

## The sand and gravel resources of the country around Fordingbridge, Hampshire

Description of 1:25 000 resource sheet SU 11 and parts of SU 00, SU 01, SU 10, SU 20 and SU 21

M. Kubala

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

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

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The asterisk on the cover indicates that parts of sheets adjacent to the one cited are described in this report.

## PREFACE

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

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

This Report describes the resources of sand and gravel of 210 km<sup>2</sup> of the country around Fordingbridge, Hampshire, shown on the accompanying 1:25 000 resource map. The survey was conducted by Mr M. R. Clarke, Mr A. J. Dixon, Mr M. Kubala and Mr R. Sobey; Mr Kubala has prepared the report with the assistance of Mr Clarke and Mr D. P. Piper. The work is based on a geological survey at 1:10 560 scale in 1896–1900 by C. Reid and F. J. Bennett, and additional survey by Mr Clarke in 1978. Mr R. A. Kent (Land Agent) was commissioned to negotiate access to land for the drilling. The ready cooperation of land owners and tenants in this work is gratefully acknowledged.

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## MAP

The sand and gravel resources of the country around Fordingbridge, Hampshire *in pocket*

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**Plate 1** Pit section in Chalky Gravel Deposits near Breamore [162 199]. These deposits which have not been found elsewhere within the survey area, comprise a series of planar and cross-bedded, chalk-rich sands and subangular flint gravels (with minor amounts of chalk and sandstone pebbles) which lie at a height of about 38 m above Ordnance Datum directly on the Upper Chalk bedrock. Apart from some solution-weathering (darker patches) near the surface, these deposits are relatively undisturbed and are thought to have been laid down in late Pleistocene times.

# The sand and gravel resources of the country around Fordingbridge, Hampshire

Description of 1:25 000 sheets SU 11 and parts of sheets SU 00, 01, 10, 20 and 21

M. KUBALA

## SUMMARY

The geological maps of the Institute of Geological Sciences, pre-existing borehole information and 108 boreholes drilled for the Industrial Minerals Assessment Unit form the basis of the assessment of sand and gravel resources of the country around Fordingbridge, Hampshire.

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

The accompanying 1:25 000 map is divided into six resource blocks containing between 2.9 and 19.7 km<sup>2</sup> of potentially workable sand and gravel. For each block, the geology of the deposits is described and the mineral-bearing area, the mean thickness of overburden and mineral, and the mean 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.

## *Bibliographic reference*

KUBALA, M. 1980. The sand and gravel resources of the country around Fordingbridge, Hampshire: description of 1:25 000 sheet SU 11 and parts of SU 00, SU 01, SU 10, SU 20 and SU 21. *Miner. Assess. Rep. Inst. Geol. Sci.*, No. 50.

## *Note*

National Grid References in this publication all lie within 100-km square SU.

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## INTRODUCTION

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

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

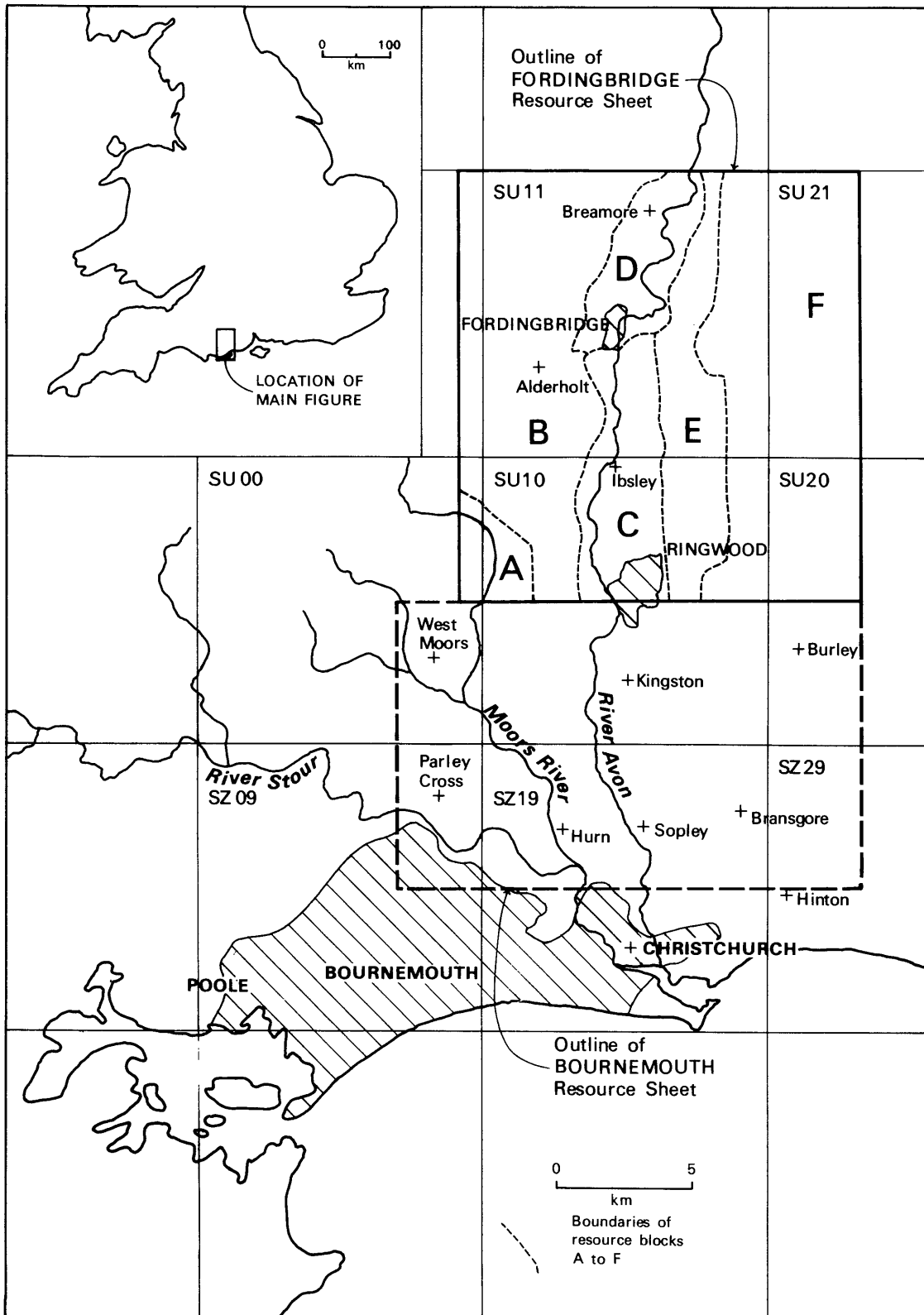
It follows that the whereabouts of reserves must still be established and their size and quality proved by the customary detailed exploration and evaluation undertaken by the industry. However, the information provided by this survey should assist in the selection of the best targets for such further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

The following arbitrary physical criteria have been adopted:

- a The deposit should average at least 1 m in thickness.
- b The ratio of overburden to sand and gravel should be no more than 3:1.
- c The proportion of fines (particles passing the No. 240 mesh BS sieve, about  $\frac{1}{16}$  mm) should not exceