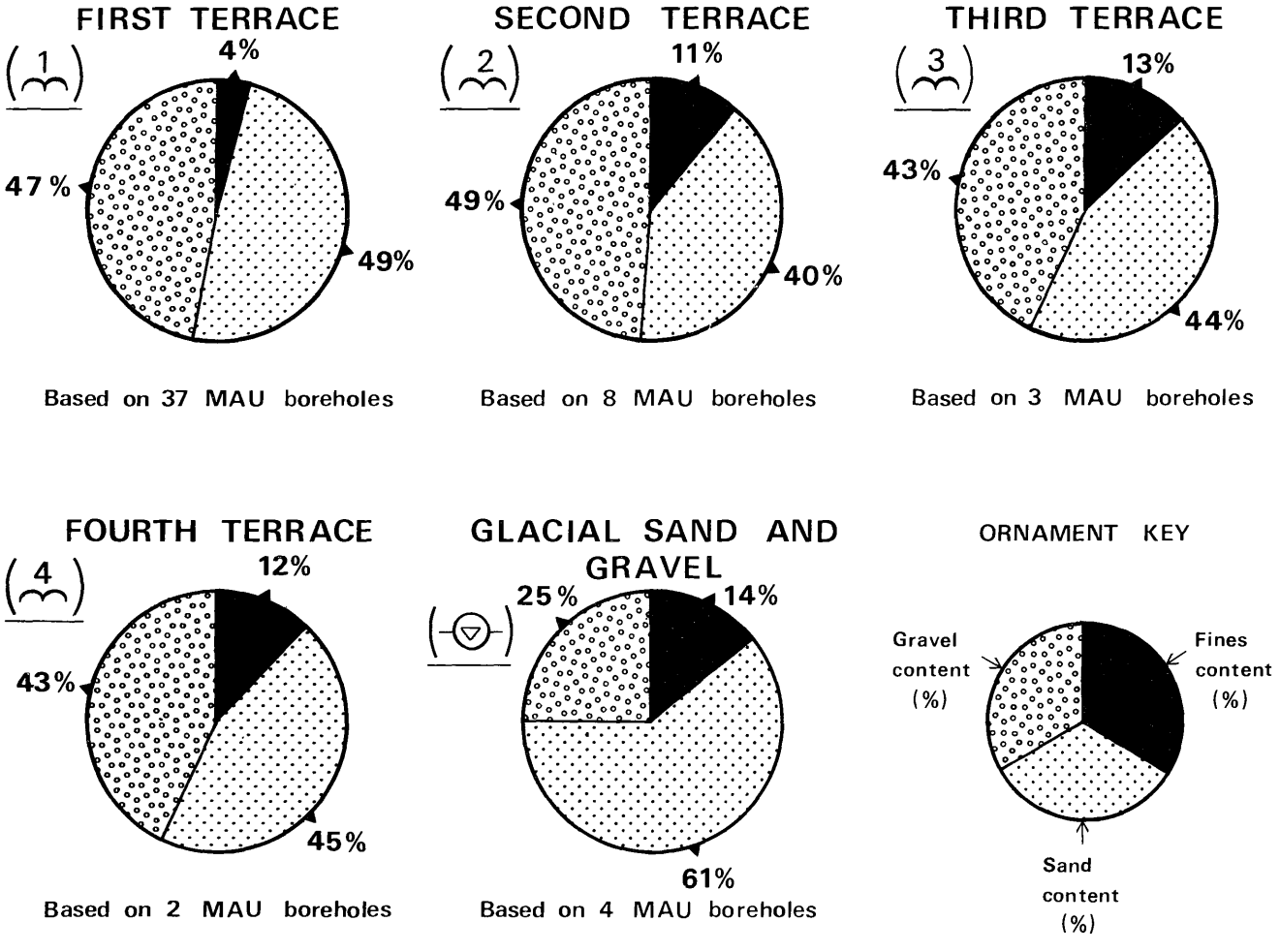


Fig. 7. Mean grading of the sand and gravel deposits of the resource sheet area

mean of 3.3 m (Table 2) and consist of pebbles of oolitic limestone with minor amounts of quartz and flint in a sandy matrix.

Head

Head is recognised in the Evenlode Valley blanketing the lower parts of the valley sides. It consists of unsorted pebbles of limestone, quartz and flint, set in a matrix of reddish brown clayey sand, as seen near the entrance to Wallace's Quarry [419 148].

Alluvium

Alluvium occurs as a continuous deposit along the floor of the present-day river valleys, where it rests on solid formations and river gravels. It consists of humic silts and clays ranging in thickness from 0.3 to 2.5 m with a mean of 1.0 m.

Peat

Two small patches of peat are present to the west of Sandford Brook in the extreme south of the area [467 007, 465 004].

COMPOSITION OF THE SAND AND GRAVEL

The potentially workable sand and gravel is found in the River Terrace Deposits (resource blocks A to G) and the Glacial Sand and Gravel (resource block H), the gradings for which are illustrated in Figs. 7 and 8. The mean gravel content in the Third and Fourth terraces is 43 per cent, in the First Terrace 47 per cent and in the Second Terrace 49 per cent. The mean sand content in the Second Terrace is 43 per cent, in the Third Terrace 44 per cent, in the Fourth Terrace 45 per cent and in the First Terrace 49 per cent. The mean fines content of the Third Terrace is 13 per cent, the Fourth Terrace 12 per cent, the Second Terrace 11 per cent and the First Terrace 4 per cent.

The grading of the Glacial Sand and Gravel shows a marked contrast with that of the River Terrace Deposits; the mean gravel content is lower at 25 per cent, the mean sand content is higher at 61 per cent and the mean fines content is 14 per cent (Figs. 7 and 8). There is a general relationship between the fines content of the terraces and the topography in that deposits at higher levels generally have a higher fines content. There is, however, some variation within each terrace in different areas. The grading characteristics of the sand and gravel deposits at each borehole are shown in Fig. 9 which demonstrates that the Thames Valley deposits are predominantly sandy gravel, while, the deposits of the Windrush and Evenlode are mainly gravel. The coarser deposits contributed by the Evenlode upgrade the deposits in the Thames Valley to predominantly gravel for a distance of 5 km below the confluence. This effect dies out west of Oxford where the grading is again sandy gravel. The River Terrace Deposits along the former course of the River Cherwell (approximately the present Oxford Canal) are predominantly sandy gravel.

The Glacial Sand and Gravel is characterised by a variation in grading from pebbly sand and 'clayey' pebbly sand to 'clayey' sandy gravel. The contrast in particle size distribution between the glacial and river deposits is shown in Fig. 10, where the cumulative frequency curve for the former (Block H) deviates significantly from those for the latter (blocks A to G).

The gravels of the River Terrace Deposits (First to Fourth) consist dominantly of sub-rounded to well rounded limestone with subordinate amounts of well rounded quartz, quartzite, flint, sandstone and ironstone. The gravel of the Glacial Sand and Gravel is dominantly of subangular to well rounded flint, quartz and quartzite, with small amounts of limestone, ironstone and sandstone.

THE MAP

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

Geological Data

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

The geological boundaries represent the best available interpretation of the information available at the time of survey. However, it is inevitable, particularly with drift deposits which change rapidly vertically and laterally, that local discrepancies may occur.

Mineral Resource Information

The mineral-bearing ground is subdivided into resource blocks (see Appendix A). The mineral is identified as 'exposed' where the thickness of overburden, commonly consisting only of soil and subsoil, averages not more than 1.0 m (3.5 ft).

Areas where bedrock outcrops are uncoloured on the map. Areas of unassessed sand and gravel, for example, in 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.

RESULTS

The statistical results are summarised in Table 3. Fuller grading particulars are shown in Fig. 10.

Accuracy of the Results

For the seven resource blocks containing River Terrace Deposits the accuracy of the

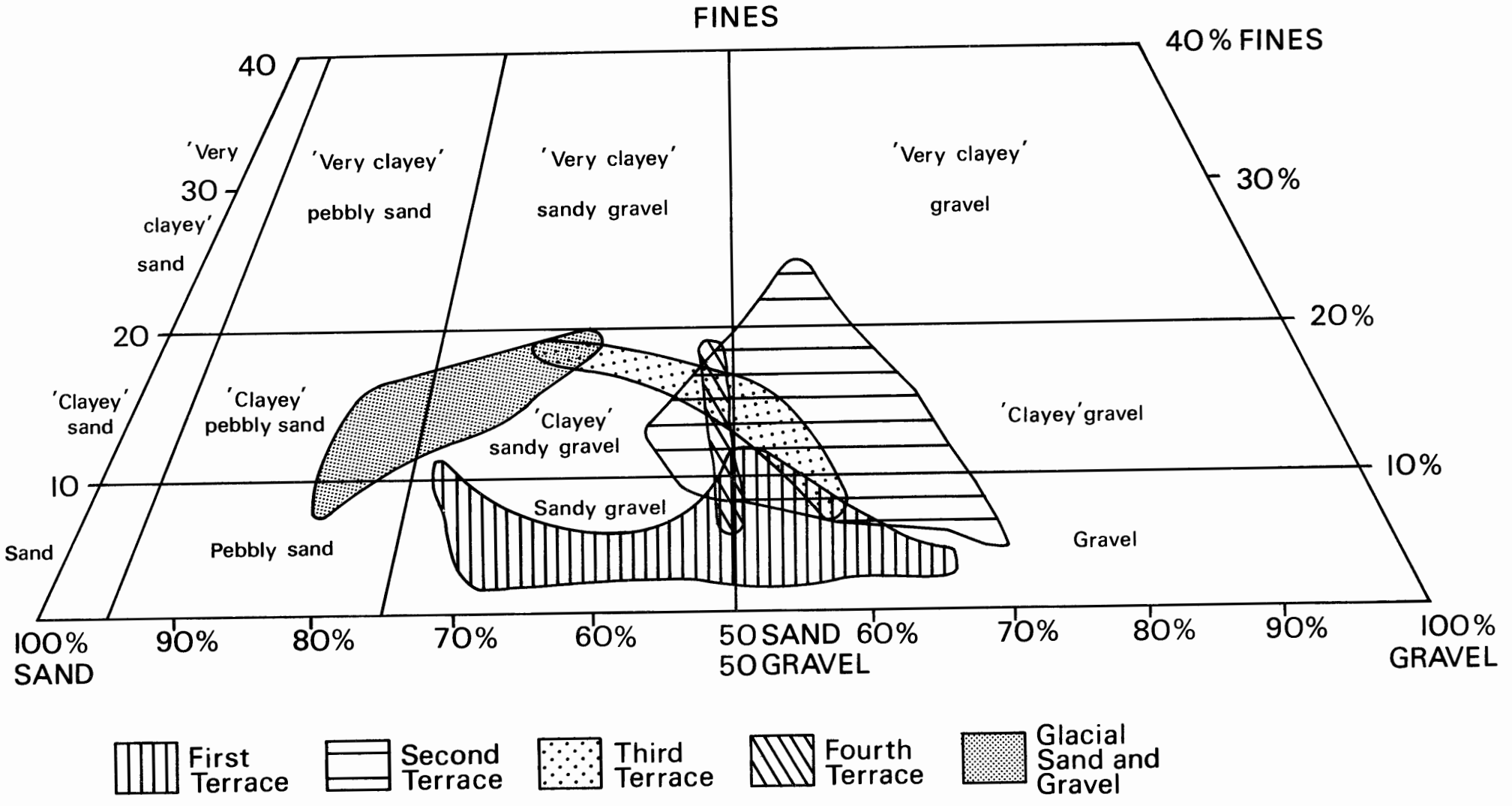


Fig. 8. Diagram showing the range in grading characteristics of the sand and gravel deposits

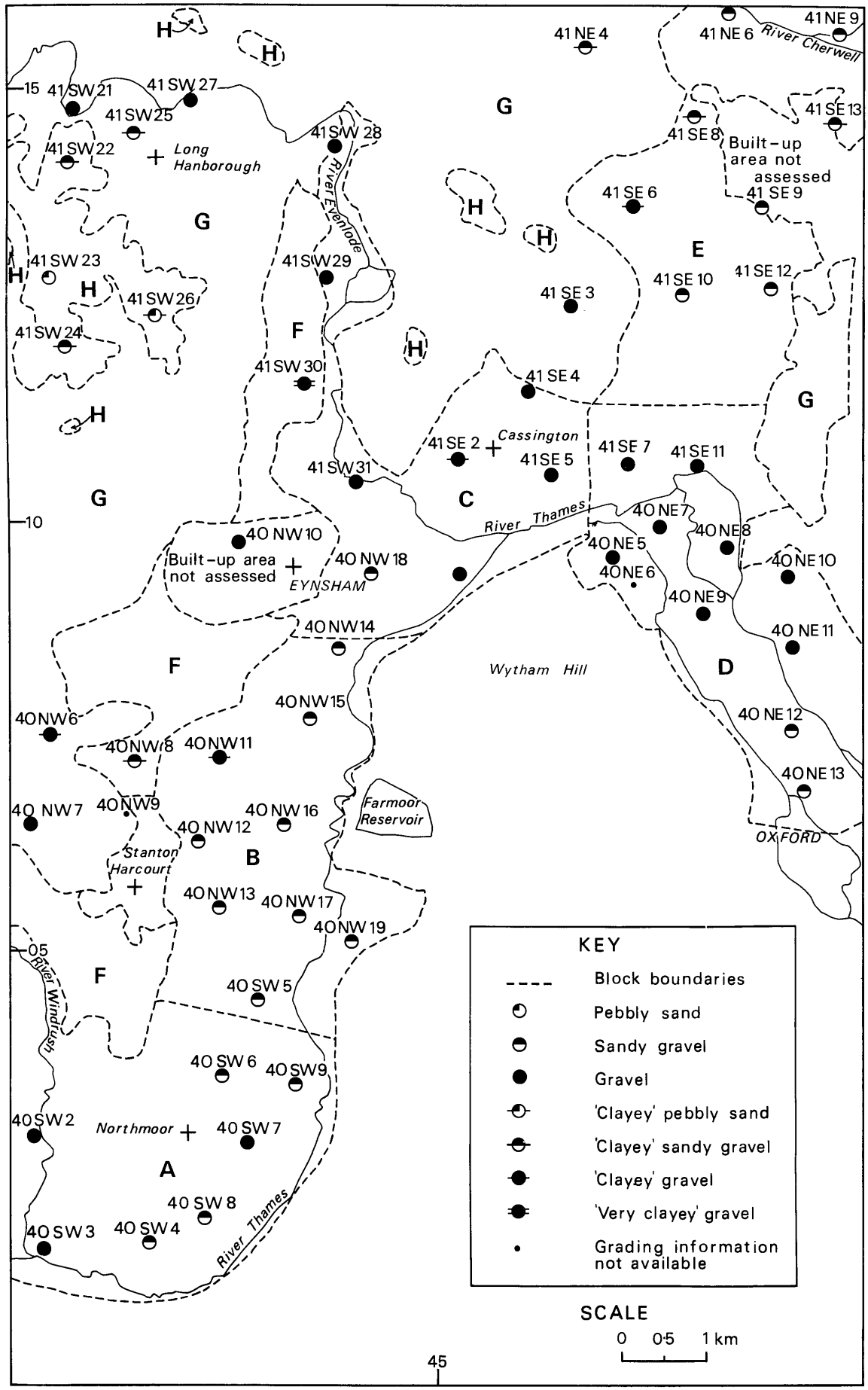


Fig. 9. Grading characteristics of the sand and gravel in the Mineral Assessment Unit boreholes

Table 3. The sand and gravel resources of sheet SP 40 and part of SP 41: summary of statistical results.

Resource block	AREA		MEAN THICKNESS				VOLUME OF MINERAL				MEAN GRADING PERCENTAGE		
	Block	Mineral	Overburden		Mineral		million	million	Limits at 95 per cent confidence level		Fines	Sand	Gravel
	km^2	km^2	m	ft	m	ft	m^3	yd^3	± %	± Volume million m^3	-1/16 mm	-4 +1/16 mm	+4 mm
A	11.4	11.2	0.8	2.5	3.3	11.0	37.1	48.5	28	10.4	3	48	49
B	9.3	9.3	1.1	3.5	2.8	9.0	26.1	34.1	25	6.5	4	56	40
C	8.6	8.0	1.2	4.0	3.6	12.0	28.7	37.5	25	7.2	4	43	53
D	9.5	9.2	0.8	2.5	3.5	11.5	32.1	42.0	23	7.4	2	45	53
E	8.5	6.4	1.0	3.5	2.3	7.5	14.8	19.4	26	3.9	8	52	40
F	8.4	5.0	1.0	3.5	2.3	7.5	11.5	15.1	38	4.4	13	39	48
G	39.9	6.0	1.5	5.0	1.7	5.5	10.2	13.3	24	2.4	10	41	49
H	3.8	3.8	1.0	3.5	1.6	5.0	6.1	8.0	60	3.7	13	65	22
A to H	99.4	59.0	1.0	3.5	2.8	9.0	166.0	217.2	10	16.6	8	48	44

results varies between 23 and 38 per cent and for the Glacial Sand and Gravel of block H it is 60 per cent at the symmetrical 95 per cent probability level (that is, it is probable that 19 times out of 20 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, 200 acres) containing similar sand and gravel deposits if the results from the same number of sample points (as provided by, say, 10 boreholes) were used in 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 10 sample points will be required, even if the area is quite small. This point can be illustrated by considering the whole of the potentially workable sand and gravel on this sheet. The volume (166 million m^3) can be estimated to limits of $\pm$ 10 per cent at the 95 per cent probability level, by a calculation based on the data from 78 sample points spread across the eight resource blocks.

However, it must be emphasised that the quoted volume of sand and gravel has no simple relationship with the amount that could be extracted in practice, as no allowance has been made in the calculations for any restraints (such as existing buildings and roads) on the use of the land for mineral working. The area and estimated volume of worked out sand and gravel deposits within the resource blocks are shown in Table 4.

Table 4. Area and estimated volume of worked out sand and gravel deposits.

A. BY RIVER TERRACE DEPOSITS	Area (km^2)	Volume (million m^3)
Terrace 1	0.58	1.62
Terrace 2	1.37	3.84
Terrace 3	0.01	0.03
Terrace 4	0.43	1.20
B. BY RESOURCE BLOCKS		
Block A	0.23	0.65
Block B	-	-
Block C	0.27	0.77
Block D	0.30	0.82
Block E	0.14	0.39
Block F	0.98	2.73
Block G	0.47	1.33
Block H	-	-
Totals	2.39	6.69

NOTES ON RESOURCE BLOCKS A to H

The area is divided into eight resource blocks in which the area of mineral varies from 3.8 km^2 to 11.2 km^2 (Table 3). As far as possible, the block boundaries were determined by geological considerations. The River Terrace Deposits (blocks A to G) are separated from the Glacial Sand and Gravel (block H). Blocks A and B contain First Terrace deposits only, blocks C, D and E First and Second Terrace deposits and block F Second Terrace deposits only. Block G contains all the outcrops of the Third and Fourth terraces and small patches of the First and Second terraces. The mineral of blocks A to D extends over 37.7 km^2 (64 per cent of the mineral outlined), has a mean thickness of 3.3 m and represents approximately 75 per cent of the resource by volume. The mineral of blocks E and F has a mean thickness of 2.3 m and that of blocks G and H only 1.6 m.

Block A

This block extends over an area of 11.4 km^2, (of which 11.2 km^2 is mineral bearing) on the northern bank of the River Thames, near its confluence with the River Windrush and within a 2 km radius of Northmoor village. It is a low-lying agricultural area sloping gently towards the River Thames from 70 m (230 ft) in the north-west to 62 m (204 ft) in the east. The bedrock is Oxford Clay. Sand and gravel has been worked at Brown's Pit [419 043], but there are no active workings (Table 4).

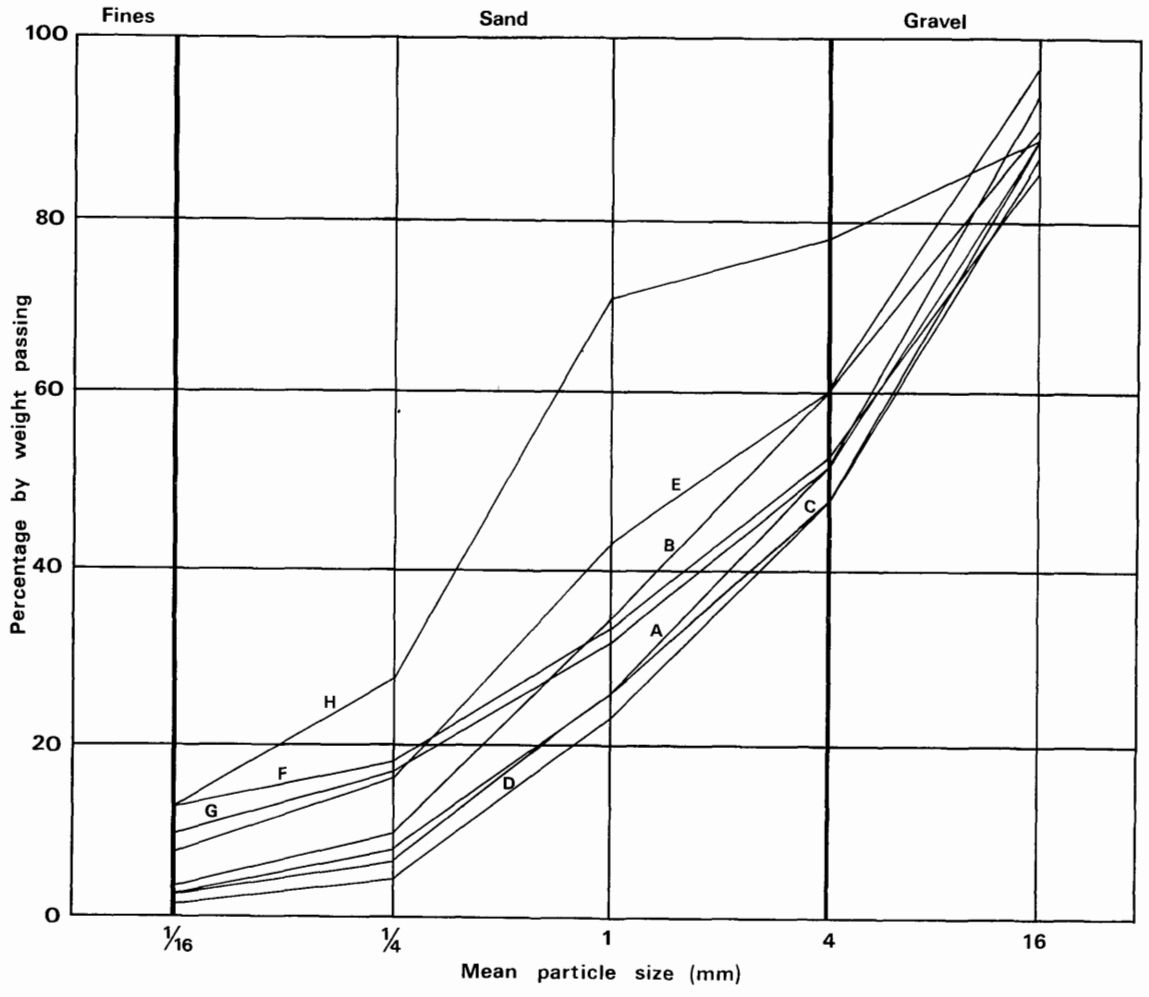
The assessment is based on seven Mineral Assessment Unit boreholes, one Hydrogeological Department record and 159 other boreholes. The mean thickness of mineral is 3.3 m; the range is from 1.3 m to 6.6 m, the latter figure proved in borehole 40 SW 2. The estimated volume of mineral is 37 million m^3 $\pm$ 28 per cent at the 95 per cent confidence level. The overburden ranges in thickness from 0.3 m in borehole 40 SW 2 to 1.2 m in borehole 236/251 and has a mean of 0.8 m. It usually consists of silty clay.

The grading results (Table 5) indicate a range in overall classification from sandy gravel in boreholes 40 SW 4, 6, 8 and 9, to gravel in boreholes 40 SW 3 and 7. The fines content is consistently low, ranging from 2 per cent in borehole 40 SW 3, 4 and 7 to 4 per cent in borehole 40 SW 8. The sand content varies from 39 per cent in borehole 40 SW 2 to 58 per cent in borehole 40 SW 6, with the coarse fraction predominating. The gravel content varies from 39 per cent in borehole 40 SW 6 to 57 per cent in borehole 40 SW 2. It consists of subrounded limestone with minor amounts of quartz and flint. The mean grading for the block is fines 3 per cent, sand 48 per cent and gravel 49 per cent.

Block B

Block B comprises 9.3 km^2 of mineral which extends northwards from block A, mainly along the western bank of the River Thames. The land is low lying with a gentle easterly slope falling from 64 m (210 ft) in the north-west to 61 m (200 ft) in the east. The bedrock is Oxford Clay, but it is nowhere exposed due to the overlying First Terrace and Alluvium deposits. There are no mineral workings in the area (Table 4).

The assessment is based on nine Mineral Assessment Unit boreholes, one Hydrogeological Department record and 37 other boreholes. The



Block	Percentage by weight passing				
	1/16 mm	$\frac{1}{4}$ mm	1 mm	4 mm	16 mm
A	3	7	25	51	93
B	4	10	34	60	96
C	4	8	25	47	86
D	2	5	23	47	87
E	8	16	42	60	89
F	13	18	33	52	85
G	10	17	31	51	88
H	13	27	70	78	88

Fig. 10. Particle size distribution for the assessed thickness of mineral in resource blocks A to H

mineral ranges in thickness from 1.2 m in borehole 236/7a to 4.5 m in borehole 40 NW 16 and has a mean of 2.8 m. The estimated volume of mineral is 26 million m^3 ± 25 per cent at the 95 per cent confidence level. The mean thickness of overburden, mainly silty clay, is 1.1 m; the range is from 0.5 m in borehole 40 NW 13 to 2.5 m in borehole 40 NW 14.

The grading results (Table 6) indicate 'clayey' gravel in borehole 40 NW 11 and sandy gravel in all the other boreholes. The fines content varies from 1 per cent in borehole 40 NW 15 to 12 per cent in borehole 40 NW 11. The sand content ranges from 43 per cent in borehole 40 NW 11 to 65 per cent in borehole 40 NW 19 with coarse sand predominating over fine sand. It consists of limestone and quartz. The gravel content shows a narrower range, from 33 per cent in borehole 40 NW 19 to 45 per cent in borehole 40 NW 11. It consists of limestone with minor amounts of flint and shell debris. The mean grading for the block is fines 4 per cent, sand 56 per cent and gravel 40 per cent.

Block C

Block C is a northward extension of block B, extending over an area of 8.6 km^2 (8.0 km^2 of which is mineral bearing) along the northern bank of the River Thames and the lower reaches of the River Evenlode. The land lies at 59 m (194 ft) near the confluence of the rivers Thames and Evenlode and rises gradually to 69 m (227 ft) at the northern limit of the block. In the Thames Valley, the bedrock is Oxford Clay, but in the Evenlode Valley, progressively older beds appear towards the north, the oldest being the White Limestone. The sand and gravel is predominantly of the First Terrace; there are small patches of Second Terrace deposits to the north of the Thames-Evenlode confluence. No mineral workings are present in the First Terrace, but the Second Terrace has been extensively exploited (Table 4) in the vicinity of Cassington [450 100]. There were no active mineral workings during the survey.

The assessment is based on eight Mineral Assessment Unit boreholes and two Hydrogeological Department records. The mineral ranges in thickness from 1.3 m in borehole 41 SE 4 to 5.2 m in borehole 40 NW 18 and has a mean of 3.6 m. The estimated volume of mineral is 29 million m^3 ± 25 per cent at the 95 per cent confidence level. The overburden averages 1.2 m in thickness and ranges from 0.7 m in boreholes 40 NW 18 and 41 SW 29 to 2.2 m in boreholes 41 SE 4 and 41 SW 28; it consists of clay and silty clay.

The grading results (Table 7) indicate a range in the classification of the mineral from 'clayey' gravel in borehole 41 SE 2, and sandy gravel in borehole 40 NW 18 to gravel in the remaining boreholes. The fines content varies from 2 per cent in boreholes 41 SE 5 and 40 NE 4 to 8 per cent in borehole 41 SE 2. The sand content varies from 29 per cent in borehole 41 SE 4 to 49 per cent in borehole 41 SE 2. About half of the sand is coarse grained and consists of limestone and quartz. The gravel content varies from 43 per cent in borehole 41 SE 2 to 67 per cent in borehole 41 SE 4. It is subrounded limestone with minor amounts of quartz, flint, ironstone and shell debris. The mean grading for the block is fines 4 per cent, sand 43 per cent and gravel 53 per cent.

Block D

Block D occupies an area of 9.5 km^2 (9.2 km^2 of which is mineral bearing) and extends along the Thames Valley between Wolvercote and Oxford. It embraces a low-lying area with a gentle southerly gradient from 59 m (194 ft) in the north to 57 m (187 ft) in the south. The bedrock is Oxford Clay. The sands and gravels are mainly First Terrace deposits and there are two small areas of Second Terrace deposits in the north-west of the block. Both terraces have been worked for mineral (Table 4) to the north of Wolvercote [487 104, 477 113], but there are no present-day workings.

The assessment is based on 11 Mineral Assessment Unit boreholes (Table 8), one Hydrogeological Department record and 27 other boreholes. The mineral thickness ranges from 2.2 m in borehole 40 NE 5 to 5.5 m in borehole 40 NE 7; the mean is 3.5 m. The estimated volume of mineral is 32 million m^3 ± 23 per cent at the 95 per cent confidence level. The overburden averages 0.8 m in thickness and ranges from soil only in borehole 236/189b to 1.9 m in borehole 41 SE 7; it consists of silty clay.

Grading results (Table 8) indicate a range from sandy gravel in the south, in boreholes 40 NE 12 and 40 NE 13, to gravel in all the other boreholes. The fines content varies from 1 per cent in borehole 40 NE 7 to 6 per cent in borehole 40 NE 5. The sand content varies from 38 per cent in borehole 40 NE 5 to 51 per cent in borehole 40 NE 12; about half of the sand is coarse grained. It consists of limestone with minor amounts of quartz, flint and ironstone. The gravel content varies from 47 per cent in borehole 40 NE 12 to 56 per cent in borehole 40 NE 5. It is limestone with minor amounts of quartz, flint and shell debris. The mean grading for the block is fines 2 per cent, sand 45 per cent and gravel 53 per cent.

Block E

Block E extends over an area of 8.5 km^2, 6.4 km^2 of which is mineral bearing; much of the ground occupies the divide between the Thames and Cherwell valleys. The highest ground lies at 70 m (230 ft) in the central part of the block and it slopes away gently towards the north and south, falling to 62 m (204 ft) in the Cherwell Valley and to 60 m (197 ft) in the Thames Valley. The southern half of the block is underlain by Oxford Clay, but towards the north, progressively older rocks appear, the oldest being Forest Marble. First Terrace deposits occur in the north and east, and patches of Second Terrace deposits in the west. Mineral workings are restricted to the Second Terrace deposits around Begbroke [482 130, 475 140] and

Table 5. Data from Mineral Assessment Unit boreholes: block A.

Borehole No.	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines	Fine sand	Medium sand	Coarse sand	Fine gravel	Coarse gravel
			-1/16 mm	-$\frac{1}{4}$+1/16 mm	-1+$\frac{1}{4}$ mm	-4+1 mm	-16+4 mm	+16 mm
SP 40 SW 2	6.6	0.3	4	3	13	23	47	10
SP 40 SW 3	2.9	1.0	2	4	16	24	45	9
SP 40 SW 4	3.0	0.7	2	4	22	24	41	7
SP 40 SW 6	4.5	1.0	3	5	24	29	35	4
SP 40 SW 7	4.2	0.5	2	2	17	30	42	7
SP 40 SW 8	3.3	0.7	4	6	20	23	42	5
SP 40 SW 9	2.8	0.5	3	4	20	25	42	6

Table 6. Data from Mineral Assessment Unit boreholes: block B.

Borehole No.	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines	Fine sand	Medium sand	Coarse sand	Fine gravel	Coarse gravel
			-1/16 mm	-$\frac{1}{4}$+1/16 mm	-1+$\frac{1}{4}$ mm	-4+1 mm	-16+4 mm	+16 mm
SP 40 NW 11	3.5	0.9	12	8	16	19	36	9
SP 40 NW 12	3.0	1.0	3	6	30	24	32	5
SP 40 NW 13	2.7	0.5	6	9	21	27	34	3
SP 40 NW 14	2.5	2.5	3	5	21	28	39	4
SP 40 NW 15	4.2	1.4	1	3	26	27	41	2
SP 40 NW 16	4.5	0.7	3	6	25	26	36	4
SP 40 NW 17	3.4	0.8	2	4	23	28	37	6
SP 40 NW 19	1.5	1.0	2	7	31	27	31	2
SP 40 SW 5	3.2	1.0	3	5	26	31	33	2

Table 7. Data from Mineral Assessment Unit boreholes: block C.

Borehole No.	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines	Fine sand	Medium sand	Coarse sand	Fine gravel	Coarse gravel
			-1/16 mm	-¼+1/16 mm	-1+¼ mm	-4+1 mm	-16+4 mm	+16 mm
SP 41 SW 28	2.4	2.2	3	3	20	22	37	15
SP 41 SW 29	3.0	0.7	3	3	13	21	38	22
SP 41 SW 31	4.0	1.0	3	2	14	21	42	18
SP 41 SE 2	5.1	1.1	8	7	22	20	33	10
SP 41 SE 4	1.3	2.2	4	3	12	14	44	23
SP 41 SE 5	4.6	1.2	2	4	21	21	38	14
SP 40 NW 18	5.2	0.7	4	5	17	27	38	9
SP 40 NE 4	3.2	1.1	2	2	11	24	47	14

Table 8. Data from Mineral Assessment Unit boreholes: block D.

Borehole No.	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines	Fine sand	Medium sand	Coarse sand	Fine gravel	Coarse gravel
			-1/16 mm	-¼+1/16 mm	-1+¼ mm	-4+1 mm	-16+4 mm	+16 mm
SP 41 SE 7	4.0	1.9	2	3	16	27	38	14
SP 41 SE 11	3.6	1.3	2	3	18	22	38	17
SP 40 NE 5	2.2	0.8	6	4	14	20	40	16
SP 40 NE 7	5.5	0.6	1	3	19	26	39	12
SP 40 NE 8	4.2	1.6	3	3	16	24	40	14
SP 40 NE 9	4.1	0.8	2	2	20	22	42	12
SP 40 NE 10	3.4	0.6	2	3	19	21	44	11
SP 40 NE 11	4.3	0.3	3	3	14	25	41	14
SP 40 NE 12	3.6	0.9	2	4	23	24	40	7
SP 40 NE 13	3.9	0.7	2	3	22	25	40	8

Table 9. Data from Mineral Assessment Unit boreholes: block E.

Borehole No.	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines	Fine sand	Medium sand	Coarse sand	Fine gravel	Coarse gravel
			-1/16 mm	-$\frac{1}{4}$+1/16 mm	-1+$\frac{1}{4}$ mm	-4+1 mm	-16+4 mm	+16 mm
SP 41 NE 6	1.5	0.5	8	7	27	14	31	13
SP 41 NE 9	1.3	1.4	6	8	28	17	38	3
SP 41 SE 6	3.1	1.4	10	7	19	17	31	16
SP 41 SE 8	3.0	0.6	13	11	20	18	28	10
SP 41 SE 9	2.0	0.8	3	9	34	15	26	13
SP 41 SE 10	4.1	0.7	4	4	25	24	30	13
SP 41 SE 12	2.8	1.0	6	8	32	19	27	8
SP 41 SE 13	1.1	1.4	11	13	38	14	20	4

Table 10. Data from Mineral Assessment Unit boreholes: block F.

Borehole No.	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines	Fine sand	Medium sand	Coarse sand	Fine gravel	Coarse gravel
			-1/16 mm	-$\frac{1}{4}$+1/16 mm	-1+$\frac{1}{4}$ mm	-4+1 mm	-16+4 mm	+16 mm
SP 41 SW 30	1.1	0.8	25	11	11	10	16	27
SP 40 NW 10	2.0	1.9	9	3	13	17	37	21
SP 40 NW 8	2.4	1.3	11	4	19	24	38	4

Yarnton [476 115]; they are disused (Table 4).

The assessment is based on eight Mineral Assessment Unit boreholes, two Hydrogeological Department records and 30 other boreholes. The mineral ranges in thickness from 1.1 m in borehole 41 SE 13 to 4.1 m in borehole 41 SE 10 and has a mean of 2.3 m. The estimated volume of mineral is 15 million m^3 ± 26 per cent at the 95 per cent confidence level. The overburden ranges in thickness from 0.5 m in borehole 41 NE 6 to 1.9 m in borehole 236/142 and has a mean of 1.0 m. It consists of silty clay.

Grading results (Table 9) indicate a range in mineral classification from 'clayey' sandy gravel in boreholes 41 SE 13 and 41 SE 8 and 'clayey' gravel in 41 SE 6 to sandy gravel in all the other boreholes. The fines content varies from 3 per cent in borehole 41 SE 9 to 13 per cent in borehole 41 SE 8. The sand content varies from 43 per cent in borehole 41 SE 6 to 65 per cent in borehole 41 SE 13; about half of the sand is medium grained. It consists of limestone with quartz and flint. The gravel content varies from 24 per cent in borehole 41 SE 13 to 47 per cent in borehole 41 SE 6. It consists of subrounded limestone with minor amounts of quartz and flint. The mean grading for the block is fines 8 per cent, sand 52 per cent and gravel 40 per cent.

Block F

Block F, in three parts, extends over an area of 8.4 km^2 in the west of the resource sheet, where it includes Second Terrace deposits in the western banks of the Thames and Evenlode valleys. Mineral covers an area of 5 km^2. The ground slopes gently towards the rivers Thames and Evenlode from 76 m (250 ft) in the west to 61 m (200 ft) in the east. South of Eynsham the bedrock is Oxford Clay, but to the north progressively older beds appear, the oldest being Forest Marble. Extensive mineral workings occur to the south-west of Stanton Harcourt [411 042, 402 056]; Data on worked-out areas are presented in Table 4.

The assessment is based on three Mineral Assessment Unit boreholes and 85 other boreholes. The mineral ranges in thickness from 1.1 m in borehole 41 SW 30 to a maximum of 3.7 m; the mean is 2.3 m. The estimated volume of mineral is 11.5 million m^3 ± 38 per cent at the 95 per cent confidence level. The overburden ranges in thickness from 0.4 m to 1.9 m in borehole 40 NW 10 and has a mean of 1.0 m; it consists mainly of silty clay.

Grading results (Table 10) indicate a range in mineral classification from 'very clayey' gravel in borehole 41 SW 30 to 'clayey' sandy gravel in borehole 40 NW 8 and to gravel in borehole 40 NW 10. The fines content varies from 9 per cent in borehole 40 NW 10 to 25 per cent in borehole 41 SW 30. The sand content varies from 32 per cent in borehole 41 SW 30 to 47 per cent in borehole 40 NW 8; coarse grained sand predominates. It consists of limestone with quartz and shell debris. The gravel content varies from 42 per cent in borehole 40 NW 8 to 58 per cent in borehole 40 NW 10. It consists of limestone with minor amounts of quartzite and flint. The mean grading for the resource block is fines 13 per cent, sand 39 per cent and gravel 48 per cent.

Block G

Block G extends over an area of 39.9 km^2, only 6 km^2 of which are mineral bearing. It includes remnants of the Third and Fourth Terrace deposits as well as the First and Second Terrace deposits in the upper reaches of the Evenlode Valley. It is subdivided into three parts: a small area of Third Terrace north of Wolvercote; the Third and Fourth Terrace deposits north of Cassington, along the divide between the Evenlode and Cherwell valleys; the Third and Fourth Terrace deposits west of the Thames and Evenlode valleys. The ground is gently undulating, ranging in height from 61 m (200 ft) north of Wolvercote to 91 m (299 ft) north of Cassington. The bedrock in the south is Oxford Clay, but northwards, progressively older rocks outcrop, the oldest being the Stonesfield Slate, in the north-west corner of the area. The Fourth Terrace deposits have been worked extensively south of Long Hanborough [422 141] and north-west of Cassington [445 120] and the Third Terrace deposits to the north-west of Stanton Harcourt [409 074] (Table 4). There are no present-day workings.

The assessment is based on eight Mineral Assessment Unit boreholes, two Hydrogeological Department records and 26 other boreholes. The mineral ranges in thickness from 1 m in boreholes 40 NW 6 and 41 SE 3 to a maximum of 2.6 m and has a mean of 1.7 m. The estimated volume of mineral is 10.2 million m^3 ± 24 per cent at the 95 per cent confidence level. The overburden, usually silty clay, varies in thickness from 0.2 m in borehole 41 NE 4 to 3.1 m in borehole 41 SW 21 and has a mean of 1.5 m.

Grading results (Fig. 9, Table 11) indicate a range in mineral classification from 'clayey' gravel in borehole 40 NW 6 and 'clayey' sandy gravel in boreholes 41 NE 4 and 41 SW 25, to gravel in the remaining boreholes. The fines content varies from 3 per cent in borehole 41 SW 21 to 19 per cent in borehole 41 NE 4. The sand content varies from 33 per cent in borehole 41 SW 21 to 52 per cent in borehole 41 NE 4; coarse grained sand predominates. The gravel content varies from 29 per cent in borehole 41 NE 4 to 64 per cent in borehole 41 SW 21. It consists of limestone with minor amounts of quartz and flint. The mean grading for the resource block is fines 10 per cent, sand 41 per cent and gravel 49 per cent.

Block H

Block H extends over a mineral-bearing area of 3.8 km^2, and includes eight patches of Glacial Sand and Gravel covering high ground in the north. The largest area (3.2 km^2) underlies the village of Freeland and extends north-westwards. Undulating topography in this area ranges in height from 91 m (299 ft) east of Freeland to 122 m (400 ft) along the western margin of the resource sheet. The bedrock is Oxford Clay,

Table 11. Data from Mineral Assessment Unit boreholes: block G.

Borehole No.	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines	Fine sand	Medium sand	Coarse sand	Fine gravel	Coarse gravel
			-1/16 mm	-¼+1/16 mm	-1+¼ mm	-4+1 mm	-16+4 mm	+16 mm
SP 41 NE 4	1.5	0.2	19	9	21	22	21	8
SP 41 SE 3	1.0	1.5	6	7	20	20	38	9
SP 41 SW 21	1.9	3.1	3	3	9	21	47	17
SP 41 SW 25	1.8	1.6	18	14	14	14	25	15
SP 41 SW 27	2.0	1.5	5	3	10	24	40	18
SP 40 NW 6	1.0	1.1	15	8	16	15	41	5
SP 40 NW 7	2.0	1.9	6	4	15	21	46	8

Table 12. Data from Mineral Assessment Unit boreholes: block H.

Borehole No.	Recorded thickness		Mean grading percentage					
	Mineral (m)	Overburden (m)	Fines	Fine sand	Medium sand	Coarse sand	Fine gravel	Coarse gravel
			-1/16 mm	-¼+1/16 mm	-1+¼ mm	-4+1 mm	-16+4 mm	+16 mm
SP 41 SW 22	1.0	0.7	15	9	42	7	9	18
SP 41 SW 23	2.5	1.7	8	16	52	6	9	9
SP 41 SW 24	1.0	1.0	19	17	22	10	17	15
SP 41 SW 26	1.3	1.0	15	11	44	11	8	11

except in the west where progressively older rocks are exposed on the southern slopes of the Evenlode Valley, the oldest being the Forest Marble. Sand and gravel has not been worked on a commercial scale in this block.

The assessment is based on four Mineral Assessment Unit boreholes and four Hydrogeological Department records. The mineral ranges in thickness from 1 m in boreholes 41 SW 22 and 24 to 2.5 m in borehole 41 SW 23 and has a mean of 1.6 m. The estimated volume of mineral is 6 million m^3 ± 60 per cent at the 95 per cent confidence level. The overburden ranges in thickness from 0.6 m in the boreholes 41 SE Box 1 A to D to 1.7 m in borehole 41 SW 23, and has a mean of 1.0 m. It consists mainly of sandy clay.

Grading results (Fig. 9, Table 12) indicate a wide range from 'clayey' pebbly sand in borehole 41 SW 26 and pebbly sand in borehole 41 SW 23 to 'clayey' sandy gravel in boreholes 41 SW 22 and 24. The fines content varies from 8 per cent in borehole 41 SW 23 to 19 per cent in borehole 41 SW 24. The sand content varies from 49 per cent in borehole 41 SW 24 to 74 per cent in borehole 41 SW 23; medium grained sand predominates. The gravel content varies from 18 per cent in borehole 41 SW 23 to 32 per cent in borehole 41 SW 24 and consists mainly of flint and quartz. The mean grading for the resource block is fines 13 per cent, sand 65 per cent and gravel 22 per cent.

Appendix A: Field and Laboratory Procedures

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

The mineral shown on each 1:25 000 sheet is divided into resource blocks. The arbitrary size selected, 10 km², is a compromise to meet the aims of the survey by providing sufficient sample points in each block. As far as possible the block boundaries are determined by geological boundaries so that, for example, glacial and river terrace gravels are separated. Otherwise division is by arbitrary lines, which may bear no relationship to the geology. The blocks are drawn provisionally before drilling begins.

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

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

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

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

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

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

Appendix B: Statistical Procedure

Statistical Assessment

1. A statistical assessment is made of an area of mineral greater than 2 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 $S_A/S_{\bar{l}_m} \leqslant 1/3$ is assumed in all cases. It follows from equation [2] that

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

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

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

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

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

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

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

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

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

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

per cent.

11. The application of this procedure to a fictitious area is illustrated in Figs. 11 and 12.

Inferred Assessment

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

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

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

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

Appendix C: Classification and Description of Sand and Gravel

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

The terminology commonly used by geologists when describing sedimentary rocks (Wentworth, 1922) is not entirely satisfactory for this purpose. For example, Wentworth proposed that a deposit should be described as a 'gravelly sand' when it contains more sand than gravel and there is at least 10 per cent of gravel, provided that there is less than 10 per cent of material finer than sand (less than 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 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. 13). 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.29).

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

The fairly wide intervals in the scale are consistent with the general level of accuracy of the qualitative assessments of the resource blocks. Three sizes of sand are recognised, fine (−¼ +1/16 mm), medium (−1 +¼ 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 1/16 mm, ¼ 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 13. Classification of gravel, sand and fines

Size limits	Grain size description	Qualification	Primary classification
64 mm	Cobble		Gravel
16 mm	Pebble	Coarse	
		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	MAU boreholes
SE 18	1	3.3	3.3	5.8	5.8	
SE 20	1	nil	-	6.9	6.9	
SE 22	1	0.7	0.7	6.4	6.4	
SE 23	1	6.2	6.2	4.1	4.1	
SE 24	1	4.3	4.3	6.4	6.4	
SE 17	½	1.2	1.6	9.8	7.2	Hydrogeological Dept record
123/45	½	2.0		4.6		
1	¼	2.7	2.6	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	Σw = 8	Σwl_o = 20.2		Σwl_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. 11. Example of resource block assessment: calculation and results

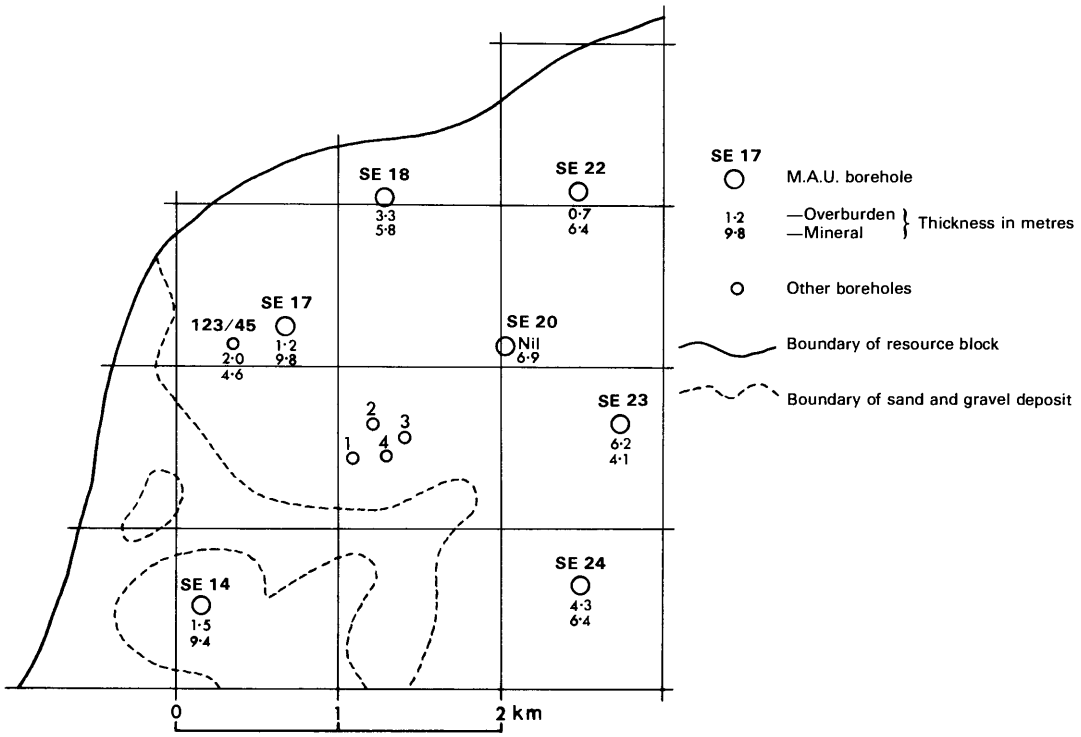


Fig. 12. Example of resource block assessment: map of a fictitious block

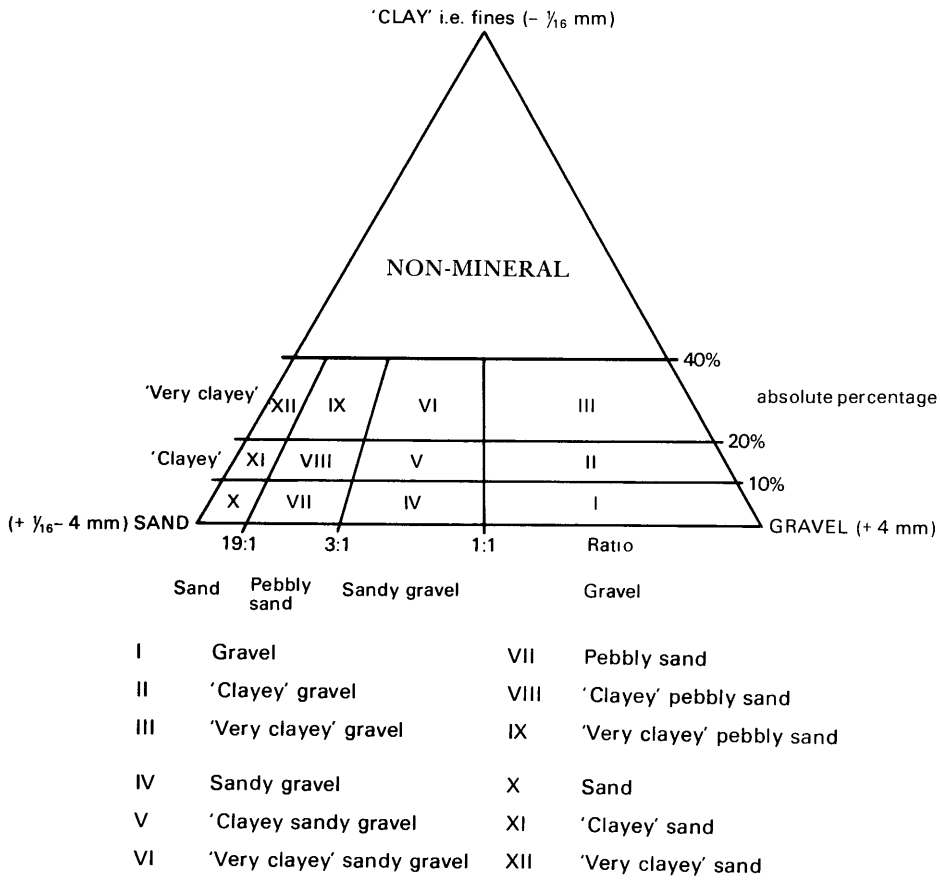


Fig. 13. Diagram to show the descriptive categories used in the classification of sand and gravel

Appendix D: Explanation of the Borehole Records

ANNOTATED EXAMPLE

SP 41 SE 5[1] 4646 1055[2] Cassington Halt, Cassington[3] Block C

Surface level (+59.4 m) +195 ft[4]
Water struck at(+58.2 m)[5]
Shell and auger (modified) 6 in (152 mm) diameter[6]
April 1971

[7]Overburden 1.2 m (4.0 ft)
Mineral 4.6 m (15.0 ft)
Bedrock 0.5 m+ (1.5 ft+)[9]

Geological Classification	LOG Lithology	Thickness m	Thickness (ft)	Depth[8] m	Depth[8] (ft)
	Soil	0.3	(1.0)	0.3	(1.0)
Alluvium[10]	Clay, silty, yellowish brown, with limestone fragments	0.7	(2.5)	1.0	(3.5)
	Sand, yellow, with minor amounts of silt and clay	0.2	(0.5)	1.2	(4.0)
First Terrace Deposits	Gravel[11] Gravel: fine to medium, tabular limestone with trace of rounded quartz Sand: fine to coarse with 5 cm dark grey silty clay at 5.1 m	4.6	(15.0)	5.8	(19.0)
Oxford Clay	Clay, silty, stiff, dark grey with thin shells	0.5+	(1.5+)	6.3	(20.5)

GRADING

Mean for Deposit

	%	mm	%
[14]Gravel	52	+16	14
		-16 + 4	38
Sand	46	-4 + 1	21
		-1 + $\frac{1}{4}$	21
		-$\frac{1}{4}$ + 1/16	4
Fines	2	-1/16	2

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel[13]
[12]1.2 - 2.2	2	44	54
2.2 - 3.2	2	44	54
3.2 - 4.2	2	46	52
4.2 - 5.2	2	50	48
5.2 - 5.8	2	45	53

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

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

1) The number of the 1:25 000 sheet on which the borehole lies, for example SP 41.
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 5.

Thus the full Registration Number is SP 41 SE 5. Usually this is abbreviated to 41 SE 5 in the text.

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

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

4. Surface Level.
The surface level at the borehole site is given in metres and feet above Ordnance Datum. All measurements were made in feet; approximate conversions to metres are given in brackets.

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

6. Type of Drill and Date of Drilling.
Modified shell and auger rigs were used in this survey. The type of machine, the external diameter of the casing used, and the month and year of the completion of the borehole are stated.

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

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

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

10. Geological Classification.
The geological classification (p. 2) is given whenever possible.

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

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

13. Grading Results.
The limits are as follows: gravel, +4 mm; sand, -4+1/16 mm; fines, -1/16 mm. If, exceptionally, grading results are not available, an attempt may be 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 square brackets.

14. Mean Grading.
The grading of the full thickness of the mineral horizon identified in the log is the mean of the individual sample gradings weighted by the thicknesses represented, if these vary. The classification used is shown in Table 5.

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

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

MINERAL ASSESSMENT UNIT BOREHOLES

Borehole No. (by sheet quadrant)		Grid reference
40 NW 6	(pp. 31-43)	4043 0757
40 NW 7		4025 0652
40 NW 8		4138 0724
40 NW 9		4139 0657
40 NW 10		4267 0969
40 NW 11		4255 0724
40 NW 12		4224 0635
40 NW 13		4242 0555
40 NW 14		4390 0855
40 NW 15		4357 0772
40 NW 16		4323 0649
40 NW 17		4340 0549
40 NW 18		4429 0938
40 NW 19		4402 0515
40 NE 4	(pp. 44-52)	4529 0944
40 NE 5		4720 0963
40 NE 6		4741 0930
40 NE 7		4771 0995
40 NE 8		4845 0971
40 NE 9		4816 0892
40 NE 10		4925 0937
40 NE 11		4936 0848
40 NE 12		4930 0761
40 NE 13		4944 0683
40 SW 2	(pp. 53-58)	4031 0290
40 SW 3		4036 0151
40 SW 4		4163 0157
40 SW 5		4291 0447
40 SW 6		4250 0353
40 SW 7		4283 0278
40 SW 8	(pp. 59-60)	4235 0192
40 SW 9		4334 0350
41 NE 4	(pp. 61-63)	4696 1542
41 NE 6		4853 1575
41 NE 9		4970 1546
41 SW 21	(pp. 64-74)	4084 1483
41 SW 22		4077 1418
41 SW 23		4049 1293
41 SW 24		4066 1202
41 SW 25		4141 1457
41 SW 26		4169 1240
41 SW 27		4220 1491
41 SW 28		4394 1437
41 SW 29		4386 1291
41 SW 30		4348 1164
41 SW 31		4408 1047
41 SE 2	(pp.75-86)	4525 1071
41 SE 3		4673 1246
41 SE 4		4614 1155
41 SE 5		4646 1055
41 SE 6		4777 1350
41 SE 7		4743 1066
41 SE 8		4821 1466
41 SE 9		4898 1354
41 SE 10		4804 1261
41 SE 11		4818 1065
41 SE 12		4902 1262
41 SE 13		4975 1459

OTHER BOREHOLES

Hydrogeological Department records: 236/6a, 7a, 30, 32, 36, 133, 142, 144, 189b, 250, 251 and 273.
Other IGS registered boreholes: SP 41 SE Box 1, A to D.
Many records, which are held in confidence, were made available by the Industry.

Appendix F: Mineral Assessment Unit Borehole Records

SP 40 NW 6 4043 0757 College Farm, Stanton Harcourt Block G

Surface level (+73.4 m) +241 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
January 1971

Overburden 1.1 m (3.5 ft)
Mineral 1.0 m (3.5 ft)
Bedrock 0.6 m+ (2.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil and subsoil of clay with scattered pebbles	1.1	(3.5)	1.1	(3.5)
Third Terrace	'Clayey' gravel Gravel: medium to fine, white and dark grey limestone with quartz and subangular to well rounded flint Sand: fine to coarse with a band of grey, silty clay at the base	1.0	(3.5)	2.1	(7.0)
Oxford Clay	Clay, stiff, dark brown with scattered shell fragments	0.6+	(2.0+)	2.7	(9.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	46	+16	5
		-16 + 4	41
Sand	39	-4 + 1	15
		-1 + $\frac{1}{4}$	16
		-$\frac{1}{4}$ + 1/16	8
Fines	15	-1/16	15

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.1 - 2.1	15	39	46

SP 40 NW 7 4025 0652 Blue Barn, Stanton Harcourt Block G

Surface level (+76.2 m) +250 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
January 1971

Overburden 1.9 m (6.0 ft)
Mineral 2.0 m (6.5 ft)
Bedrock 0.4 m+ (1.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil and subscil of silty clay with limestone and quartzite pebbles	1.9	(6.0)	1.9	(6.0)
Third Terrace Deposits	Gravel Gravel: fine and medium. Predominantly subrounded, platey and tabular limestone with fragments of quartz, flint and shell fragments Sand: fine to coarse, silty near the top	2.0	(6.5)	3.9	(13.0)
Oxford Clay	Clay, light blue becoming grey with depth	0.4+	(1.0+)	4.3	(14.0)

GRADING

Mean for deposit

	%	mm	%
Gravel	54	+16	8
		-16 + 4	46
Sand	40	-4 + 1	21
		-1 + $\frac{1}{4}$	15
		-$\frac{1}{4}$ + 1/16	4
Fines	6	-1/16	6

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.9 - 2.9	10	45	45
2.9 - 3.9	2	36	62

SP 40 NW 8 4138 0724 University Farm, Sutton Green Block F

Surface level (+66.4 m) +218 ft
Water struck at +63.3 m
Shell and auger (modified) 6 in (152 mm) diameter
September 1971

Overburden 1.3 m (4.5 ft)
Mineral 2.4 m (8.0 ft)
Bedrock 0.3 m+ (1.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil and subsoil, clayey, brown, becoming stiff and pebbly in the lower part and passing into sandy gravel	1.3	(4.5)	1.3	(4.5)
Second Terrace Deposits	'Clayey' sandy gravel Gravel: fine and medium limestone with some well rounded quartz Sand: fine to coarse with traces of quartz and shell fragments	2.4	(7.5)	3.7	(12.0)
Oxford Clay	Clay, light blue, becoming grey with depth	0.3+	(1.0+)	4.0	(13.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	42	+16	4
		-16 + 4	38
Sand	47	-4 + 1	24
		-1 + $\frac{1}{4}$	19
		-$\frac{1}{4}$ + 1/16	4
Fines	11	-1/16	11

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.3 - 2.3	13	49	38
2.3 - 3.3	11	50	39
3.3 - 3.7	5	37	58

SP 40 NW 9 4139 0657 Nicholl's Farm, Sutton Block E

Surface level (+65.7 m) +216 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Waste 2.8 m (9.0 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil and subsoil, yellowish brown, silty	1.7	(5.5)	1.7	(5.5)
Head	Fine to medium grained sand and gravel	0.3	(1.0)	2.0	(6.5)
	Clay, silty, stiff, brown, with gravel fragments	0.8	(2.5)	2.8	(9.0)
Oxford Clay	Clay, brown and firm becoming grey with depth	0.4+	(1.5+)	3.2	(10.5)

SP 40 NW 11 4255 0724 Sutton Farm, Stanton Harcourt Block B

Surface level (+61.0 m) +201 ft
Water struck at +59.7 m
Shell and auger (modified) 6 in (152 mm) diameter
September 1971

Overburden 0.9 m (3.0 ft)
Mineral 3.5 m (11.5 ft)
Bedrock 0.2 m+ (0.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
Alluvium	Soil, brown, clayey, passing into reddish brown pebbly clay	0.9	(3.0)	0.9	(3.0)
First Terrace Deposits	'Clayey' gravel Gravel: fine to medium grained limestone with subangular flint and some subrounded to well rounded quartz Sand: fine to medium grained brown limestone with some quartz	3.5	(11.5)	4.4	(14.5)
Oxford Clay	Clay, dark grey, stiff with shaley partings and shelly fragments	0.2+	(0.5+)	4.6	(15.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	45	+16	9
		-16 + 4	36
Sand	43	-4 + 1	19
		-1 + $\frac{1}{4}$	16
		-$\frac{1}{4}$ + 1/16	8
Fines	12	-1/16	12

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.9 - 2.2	11	61	28
2.2 - 3.0	26	36	38
3.0 - 4.4	4	31	65

SP 40 NW 10 4267 0969 Inglemere, Eynsham

Surface level (+72.1 m) +237 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 1.9 m (6.0 ft)
Mineral 2.0 m (6.5 ft)
Waste 1.2 m (4.0 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil and subsoil, yellowish brown silty clay with some limestone and quartz pebbles near the base	1.9	(6.0)	1.9	(6.0)
Second Terrace Deposits	Gravel Gravel: fine to coarse limestone with flint and quartzite Sand: medium to coarse with a grey silty band at the base containing shell fragments	2.0	(6.5)	3.9	(13.0)
	Clay, grey with well rounded limestone, flint and quartzite pebbles	1.2	(4.0)	5.1	(17.0)
Oxford Clay	Clay, stiff, grey with fragile shell remains	0.4	(1.5)	5.5	(18.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	58	+16	21
		-16 + 4	37
Sand	33	-4 + 1	17
		-1 + $\frac{1}{4}$	13
		-$\frac{1}{4}$ + 1/16	3
Fines	9	-1/16	9

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.9 - 2.9	3	38	59
2.9 - 3.9	16	27	57

SP 40 NW 12 4224 0635 Stanton Harcourt Block B

Surface level (+62.3 m) + 205 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 1.0 m (3.5 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)
Alluvium	Soil and subsoil, on brown, silty clay	1.0	(3.5)	1.0	(3.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium grained white limestone, with subangular to well rounded quartz, and shell fragments Sand: medium to coarse grained limestone with some quartz	3.0	(10.0)	4.0	(13.0)
Oxford Clay	Clay, bluish grey	0.4+	(1.5+)	4.4	(14.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	37	+16	5
		-16 + 4	32
Sand	60	-4 + 1	24
		-1 + ¼	30
		-¼ + 1/16	6
Fines	3	-1/16	3

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.0 - 2.0	4	70	26
2.0 - 3.0	4	65	31
3.0 - 4.0	2	46	52

SP 40 NW 13 4242 0555 Stanton Harcourt Block B

Surface level (+61.6 m) +202 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 0.5 m (1.5 ft)
Mineral 2.7 m (9.0 ft)
Bedrock 0.3 m+ (1.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil and subsoil	0.5	(1.5)	0.5	(1.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium grained white limestone with subrounded flint and shell fragments Sand: medium to coarse grained, with silty bands	2.7	(9.0)	3.2	(10.5)
Oxford Clay	Clay, bluish grey, silty	0.3+	(1.0+)	3.5	(11.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	37	+16	3
		-16 + 4	34
Sand	57	-4 + 1	27
		-1 + $\frac{1}{4}$	21
		-$\frac{1}{4}$ + 1/16	9
Fines	6	-1/16	6

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.5 - 1.5	8	51	41
1.5 - 2.5	5	67	28
2.5 - 3.2	5	50	45

SP 40 NW 14 4390 0855 Swinford Bridge, Eynsham Block B

Surface level (+60.0 m) +197 ft
Water struck at +57.5 m
Shell and auger (modified) 6 in (152 mm) diameter
April 1971

Overburden 2.5 m (8.0 ft)
Mineral 2.5 m (8.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil and subsoil	0.3	(1.0)	0.3	(1.0)
Alluvium	Silt, very soft, mottled brown and blue	1.5	(5.0)	1.8	(6.0)
	Peat, black and silty	0.7	(2.5)	2.5	(8.0)
First Terrace Deposits	Sandy gravel Gravel: fine to medium grained grey limestone with subangular flint and shell fragments Sand: medium to coarse grained	2.5	(8.0)	5.0	(16.5)
Oxford Clay	Clay, stiff, dark bluish grey with shell fragments	0.5+	(1.5+)	5.5	(18.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	43	+16	4
		-16 + 4	39
Sand	54	-4 + 1	28
		-1 + $\frac{1}{4}$	21
		-$\frac{1}{4}$ + 1/16	5
Fines	3	-1/16	3

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
2.5 - 3.5	3	53	44
3.5 - 4.5	3	51	46
4.5 - 5.0	4	62	34

SP 40 NW 15 4357 0772 Pinkhill Farm, Stanton Harcourt Block B

Surface level (+60.9 m) +200 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 1.4 m (4.5 ft)
Mineral 4.2 m (14.0 ft)
Bedrock 0.6 m+ (2.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
Alluvium	Soil and subsoil, on brown, silty clay	1.4	(4.5)	1.4	(4.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium limestone with subrounded flint and shell fragments Sand: medium to coarse grained	4.2	(14.0)	5.6	(18.5)
Oxford Clay	Clay, silty, whitish grey passing passing into bluish grey, with shell fragments	0.6+	(2.0+)	6.2	(20.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	43	+16	2
		-16 + 4	41
Sand	56	-4 + 1	27
		-1 + ¼	26
		-¼ + 1/16	3
Fine	1	-1/16	1

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.4 - 2.4	0	70	30
2.4 - 3.4	1	53	46
3.4 - 4.4	2	50	48
4.4 - 5.6	[2	50	48]

SP 40 NW 16 4323 0649 Pinkhill Farm, Stanton Harcourt Block B

Surface level (+61.6 m) +202 ft
Water struck at +60.0 m
Shell and auger (modified) 6 in (152 mm) diameter
April 1971

Overburden 0.7 m (2.5 ft)
Mineral 4.5 m (15.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil, brown	0.1	(0.5)	0.1	(0.5)
Alluvium	Clay, silty, mottled brown and grey	0.6	(2.0)	0.7	(2.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium, brown to buff limestone with subrounded flint and shell fragments Sand: coarse and medium, with silty bands in the upper part	4.5	(15.0)	5.2	(17.0)
Oxford Clay	Clay, bluish grey	0.5+	(1.5+)	5.7	(18.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	40	+16	4
		-16 + 4	36
Sand	57	-4 + 1	26
		-1 + $\frac{1}{4}$	25
		-$\frac{1}{4}$ + 1/16	6
Fines	3	-1/16	3

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.7 - 1.7	6	68	26
1.7 - 2.7	2	62	36
2.7 - 3.7	2	44	54
3.7 - 4.7	3	55	42
4.7 - 5.2	2	57	41

SP 40 NW 17 4340 0549 Tawney's Farm, Stanton Harcourt Block B

Surface level (+61.5 m) +202 ft
Ground conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 0.8 m (2.5 ft)
Mineral 3.4 m (11.0 ft)
Bedrock 0.6 m+ (2.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
Alluvium	Soil, on grey, brown, silty clay	0.8	(2.5)	0.8	(2.5)
First Terrace Deposits	Sandy gravel Gravel: fine to coarse, subrounded, tabular limestone Sand: medium to coarse	3.4	(11.0)	4.2	(14.0)
Oxford Clay	Clay, silty, bluish grey	0.6+	(2.0+)	4.8	(16.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	43	+16	6
		-16 + 4	37
Sand	55	-4 + 1	28
		-1 + $\frac{1}{4}$	23
		-$\frac{1}{4}$ + 1/16	4
Fines	2	-1/16	2

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.8 - 1.8	3	46	51
1.8 - 2.8	2	52	46
2.8 - 3.8	1	64	35
3.8 - 4.2	2	57	41

SP 40 NW 18 4429 0938 Eynsham Wharf, Eynsham Block C

Surface level (+60.9) +200 ft
Ground conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 0.7 (2.5 ft)
Mineral 5.2 (17.0 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
Alluvium	Soil, on greyish brown, silty clay	0.7	(2.5)	0.7	(2.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium, subrounded, tabular limestone with shell fragments and quartzite pebbles. Silty bands and boulders of white oolitic limestones (100 m diameter) occur between 4.7 and 5.7 m Sand: fine to coarse, with thin silt bands	5.2	(17.0)	5.9	(19.5)
Oxford Clay	Clay, stiff, bluish grey with shell fragments	0.4+	(1.5+)	6.3	(20.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	47	+16	9
		-16 + 4	38
Sand	49	-4 + 1	27
		-1 + $\frac{1}{4}$	17
		-$\frac{1}{4}$ + 1/16	5
Fines	4	-1/16	4

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.7 - 1.7	11	55	34
1.7 - 2.7	3	58	39
2.7 - 3.7	2	51	47
3.7 - 4.7	2	37	61
4.7 - 5.9	2	48	50

SP 40 NW 19 4402 0515 Lower Whitley Farm, Cumnor Block B

Surface level (+63.0) +207 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 1.0 m (3.5 ft)
Mineral 1.5 m (5.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
Alluvium	Soil, on brown, silty clay	1.0	(3.5)	1.0	(3.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium subrounded limestone with flint and shell fragments Sand: medium to coarse	1.5	(5.0)	2.5	(8.0)
Oxford Clay	Clay, stiff, bluish brown	0.5+	(1.5+)	3.0	(10.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	33	+16	2
		-16 + 4	31
Sand	65	-4 + 1	27
		-1 + $\frac{1}{4}$	31
		-$\frac{1}{4}$ + 1/16	7
Fines	2	-1/16	2

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.0 - 2.0	2	61	37
2.0 - 2.5	2	73	25

SP 40 NE 4 4529 0944 Old Canal, Eynsham Block C

Surface level (+59.7 m) +196 ft
Water struck at +58.6 m
Shell and auger (modified) 6 in (152 mm) diameter
April 1971

Overburden 1.1 m (3.5 ft)
Mineral 3.2 m (10. 5 ft)
Bedrock 0.2 m+ (0.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil and subsoil	0.2	(0.5)	0.2	(0.5)
Alluvium	Silt, light blue, becoming grey and containing bleached shell fragments and limestone pebbles at the base	0.9	(3.0)	1.1	(3.5)
First Terrace Deposits	Gravel Gravel: fine to coarse limestone with subrounded quartzites, and traces of shell material Sand: medium to coarse grained	3.2	(10.5)	4.3	(14.0)
Oxford Clay	Clay, stiff, grey, with shell fragments	0.2+	(0.5+)	4.5	(15.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	61	+16	14
		-16 + 4	47
Sand	37	-4 + 1	24
		-1 + $\frac{1}{4}$	11
		-$\frac{1}{4}$ + 1/16	2
Fines	2	-1/16	2

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.1 - 2.1	1	24	75
2.1 - 3.1	3	39	58
3.1 - 4.3	1	45	54

SP 40 NE 5 4720 0963 University Field Station, Wytham Block D

Surface level (+62.9 m) +207 ft
Water struck at +60.8 m
Shell and auger (modified) 152 mm (6 in) diameter
March 1974

Overburden 0.8m (2.5 ft)
Mineral 2.2m (7.0 ft)
Bedrock 1.4 m+ (4.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil and subsoil	0.8	(2.5)	0.8	(2.5)
Second Terrace Deposits	Gravel Gravel: fine to coarse, subrounded limestones with quartz and shell fragments; some iron staining Sand: medium to coarse subrounded limestone with flint, quartz and shell fragments	2.2	(7.0)	3.0	(10.0)
Oxford Clay	Clay, stiff, dark grey	1.4+	(4.5+)	4.4	(14.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	56	+16	16
		-16 + 4	40
Sand	38	-4 + 1	20
		-1 + $\frac{1}{4}$	14
		-$\frac{1}{4}$ + 1/16	4
Fines	6	-1/16	6

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.8 - 1.8	9	42	49
1.8 - 2.1	9	42	49
2.1 - 3.0	2	32	66

SP 40 NE 6 4741 0930 Old Gravel Pit, Wytham Block D

Surface level (+61.6 m) +202 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Waste 1.4 m (4.5 ft)
Bedrock 1.8 m+ (6.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
Alluvium	Soil on brown, silty clay with flint and limestone pebbles	0.8	(2.5)	0.8	(2.5)
Second Terrace Deposits	Fine to coarse grained white limestone gravel in a matrix of bluish brown clay	0.6	(2.0)	1.4	(4.5)
Oxford Clay	Clay, brown to dark grey, with limestone pebbles and shell fragments	1.8+	(6.0+)	3.2	(10.5)

SP 40 NE 7 4771 0995 Wytham Mill, Wytham Block D

Surface level (+59.4 m) +195 ft
Water struck at +58.6 m
Shell and auger (modified) 6 in (152 mm) diameter
March 1974

Overburden 0.6 m (2.0 ft)
Mineral 5.5 m (18.0 ft)
Bedrock 1.4 m+ (4.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, brown	0.2	(0.5)	0.2	(0.5)
Alluvium	Clay, brown	0.4	(1.5)	0.6	(2.0)
First Terrace Deposits	Gravel Gravel: fine to coarse limestones, subrounded, tabular, with flint and quartz pebbles; iron staining Sand: medium to coarse limestone with flint, quartz and shell fragments	5.5	(18.0)	6.1	(20.5)
Oxford Clay	Clay, bluish grey	1.4+	(4.5+)	7.5	(24.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	51	+16	12
		-16 + 4	39
Sand	48	-4 + 1	26
		-1 + $\frac{1}{4}$	19
		-$\frac{1}{4}$ + 1/16	3
Fines	1	-1/16	1

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.6 - 0.8	8	49	43
0.8 - 1.8	1	47	52
1.8 - 2.8	1	52	47
2.8 - 3.8	1	48	51
3.8 - 4.8	1	46	53
4.8 - 6.1	1	47	52

SP 40 NE 8 4845 0971 Pixey Head, Lower Wolvercote Block D

Surface level (+58.5 m) +192 ft
Water struck at +56.9 m
Shell and auger (modified) 6 in (152 mm) diameter
April 1971

Overburden 1.6 m (5.5 ft)
Mineral 4.2 m (14.0 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)
Alluvium	Clay, yellowish brown to bluish grey, silty	1.4	(4.5)	1.6	(5.5)
First Terrace Deposits	Gravel Gravel: fine to medium, subrounded, tabular limestone with rounded quartz and flint. Silty clay matrix in the upper part becoming coarser with depth. Cobbles up to 100 mm in the lower part. Shell fragments and iron staining Sand: fine to medium, silty	4.2	(14.0)	5.8	(19.0)
Oxford Clay	Clay, firm, medium blue, silty	0.6+	(2.0+)	6.4	(21.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	54	+16	14
		-16 + 4	40
Sand	43	-4 + 1	24
		-1 + $\frac{1}{4}$	16
		-$\frac{1}{4}$ + 1/16	3
Fines	3	-1/16	3

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.6 - 2.6	6	39	55
2.6 - 3.6	1	49	50
3.6 - 4.6	1	44	55
4.6 - 5.8	3	39	58

SP 40 NE 9 4816 0892 Godstow Holt, Lower Wolvercote Block D

Surface level (+57.9 m) +190 ft
Water struck at +57.1 m
Shell and auger (modified) 6 in (152 mm) diameter
April 1971

Overburden 0.8 m (2.5 ft)
Mineral 4.1 m (13.5 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil, dark brown	0.2	(0.5)	0.2	(0.5)
Alluvium	Clay, firm, pale brownish grey, silty in lower part	0.6	(2.0)	0.8	(2.5)
First Terrace Deposits	Gravel Gravel: fine to medium subrounded limestone with some rounded quartz Sand: fine to coarse grained, silty, becoming coarser towards the base	4.1	(13.5)	4.9	(16.0)
Oxford Clay	Clay, firm, light bluish grey	0.5+	(1.5+)	5.4	(18.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	54	+16	12
		-16 + 4	42
Sand	44	-4 + 1	22
		-1 + ¼	20
		-¼ + 1/16	2
Fines	2	-1/16	2

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.8 - 1.8	2	43	55
1.8 - 2.8	2	46	52
2.8 - 3.8	2	46	52
3.8 - 4.9	2	40	58

SP 40 NE 10 4925 0937 Allotment Gardens, Wolvercote Common Block D

Surface level (+57.9 m) +190 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 0.6 m (2.0 ft)
Mineral 3.4 m (11.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
Alluvium	Clay, silty, yellowish brown	0.6	(2.0)	0.6	(2.0)
First Terrace Deposits	Gravel Gravel: fine to medium white oolitic limestone with some flint and shell fragments Sand: mainly medium and coarse	3.4	(11.0)	4.0	(13.0)
Oxford Clay	Clay, stiff, brown, becoming grey with depth	0.5+	(1.5+)	4.5	(15.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	55	+16	11
		-16 + 4	44
Sand	43	-4 + 1	21
		-1 + $\frac{1}{4}$	19
		-$\frac{1}{4}$ + 1/16	3
Fines	2	-1/16	2

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.6 - 1.6	3	42	55
1.6 - 2.6	1	45	54
2.6 - 4.0	1	43	56

SP 40 NE 11 4936 0848 Port Meadow, Wolvercote Common Block D

Surface level (+57.6 m) +189 ft
Water struck at +57.1 m
Shell and auger (modified) 6 in (152 mm) diameter
April 1971

Overburden 0.3 m (1.0 ft)
Mineral 4.3 m (14.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil, dark brown, clayey, becoming coarser towards the base	0.3	(1.0)	0.3	(1.0)
First Terrace Deposits	Gravel Gravel: fine to medium subrounded platy limestone with some quartz; some iron staining. Cobbles at base Sand: fine to coarse grained, silty	4.3	(14.0)	4.6	(15.0)
Oxford Clay	Clay, firm, light grey	0.5+	(1.5+)	5.1	(17.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	55	+16	14
		-16 + 4	41
Sand	42	-4 + 1	25
		-1 + $\frac{1}{4}$	14
		-$\frac{1}{4}$ + 1/16	3
Fines		-1/16	3

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.3 - 1.3	1	32	67
1.3 - 2.3	2	45	53
2.3 - 3.3	1	34	65
3.3 - 4.3	11	60	29
4.3 - 4.6	1	35	64

SP 40 NE 12 4930 0761 The Limes, Binsey Block D

Surface level (+57.0 m) +187 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 0.9 m (3.0 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)
Alluvium	Clay, silty, greyish brown	0.9	(3.0)	0.9	(3.0)
First Terrace Deposits	Sandy gravel Gravel: fine to medium subrounded limestone with some quartzite and flint Sand: medium to coarse grained, light brown	3.6	(12.0)	4.5	(15.0)
Oxford Clay	Clay, stiff, bluish grey	0.5+	(1.5+)	5.0	(16.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	47	+16	7
		-16 + 4	40
Sand	51	-4 + 1	24
		-1 + $\frac{1}{4}$	23
		-$\frac{1}{4}$ + 1/16	4
Fines	2	-1/16	2

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.9 - 1.9	4	54	42
1.9 - 2.9	1	46	53
2.9 - 3.9	2	49	49
3.9 - 4.5	2	55	43

SP 40 NE 13 4944 0683 Binsey Lane, Binsey Block D

Surface level (+56.9 m) +187 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 1.0 m (3.5 ft)
Mineral 4.3 m (14.0 ft)
Bedrock 0.3 m+ (1.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
Alluvium	Clay, silty brown	1.0	(3.5)	1.0	(3.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium grained, subrounded, tabular limestone with some quartz, flint and shell fragments. Coarser gravel near the base Sand: medium to coarse grained	4.3	(14.0)	5.3	(17.5)
Oxford Clay	Clay, stiff, bluish grey	0.3+	(1.0+)	5.6	(18.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	48	+16	8
		-16 + 4	40
Sand	50	-4 + 1	25
		-1 + $\frac{1}{4}$	22
		-$\frac{1}{4}$ + 1/16	3
Fines	2	-1/16	2

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.0 - 2.0	3	56	41
2.0 - 3.0	3	50	47
3.0 - 4.0	1	51	48
4.0 - 5.3	1	44	55

SP 40 SW 2 4031 0290 Broad Bridges, Rack End Block A

Surface level (+64.9 m) +213 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 0.3 m (1.0 ft)
Mineral 6.6 m (21.5 ft)
Bedrock 0.9 m+ (3.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil, brown	0.3	(1.0)	0.3	(1.0)
First Terrace Deposits	Gravel, with silt from 5.4 to 6.0 m Gravel: fine to medium limestone with quartz, flint and shell fragments Sand: medium to coarse, with minor silt bands towards the base	6.6	(21.5)	6.9	(22.5)
Oxford Clay	Clay, stiff, bluish grey	0.9+	(3.0+)	7.8	(25.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	57	+16	10
		-16 + 4	47
Sand	39	-4 + 1	23
		-1 + $\frac{1}{4}$	13
		-$\frac{1}{4}$ + 1/16	3
Fines	4	-1/16	4

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.3 - 1.3	2	40	58
1.3 - 2.3	2	42	56
2.3 - 3.3	1	39	60
3.3 - 4.3	5	36	59
4.3 - 5.4	2	27	71
5.4 - 6.0		silt	
6.0 - 6.9	12	51	37

SP 40 SW 3 4036 0151 Newbridge, Moreton Block A

Surface level (+63.7 m) +209 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 1.0 m (3.5 ft)
Mineral 2.9 m (9.5 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
Alluvium	Clay, silty brown	1.0	(3.5)	1.0	(3.5)
First Terrace Deposits	Gravel Gravel: fine to medium grained subrounded tabular limestone with some quartz, flint and shell fragments Sand: medium to coarse grained	2.9	(9.5)	3.9	(13.0)
Oxford Clay	Clay, stiff, bluish grey	0.5+	(1.5+)	4.4	(14.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	54	+16	9
		-16 + 4	45
Sand	44	-4 + 1	24
		-1 + $\frac{1}{4}$	16
		-$\frac{1}{4}$ + 1/16	4
Fines	2	-1/16	2

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.0 - 2.0	3	44	53
2.0 - 3.0	2	50	48
3.0 - 3.9	1	37	62

SP 40 SW 4 4163 0157 Moreton Farm, Moreton Block A

Surface level (+63.0 m) 207 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 0.7 m (2.5 ft)
Mineral 3.0 m (10.0 ft)
Bedrock 0.8 m+ (2.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
Alluvium	Clay, silty, brown	0.7	(2.5)	0.7	(2.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium grained subrounded limestones with quartz, flint and shell fragments, particularly towards the base Sand: medium to coarse grained	3.0	(10.0)	3.7	(12.0)
Oxford Clay	Clay, silty, bluish grey	0.8+	(2.5+)	4.5	(15.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	48	+16	7
		-16 + 4	41
Sand	50	-4 + 1	24
		-1 + $\frac{1}{4}$	22
		-$\frac{1}{4}$ + 1/16	4
Fines	2	-1/16	2

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.7 - 1.7	4	53	43
1.7 - 2.7	2	45	53
2.7 - 3.7	1	51	48

SP 40 SW 5 4291 0447 West End, Stanton Harcourt Block B

Surface level (+62.4 m) +205 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 1.0 m (3.5 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)
Alluvium	Clay, silty, yellowish brown	1.0	(3.5)	1.0	(3.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium grained subrounded limestone with some quartz, flint and shell fragments Sand: medium to coarse grained, yellowish white	3.2	(10.5)	4.2	(14.0)
Oxford Clay	Clay, stiff, steel-grey	0.5+	(1.5+)	4.7	(15.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	35	+16	2
		-16 + 4	33
Sand	62	-4 + 1	31
		-1 + $\frac{1}{4}$	26
		-$\frac{1}{4}$ + 1/16	5
Fines	3	-1/16	3

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.0 - 2.0	5	60	35
2.0 - 3.0	2	66	32
3.0 - 4.2	2	62	36

SP 40 SW 6 4250 0353 Watkins Farm, Northmoor Block A

Surface level (+63.0 m) +207 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 1.0 m (3.5 ft)
Mineral 4.5 m (15.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil and subsoil	1.0	(3.5)	1.0	(3.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium, subrounded, tabular limestone with some quartz and flint. Shell fragments near the base Sand: medium to coarse	4.5	(15.0)	5.5	(18.0)
Oxford Clay	Clay, stiff, steel-grey	0.5+	(1.5+)	6.0	(19.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	39	+16	4
		-16 + 4	35
Sand	58	-4 + 1	29
		-1 + $\frac{1}{4}$	24
		-$\frac{1}{4}$ + 1/16	5
Fines	3	-1/16	3

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.0 - 2.0	3	44	53
2.0 - 3.0	3	57	40
3.0 - 4.0	3	74	23
4.0 - 5.5	2	59	39

SP 40 SW 7 4283 0278 Radgnoll Farm, Northmoor Block A

Surface level (+62.4 m) +205 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 0.5 m (1.5 ft)
Mineral 4.2 m (14.0 ft)
Bedrock 0.6 m+ (2.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil and subsoil	0.5	(1.5)	0.5	(1.5)
First Terrace Deposits	Gravel Gravel: fine to medium, subrounded limestone with some quartz and shell fragments Sand: medium to coarse grained	4.2	(14.0)	4.7	(15.5)
Oxford Clay	Clay, stiff, bluish grey	0.6+	(2.0+)	5.3	(17.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	49	+16	7
		-16 + 4	42
Sand	49	-4 + 1	30
		-1 + $\frac{1}{4}$	17
		-$\frac{1}{4}$ + 1/16	2
Fines	2	-1/16	2

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.5 - 1.5	3	40	57
1.5 - 2.5	2	46	52
2.5 - 3.5	2	56	42
3.5 - 4.7	2	54	44

SP 40 SW 8 4235 0192 Moreton Farm, Northmoor Block A

Surface level (+62.8 m) +206 ft
Water struck at +61.9 m
Shell and auger (modified) 6 in (152 mm) diameter
April 1971

Overburden 0.7 m (2.5 ft)
Mineral 3.3 m (11.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil	0.2	(0.5)	0.2	(0.5)
Alluvium	Clay, silty, light brown	0.5	(1.5)	0.7	(2.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium limestone with coarse shell fragments near the base Sand: medium to coarse, greyish brown	3.3	(11.0)	4.0	(13.0)
Oxford Clay	Clay, silty, bluish grey	0.5+	(1.5+)	4.5	(15.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	47	+16	5
		-16 + 4	42
Sand	49	-4 + 1	23
		-1 + $\frac{1}{4}$	20
		-$\frac{1}{4}$ + 1/16	6
Fines	4	-1/16	4

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.7 - 1.7	9	53	38
1.7 - 2.7	2	46	52
2.7 - 4.0	2	50	48

Surface level (+61.9 m) +203 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 0.5 m (1.5 ft)
Mineral 2.8 m (9.0 ft)
Bedrock 0.2 m+ (0.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil and subsoil	0.5	(1.5)	0.5	(1.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium, subrounded limestone with quartz and flint. Coarse shell material becomes more prominent at the base Sand: medium to coarse	2.8	(9.0)	3.3	(11.0)
Oxford Clay	Clay, stiff, bluish grey	0.2+	(0.5+)	3.5	(11.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	48	+16	6
		-16 + 4	42
Sand	49	-4 + 1	25
		-1 + ¼	20
		-¼ + 1/16	4
Fines	3	-1/16	3

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.5 - 1.5	4	48	48
1.5 - 2.5	2	46	52
2.5 - 3.3	1	54	45

SP 41 NE 4 4696 1542 Oxford Airport, Thrupp Block G

Surface level (+78.0 m) +256 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
March 1974

Overburden 0.2 m (0.5 ft)
Mineral 1.5 m (5.0 ft)
Bedrock 0.8 m+ (2.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, brown clayey	0.2	(0.5)	0.2	(0.5)
Third Terrace Deposits	'Clayey' sandy gravel Gravel: fine to coarse subrounded limestone with flint towards the base Sand: medium to coarse flint	1.5	(5.0)	1.7	(5.5)
Cornbrash	Limestone	0.8+	(2.5+)	2.5	(8.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	29	+16	8
		-16 + 4	21
Sand	52	-4 + 1	22
		-1 + $\frac{1}{4}$	21
		-$\frac{1}{4}$ + 1/16	9
Fines	19	-1/16	19

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.2 - 0.6	18	54	28
0.6 - 1.7	22	47	31

SP 41 NE 6 4853 1575 Thrupp Bridge, Thrupp Block E

Surface level (+62.4 m) +205 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
January 1971

Overburden 0.5 m (1.5 ft)
Mineral 1.0 m (5.0 ft)
Bedrock 0.2 m+ (0.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
Alluvium	Soil, brown, sandy	0.5	(1.5)	0.5	(1.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium, subrounded, oolitic limestone with some quartz and flint Sand: medium to coarse, clayey, brown	1.0	(3.5)	1.5	(5.5)
Cornbrash	Limestone, hard	0.2+	(0.5+)	1.7	(5.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	44	+16	13
		-16 + 4	31
Sand	48	-4 + 1	14
		-1 + $\frac{1}{4}$	27
		-$\frac{1}{4}$ + 1/16	7
Fines	8	-1/16	8

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.5 - 1.5	8	48	44

SP 41 NE 9 4970 1546 Manor Farm, Hampton Gay Block E

Surface level (+62.8 m) +206 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
January 1971

Overburden 1.4 m (4.5 ft)
Mineral 1.3 m (4.5 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, brown	0.5	(1.5)	0.5	(1.5)
Alluvium	Sand, brown, clayey, with scattered flints	0.9	(3.0)	1.4	(4.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium limestone and sandstone containing bands of black organic silty clay, and some flint Sand: light brown, medium to coarse, minor amount of silt	1.3	(4.5)	2.7	(9.0)
Kellaways Clay	Clay, bluish grey, traces of fragile shell material	0.4+	(1.5+)	3.1	(10.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	41	+16	3
		-16 + 4	38
Sand	53	-4 + 1	17
		-1 + $\frac{1}{4}$	28
		-$\frac{1}{4}$ + 1/16	8
Fines	6	-1/16	6

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.4 - 2.7	6	53	41

SP 41 SW 21 4084 1483 Brook Hill Combe Block G

Surface level (+71.0 m) +236 ft
Water struck at +68.8 m
Shell and auger (modified) 6 in (152 mm) diameter
April 1971

Overburden 3.1 m (10.0 ft)
Mineral 1.9 m (6.0 ft)
Bedrock 0.2 m+ (0.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, silty and clayey	0.2	(0.5)	0.2	(0.5)
Alluvium	Clay, silty, light brown, blue near base	2.4	(8.0)	2.6	(8.5)
	Peat, brownish black, with plant remains	0.5	(1.5)	3.1	(10.0)
First Terrace Deposits	Gravel Gravel: fine to coarse limestone with some quartz Sand: medium to coarse	1.9	(6.0)	5.0	(16.5)
Taynton Stone	Limestone, oolitic, buff	0.2+	(0.5+)	5.2	(17.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	64	+16	17
		-16 + 4	47
Sand	33	-4 + 1	21
		-1 + $\frac{1}{4}$	9
		-$\frac{1}{4}$ + 1/16	3
Fines	3	-1/16	3

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
3.1 - 4.1	1	28	71
4.1 - 5.0	5	39	56

SP 41 SW 22 4077 1418 Malvern Villa, Combe Block H

Surface level (+107.9 m) +354 ft
Water struck at +105.9 m
Shell and auger (modified) 6 in (152 mm) diameter
February 1974

Overburden 0.7 m (2.5 ft)
Mineral 1.0 m (3.5 ft)
Waste 0.9 m (3.0 ft)
Bedrock 1.5 m+ (5.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, on light to dark brown sandy clay	0.7	(2.5)	0.7	(2.5)
Glacial Sand and Gravel	'Clayey' sandy gravel Gravel: fine to medium reddish brown limestone with rounded flint and quartz Sand: medium grained	1.0	(3.5)	1.7	(5.5)
	Clay, silty and sandy, mottled grey to light brown	0.9	(3.0)	2.6	(8.5)
Oxford Clay	Clay, dark grey, iron-stained	1.5+	(5.0+)	4.1	(13.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	27	+16	18
		-16 + 4	9
Sand	58	-4 + 1	7
		-1 + $\frac{1}{4}$	42
		-$\frac{1}{4}$ + 1/16	9
Fines	15	-1/16	15

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.7 - 1.7	15	58	27
1.7 - 2.6	No grading available		

SP 41 SW 23 4049 1293 Claypit Clumps, Freeland Block H

Surface level (+107.3 m) +352 ft
Water struck at +105.6 m
Shell and auger (modified) 6 in (152 mm) diameter
March 1974

Overburden 1.7 m (5.5 ft)
Mineral 2.5 m (8.0 ft)
Bedrock 1.8 m+ (6.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil and subsoil	0.5	(1.5)	0.5	(1.5)
Glacial Sand and Gravel	Clay, sandy, with scattered pebbles at base, grey and brownish yellow	1.1	(3.5)	1.6	(5.0)
	Clay, sandy grey	0.1	(0.5)	1.7	(5.5)
	Pebbly sand Gravel: fine to coarse subrounded quartz with quartzite and shale Sand: medium to coarse quartz and rock fragments	2.5	(8.0)	4.2	(14.0)
Oxford Clay	Clay, bluish grey, sandy from 4.7 - 5.6 m	1.8+	(6.0+)	6.0	(19.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	18	+16	9
		-16 + 4	9
Sand	74	-4 + 1	6
		-1 + $\frac{1}{4}$	52
		-$\frac{1}{4}$ + 1/16	16
Fines	8	-1/16	8

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.7 - 3.0	11	84	5
3.0 - 4.2	4	64	32

SP 41 SW 24 4066 1202 Tanner's Hill Clump, Freeland Block H

Surface level (+104.1 m) +342 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
March 1974

Overburden 1.0 m (3.5 ft)
Mineral 1.0 m (3.5 ft)
Bedrock 0.7 m+ (2.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil, brown, clayey, passing into subsoil of grey clay, mottled and sandy towards base	1.0	(3.5)	1.0	(3.5)
Glacial Sand and Gravel	'Clayey' sandy gravel Gravel: fine, subrounded quartz, with some quartzite, iron-stained Sand: medium to coarse, subrounded quartz	1.0	(3.5)	2.0	(6.5)
Oxford Clay	Clay, light grey, top 0.3 m weathered, and sandy	0.7+	(2.5+)	2.7	(9.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	32	+16	15
		-16 + 4	17
Sand	49	-4 + 1	10
		-1 + $\frac{1}{4}$	22
		-$\frac{1}{4}$ + 1/16	17
Fines	19	-1/16	19

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.0 - 2.0	19	49	32

SP 41 SW 25 4141 1457 Millwood Farm, Long Hanborough Block G

Surface level (+98.8 m) +324 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
January 1971

Overburden 1.6 m (5.5 ft)
Mineral 1.8 m (6.0 ft)
Bedrock 0.2 m+ (0.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil and subsoil on reddish brown silty clay	1.6	(5.5)	1.6	(5.5)
Fourth Terrace Deposits	'Clayey' sandy gravel Gravel: fine to coarse oolitic limestone with some well rounded quartz Sand: fine to coarse	1.8	(6.0)	3.4	(11.0)
Cornbrash	Limestone, rubbly	0.2+	(0.5+)	3.6	(12.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	40	+16	15
		-16 + 4	25
Sand	42	-4 + 1	14
		-1 + $\frac{1}{4}$	14
		-$\frac{1}{4}$ + 1/16	14
Fines	18	-1/16	18

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.6 - 2.8	No grading available		
2.8 - 3.4	18	42	40

SP 41 SW 26 4169 1240 Elm Farm, Freeland Block H

Surface level (+104.7 m) +344 ft
Water struck at +103.2 m
Shell and auger (modified) 6 in (152 mm) diameter
February 1974

Overburden 1.0 m (3.5 ft)
Mineral 1.3 m (4.5 ft)
Waste 1.0 m (3.5 ft)
Bedrock 1.0 m+ (3.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil and clayey subsoil	1.0	(3.5)	1.0	(3.5)
Glacial Sand and Gravel	'Clayey' pebbly sand Gravel: fine to coarse quartz Sand: mainly medium quartz, reddish brown	1.3	(4.5)	2.3	(7.5)
	Clay, pale blue	1.0	(3.5)	3.3	(11.0)
Oxford Clay	Clay, bluish grey	1.0+	(3.5+)	4.3	(14.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	19	+16	11
		-16 + 4	8
Sand	66	-4 + 1	11
		-1 + $\frac{1}{4}$	44
		-$\frac{1}{4}$ + 1/16	11
Fines	15	-1/16	15

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.0 - 1.5	22	66	12
1.5 - 2.3	11	66	23

SP 41 SW 27 4220 1491 Evenlode Bridge, Long Hanborough Block G

Surface level (+69.5 m) +228 ft
Water struck at 68.0 m
Shell and auger (modified) 6 in (152 mm) diameter
January 1971

Overburden 1.5 m (5.0 ft)
Mineral 2.0 m (6.5 ft)
Bedrock 0.3 m+ (1.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Made ground	0.3	(1.0)	0.3	(1.0)
Alluvium	Clay, silty, yellowish brown	1.2	(4.0)	1.5	(5.0)
First Terrace Deposit	Gravel Gravel: fine to coarse, white, oolitic limestone with some sandstone and quartz Sand: mainly coarse grained	2.0	(6.5)	3.5	(11.5)
White Limestone	Limestone, oolitic	0.3+	(1.0+)	3.8	(12.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	58	+16	18
		-16 + 4	40
Sand	37	-4 + 1	24
		-1 + $\frac{1}{4}$	10
		-$\frac{1}{4}$ + 1/16	3
Fines	5	-1/16	5

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.5 - 2.5	4	32	64
2.5 - 3.5	6	43	51

SP 41 SW 28 4394 1437 Hanborough Bridge Block C

Surface level (+67.0 m) 220 ft
Water struck at +64.8 m
Shell and auger (modified) 6 in (152 mm) diameter
April 1971

Overburden 2.2 m (7.0 ft)
Mineral 2.4 m (8.0 ft)
Bedrock 0.7 m+ (2.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil	0.3	(1.0)	0.3	(1.0)
Alluvium	Clay, brown, silty, with coarse limestone pebbles; bluish grey towards the base	1.9	(6.0)	2.2	(7.0)
First Terrace Deposits	Gravel Gravel: fine to coarse, buff limestone with some flint and quartz Sand: medium to coarse	2.4	(8.0)	4.6	(15.0)
Forest Marble	Limestone, oolitic, buff, fossiliferous	0.7+	(2.5+)	5.3	(17.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	52	+16	15
		-16 + 4	37
Sand	45	-4 + 1	22
		-1 + $\frac{1}{4}$	20
		-$\frac{1}{4}$ + 1/16	3
Fines	3	-1/16	3

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.2 - 3.2	1	27	72
3.2 - 4.2	5	60	35
4.2 - 4.6	4	53	43

SP 41 SW 29 4386 1291 New Barn, Church Hanborough Block C

Surface level (+64.6 m) 212 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
January 1971

Overburden 0.7 m (2.5 ft)
Mineral 3.0 m (10.0 ft)
Bedrock 0.3 m+ (1.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
Alluvium	Soil on clay, silty, yellowish brown	0.7	(2.5)	0.7	(2.5)
First Terrace Deposits	Gravel Gravel: fine to coarse, white oolitic limestone with reddish brown sandstone, subrounded quartz and flint Sand: medium to coarse, light brown, quartz	3.0	(10.0)	3.7	(12.0)
Forest Marble	Clay, plastic, silty, bluish grey with fossil fragments	0.3+	(1.0+)	4.0	(13.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	60	+16	22
		-16 + 4	38
Sand	37	-4 + 1	21
		-1 + $\frac{1}{4}$	13
		-$\frac{1}{4}$ + 1/16	3
Fines	3	-1/16	3

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.7 - 1.7	2	39	59
1.7 - 2.7	3	27	70
2.7 - 3.7	3	46	51

SP 41 SW 30 4348 1164 New Barn, Church Hanborough Block F

Surface level (+69.1 m) +227 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
January 1971

Overburden 0.8 m (2.5 ft)
Mineral 1.1 m (3.5 ft)
Bedrock 0.4 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil on clay, brown, silty, with fragments of quartz and white limestone	0.8	(2.5)	0.8	(2.5)
Second Terrace Deposits	'Very clayey' gravel Gravel: fine to coarse, white limestone becoming black near the base Sand: fine to coarse, yellowish brown, silt bands, clayey below 1.4 m	1.1	(3.5)	1.9	(6.0)
Cornbrash	Limestone, rubbly, fossiliferous	0.4+	(1.5+)	2.3	(7.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	43	+16	27
		-16 + 4	16
Sand	32	-4 + 1	10
		-1 + $\frac{1}{4}$	11
		-$\frac{1}{4}$ + 1/16	11
Fines	25	-1/16	25

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.8 - 1.9	25	32	43

SP 41 SW 31 4408 1047 Mill Lane, Eynsham Block C

Surface level (+62.4 m) +205 ft
Water struck at +60.0 m
Shell and auger (modified) 6 in (152 mm) diameter
September 1971

Overburden 1.0 m (3.5 ft)
Mineral 4.0 m (13.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil, dark brown, clayey	0.2	(0.5)	0.2	(0.5)
Alluvium	Clay, silty, reddish brown becoming light grey towards the base	0.8	(2.5)	1.0	(3.5)
First Terrace Deposits	Gravel Gravel: fine to coarse, subrounded, oolitic limestone, buff to greyish brown, with some quartz, sandstone, ironstone and shell fragments. Limestone becomes coarser towards the base Sand: fine to coarse grey limestone with traces of quartz	4.0	(13.0)	5.0	(16.5)
Oxford Clay	Clay, bluish grey stiff, silty in upper part, shell fragments	0.5+	(1.5+)	5.5	(18.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	60	+16	18
		-16 + 4	42
Sand	37	-4 + 1	21
		-1 + ¼	14
		-¼ + 1/16	2
Fines	3	-1/16	3

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.0 - 2.0	9	51	40
2.0 - 3.0	2	31	67
3.0 - 4.0	1	33	66
4.0 - 5.0	1	31	68

SP 41 SE 2 4525 1071 Cassington House, Cassington Block C

Surface level (+63.1 m) +207 ft
Water struck at +59.0 m
Shell and auger (modified) 6 in (152 mm) diameter
January 1971

Overburden 1.1 m (3.5 ft)
Mineral 5.1 m (17.0 ft)
Bedrock 0.9 m+ (3.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Made ground	1.1	(3.5)	1.1	(3.5)
Second Terrace Deposits	'Clayey' gravel Gravel: medium to coarse, white limestone with angular flint and subrounded quartz Sand: medium to coarse, light brown	5.1	(17.0)	6.2	(20.5)
Oxford Clay	Clay, bluish grey, stiff	0.9+	(3.0+)	7.1	(23.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	43	+16	10
		-16 + 4	33
Sand	49	-4 + 1	20
		-1 + $\frac{1}{4}$	22
		-$\frac{1}{4}$ + 1/16	7
Fines	8	-1/16	8

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.1 - 2.1	15	42	43
2.1 - 3.1	[12	46	42]
3.1 - 4.1	10	50	40
4.1 - 5.1	2	54	44
5.1 - 6.2	2	52	46

SP 41 SE 3 4673 1246 Spring Hill, Begbroke Block G

Surface level (+95.4 m) +313 ft
Water struck at +93.7 m
Shell and auger (modified) 6 in (152 mm) diameter
May 1971

Overburden 1.5 m (5.0 ft)
Mineral 1.0 m (3.5 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil with well rounded quartz pebbles near the base	0.6	(2.0)	0.6	(2.0)
Fourth Terrace Deposits	Clay, sandy, orange-brown, stiff with quartzite pebbles	0.9	(3.0)	1.5	(5.0)
	Gravel Gravel: fine to medium limestone with subrounded quartzite Sand: fine to coarse, clayey bands in upper part	1.0	(3.5)	2.5	(8.0)
Oxford Clay	Clay, light blue, firm, with fragile shells	0.5+	(1.5+)	3.0	(10.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	47	+16	9
		-16 + 4	38
Sand	47	-4 + 1	20
		-1 + $\frac{1}{4}$	20
		-$\frac{1}{4}$ + 1/16	7
Fines	6	-1/16	6

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.5 - 2.5	6	47	47

SP 41 SE 4 4614 1155 Rectory Farm, Worton Block C

Surface level (+64.6 m) +212 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
February 1971

Overburden 2.2 m (7.0 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, on brown silty clay, sandy towards the base	2.2	(7.0)	2.2	(7.0)
Second Terrace Deposits	Gravel Gravel: fine to coarse, white, oolitic limestone with subrounded quartz and flint and traces of shell fragments Sand: medium to coarse with trace of silty clay	1.3	(4.5)	3.5	(11.5)
Oxford Clay	Clay, brown, becoming steel-grey with depth	0.5+	(1.5+)	4.0	(13.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	67	+16	23
		-16 + 4	44
Sand	29	-4 + 1	14
		-1 + $\frac{1}{4}$	12
		-$\frac{1}{4}$ + 1/16	3
Fines	4	-1/16	4

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
2.2 - 3.5	4	29	67

SP 41 SE 5 4646 1055 Cassington Halt, Cassington Block C

Surface level (+59.4 m) +195 ft
Water struck at +58.2 m
Shell and auger (modified) 6 in (152 mm) diameter
April 1971

Overburden 1.2 m (4.0 ft)
Mineral 4.6 m (15.0 ft)
Bedrock 0.5 m+ (1.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil	0.3	(1.0)	0.3	(1.0)
Alluvium	Clay, silty, yellowish brown, with limestone fragments	0.7	(2.5)	1.0	(3.5)
	Sand, yellow, with minor amounts of silt and clay	0.2	(0.5)	1.2	(4.0)
First Terrace Deposits	Gravel Gravel: fine to medium, tabular limestone with some rounded quartz Sand: fine to coarse, with 5 cm dark grey silty clay at 5.1 m	4.6	(15.0)	5.8	(19.0)
Oxford Clay	Clay, silty, stiff, dark grey, with thin shells	0.5+	(1.5+)	6.3	(20.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	52	+16	14
		-16 + 4	38
Sand	46	-4 + 1	21
		-1 + $\frac{1}{4}$	21
		-$\frac{1}{4}$ + 1/16	4
Fines	2	-1/16	2

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.2 - 2.2	2	44	54
2.2 - 3.2	2	44	54
3.2 - 4.2	2	46	52
4.2 - 5.2	2	50	48
5.2 - 5.8	2	45	53

SP 41 SE 6 4777 1350 Begbroke Hill, Begbroke Block E

Surface level (+68.2 m) +224 ft
Water struck at +64.8 m
Shell and auger (modified) 6 in (152 mm) diameter
January 1971

Overburden 1.4 m (4.5 ft)
Mineral 3.1 m (10.0 ft)
Bedrock 0.3 m+ (1.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil and subsoil of brown silty clay	1.4	(4.5)	1.4	(4.5)
Second Terrace Deposits	'Clayey' gravel Gravel: fine to medium, white limestone with subangular flint Sand: fine to medium, silty in parts, brown	3.1	(10.0)	4.5	(15.0)
Oxford Clay	Clay, dark grey	0.3+	(1.0+)	4.8	(16.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	47	+16	16
		-16 + 4	31
Sand	43	-4 + 1	17
		-1 + $\frac{1}{4}$	19
		-$\frac{1}{4}$ + 1/16	7
Fines	10	-1/16	10

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.4 - 2.4	16	52	32
2.4 - 3.4	10	40	50
3.4 - 4.5	4	38	58

SP 41 SE 7 4743 1066 Kings Lock, Yarnton Block D

Surface level (+58.8 m) +193 ft
Water struck at +56.9 m
Shell and auger (modified) 152 mm (6 in) diameter
April 1971

Overburden 1.9 m (6.0 ft)
Mineral 4.0 m (13.0 ft)
Bedrock 0.6 m+ (2.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil, dark brown	0.1	(0.5)	0.1	(0.5)
Alluvium	Clay, silty, yellowish brown, becoming greyish blue towards the base Carbonaceous material and shell fragments	1.8	(6.0)	1.9	(6.0)
First Terrace Deposits	Gravel Gravel: medium to coarse, tabular limestone with subrounded quartz, flint, and shell fragments Sand: fine to coarse, buff	4.0	(13.0)	5.9	(19.5)
Oxford Clay	Clay, silty, stiff, dark grey, shell fragments	0.6+	(2.0+)	6.5	(21.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	52	+16	14
		-16 + 4	38
Sand	46	-4 + 1	27
		-1 + $\frac{1}{4}$	16
		-$\frac{1}{4}$ + 1/16	3
Fines	2	-1/16	2

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.9 - 2.9	2	44	54
2.9 - 3.9	2	47	51
3.9 - 4.9	1	48	51
4.9 - 5.9	2	47	51

SP 41 SE 8 4821 1466 Kidlington Station, Kidlington Block E

Surface level (+67.6 m) +222 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
January 1971

Overburden 0.6 m (2.0 ft)
Mineral 3.0 m (10.0 ft)
Bedrock not penetrated

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
	Soil and subsoil, brown	0.6	(2.0)	0.6	(2.0)
Second Terrace Deposits	'Clayey' sandy gravel Gravel: fine to coarse limestone, tabular, with subangular flint Sand: fine to medium grained limestone, brown	3.0	(10.0)	3.6	(12.0)
?Kellaways Clay	No sample recovered			not penetrated	

GRADING

Mean for Deposit

	%	mm	%
Gravel	38	+16	10
		-16 + 4	28
Sand	49	-4 + 1	18
		-1 + $\frac{1}{4}$	20
		-$\frac{1}{4}$ + 1/16	11
Fines	13	-1/16	13

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.6 - 1.6	9	53	38
1.6 - 2.6	12	48	40
2.6 - 3.6	18	47	35

SP 41 SE 9 4898 1354 Grove Farm, Kidlington Block E

Surface level (+61.5 m) +202 ft
Groundwater conditions not recorded
Shell and auger (modified) 6 in (152 mm) diameter
January 1971

Overburden 0.8 m (2.5 ft)
Mineral 2.0 m (6.5 ft)
Bedrock 0.2 m+ (0.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
Alluvium	Clay, silty, yellowish brown	0.8	(2.5)	0.8	(2.5)
First Terrace Deposits	Sandy gravel Gravel: fine to medium limestone with some flint, sandstone, and shell fragments Sand: medium grained, light brown	2.0	(6.5)	2.8	(9.0)
Oxford Clay	Clay, stiff, bluish grey	0.2+	(0.5+)	3.0	(10.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	39	+16	13
		-16 + 4	26
Sand	58	-4 + 1	15
		-1 + $\frac{1}{4}$	34
		-$\frac{1}{4}$ + 1/16	9
Fines	3	-1/16	3

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.8 - 1.8	5	73	22
1.8 - 2.8	2	43	55

SP 41 SE 10 4804 1261 Ivy House, Yarnton Block E

Surface level (+60.6 m) +199 ft
Water struck at +59.9 m
Shell and auger (modified) 6 in (152 mm) diameter
January 1971

Overburden 0.7 m (2.5 ft)
Mineral 4.1 m (13.5 ft)
Bedrock 0.2 m+ (0.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
Alluvium	Clay, silty, light brown	0.7	(2.5)	0.7	(2.5)
First Terrace Deposits	Sandy gravel, with bands of brown silty clay towards the base Gravel: fine to medium, white limestone with subangular quartz and flint Sand: medium to coarse	4.1	(13.5)	4.8	(16.0)
Oxford Clay	Clay, bluish grey	0.2+	(0.5+)	5.0	(16.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	43	+16	13
		-16 + 4	30
Sand	53	-4 + 1	24
		-1 + $\frac{1}{4}$	25
		-$\frac{1}{4}$ + 1/16	4
Fines	4	-1/16	4

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
0.7 - 1.7	9	59	32
1.7 - 2.7	2	51	47
2.7 - 3.7	3	51	46
3.7 - 4.8	4	51	45

SP 41 SE 11 4818 1065 Dukes Lock, Yarnton Block D

Surface level (+59.1 m) +194 ft
Water struck at +57.8 m
Shell and auger (modified) 6 in (152 mm) diameter
April 1971

Overburden 1.3 m (4.5 ft)
Mineral 3.6 m (12.0 ft)
Bedrock 0.6 m+ (2.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
	Soil, dark brown	0.2	(0.5)	0.2	(0.5)
Alluvium	Clay, silty, yellowish brown, becoming greyish brown towards the base	1.1	(3.5)	1.3	(4.5)
First Terrace Deposits	Gravel Gravel: fine to coarse limestone with subrounded quartzite, ironstone and shell fragments. Coarser towards the base Sand: fine to coarse limestone, quartz and ironstone, silty in parts	3.6	(12.0)	4.9	(16.0)
Oxford Clay	Clay, dark grey, stiff, with shell fragments	0.6+	(2.0+)	5.5	(18.0)

GRADING

Mean for Deposit

	%	mm	%
Gravel	55	+16	17
		-16 + 4	38
Sand	43	-4 + 1	22
		-1 + $\frac{1}{4}$	18
		-$\frac{1}{4}$ + 1/16	3
Fines	2	-1/16	2

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.3 - 2.3	3	59	38
2.3 - 3.3	1	46	53
3.3 - 4.3	1	32	67
4.3 - 4.9	1	28	71

SP 41 SE 12 4902 1262 Kidlington Green Lock, Kidlington Block E

Surface level (+60.3 m) +198 ft
Water struck at +59.3 m
Shell and auger (modified) 6 in (152 mm) diameter
January 1971

Overburden 1.0 m (3.5 ft)
Mineral 2.8 m (9.0 ft)
Bedrock 0.3 m+ (1.0 ft+)

LOG

Geological Classification	Lithology	Thickness m	(ft)	Depth m	(ft)
Alluvium	Soil and brown, silty clay	1.0	(3.5)	1.0	(3.5)
First Terrace Deposits	Sandy gravel, clayey towards base Gravel: fine to medium, tabular white limestone with some flint, sandstone and quartz Sand: medium to coarse	2.8	(9.0)	3.8	(12.5)
Oxford Clay	Clay, stiff, greyish blue, with shell fragments	0.3+	(1.0+)	4.1	(13.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	35	+16	8
		-16 + 4	27
Sand	59	-4 + 1	19
		-1 + ¼	32
		-¼ + 1/16	8
Fines	6	-1/16	6

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.0 - 2.0	8	56	36
2.0 - 3.0	6	64	30
3.0 - 3.8	5	57	38

SP 41 SE 13 4975 1459 Manor Farm, Kidlington Block E

Surface level (+62.7 m) +206 ft
Water struck at +61.0 m
Shell and auger (modified) 6 in (152 mm) diameter
February 1974

Overburden 1.4 m (4.5 ft)
Mineral 1.1 m (3.5 ft)
Bedrock 1.0 m+ (3.5 ft+)

LOG

Geological Classification	Lithology	Thickness m	Thickness (ft)	Depth m	Depth (ft)
Alluvium	Soil on reddish brown silty clay, pebbly towards base	1.4	(4.5)	1.4	(4.5)
First Terrace Deposits	'Clayey' sandy gravel Gravel: predominantly fine limestone with subrounded flint and quartz Sand: medium to coarse quartz and flint	1.1	(3.5)	2.5	(8.0)
Kellaways Clay	Clay, grey, silty	1.0+	(3.5+)	3.5	(11.5)

GRADING

Mean for Deposit

	%	mm	%
Gravel	24	+16	4
		-16 + 4	20
Sand	65	-4 + 1	14
		-1 + $\frac{1}{4}$	38
		-$\frac{1}{4}$ + 1/16	13
Fines	11	-1/16	11

Bulk Samples

Depth below surface (m)	Percentages Fines	Sand	Gravel
1.4 - 1.7	11	61	28
1.7 - 2.5	11	66	23

Appendix G: List of Workings

In June 1975, the following sand and gravel workings in River Terrace Deposits were known to be operational in the area.

Location	Grid Reference
Dix Pit	409 043
West of Stanton Harcourt	401 055
The following quarries are known to be disused:	
South of Cassington	450 102
Near Begbroke	482 131
The Row, Long Hanborough	414 142
The Row, Long Hanborough	416 139
Near the A 4095, Long Hanborough	423 141
Between Long Hanborough and Church Hanborough	421 135
City Farm	430 109

Appendix H: Conversion Table, Metres to Feet (to nearest 0.5 ft)

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

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Assessment of British Sand and Gravel Resources

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INSTITUTE OF GEOLOGICAL SCIENCES

MINERAL ASSESSMENT UNIT

THE SAND AND GRAVEL RESOURCES OF THE EYNSHAM AREA

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

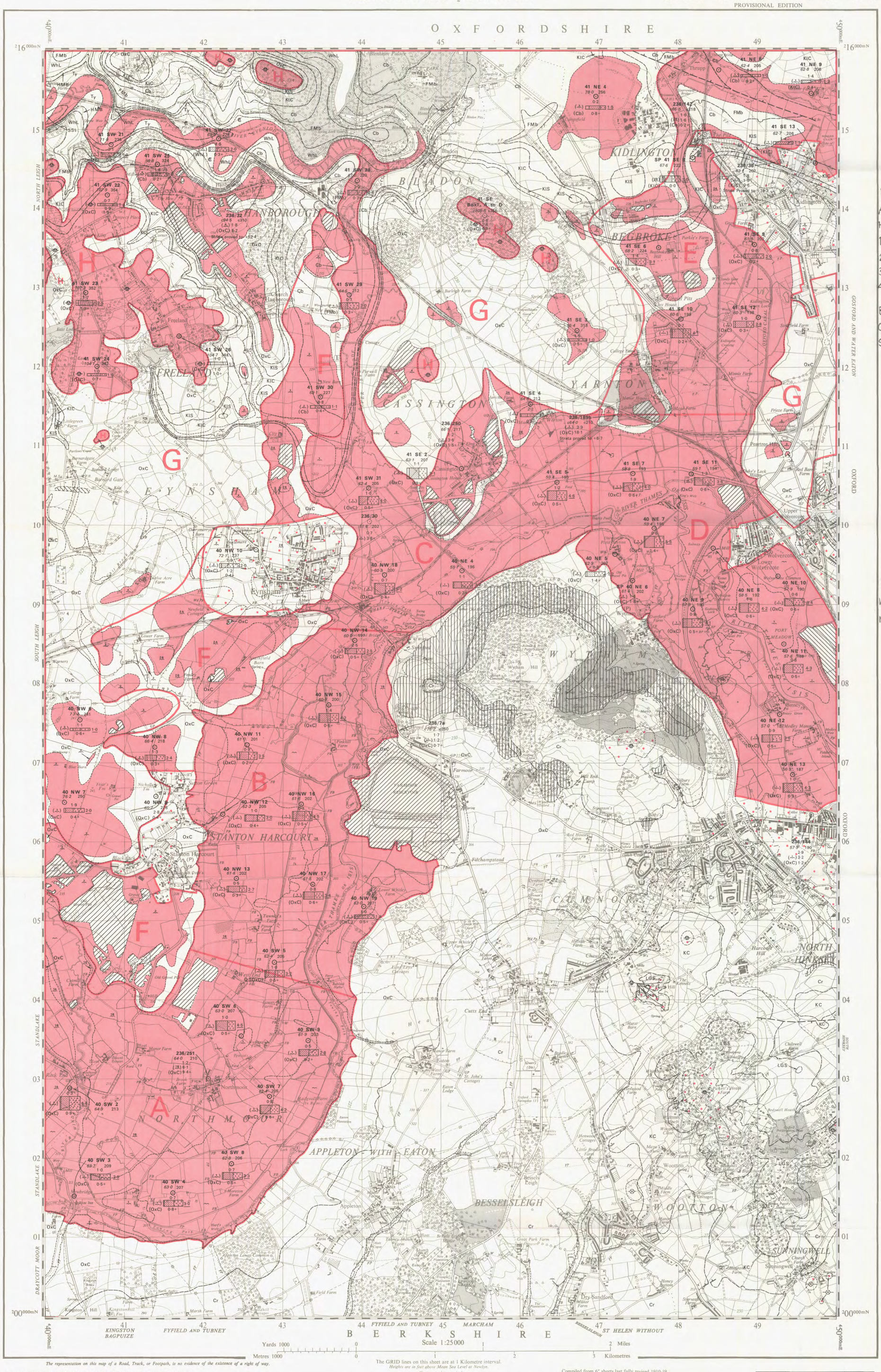
ORDNANCE SURVEY

SHEET SP40 & PART OF SP41

PROVISIONAL EDITION

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

28



EXPLANATION OF SYMBOLS AND ABBREVIATIONS

DRIFT

RECENT AND PLEISTOCENE

P-1		**Peat**
A-19		**Alluvium** — variably coloured humic silts and clays.
H-13		**Head** — unsorted pebbles of limestone in a reddish-brown clayey-sand matrix.
1T-9	1A	**First Terrace (Northmoor)**
2T-6	2B / 2A	**Second Terrace (Summertown-Radley)**
3T-5	3B / 3A	**Third Terrace (Wolvercote)**
4T-3	4B / 4A	**Fourth Terrace (Hanborough)**

River Terrace Deposits — mainly sand and gravel.

BC-11		**Boulder Clay**
CS-17		**Glacial Sand and Gravel**
SG-1		**Sand and Gravel of Unknown Age**

SOLID

CRETACEOUS

LGS	**Lower Greensand, unconformity at base** — Ferruginous sand.

JURASSIC

KC	**Kimmeridge Clay** — Blue-grey silty clay.
Cr	**Corallian** — Oolitic, coralline and shelly limestone sands, clays and silts.
OxC	**Oxford Clay**
KlS	**Kellaways Sand**
KlC	**Kellaways Clay**
Cb	**Cornbrash** — Rubbly, shelly detrital limestone.
FMb	**Forest Marble** — Interbedded flaggy limestones and clays.
WhL	**White Limestone**
HMB	**Hampen Marly Beds**
Ty	**Taynton Stone**
SSt	**Stonesfield Slate**

Great Oolite 'Series' — Limestones, grey clays and silts.

L-1	Landslip
WO-2	Worked out opencast sand and gravel areas.
MG-2	Made Ground

BOUNDARY LINES

- Geological boundary, Drift.
- Geological boundary, Solid.
- Fault at surface, crossmark indicates downthrow side.
- Resource Block Boundary.

Broken lines denote uncertainty.

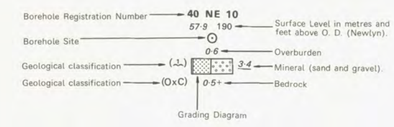
BOREHOLE DATA

SITE LOCATIONS

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

⊙ Other Boreholes.

M.A.U. BOREHOLES



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

Borehole Registration Number

Each M.A.U. borehole is identified by a Registration Number, e.g. 40 NE 10. The first number and letters refer to the quarter sheet, and the second number to the I.G.S. serial number for that quarter. The unique designation for borehole 40 NE 10 is SP 40 NE 10

Grading Diagrams

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

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

OTHER BOREHOLES

The layout of information is the same as for M.A.U. boreholes, although data available may not be as comprehensive. They are registered in the same series, except for records in the Hydrogeological Department: For example **236/251** signifies Hydrogeological Department borehole 251 on New Series One-Inch Geological sheet 236. The final depth of deep boreholes is given in metres above (+) or below(−) O.D.(Newlyn).

CATEGORIES OF DEPOSITS

	Exposed mineral. CAT-E6
	Sand and gravel not assessed. CAT-N1
	Sand and gravel absent. CAT-A3

RESOURCE BLOCKS

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

Detailed records may be consulted on application to the Head, Mineral 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 existence of a right of way.

Original geological survey on the one-inch scale by W. T. Aveline, H. Baverman, F. J. Bennett, J. H. Blake, E. Hull and W. Whittaker and others. Published on parts of Old Series Sheets.

Surveyed on the six-inch scale by J. H. Blake and T. I. Pocock 1896-1908. Published as special Oxford District Sheet 236.

Re-surveyed by A. W. Kemp, B. C. Coppock, D. Foster, S. R. Mills and E. G. Poole in 1969-73.

Sand and Gravel Survey by H. C. Squirrell, P. Robson, J. A. Gray, D. J. Havard and W. J. R. Harries in 1971-74 R. G. Thurrell, Head, Mineral Assessment Unit.

1:25 000 Sand and Gravel Resource Sheet published 1977

Austin W. Woodland, C.B.E., *Director, Institute of Geological Sciences, incorporating the Geological Survey of Great Britain, the Museum of Practical Geology and Overseas Geological Surveys.*

1550/77

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

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

Compiled from 6" sheets last fully revised 1910-19.
Other partial systematic revision 1936-56 has been incorporated.
Farmoor Reservoir revised 1965.
Major roads revised 1961-68.

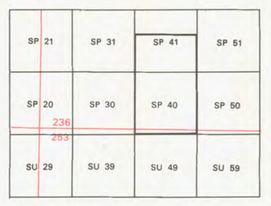


Diagram showing the relation of this sheet with the National Grid 1:25 000 and the One-Inch Geological Sheets 236 and 253.

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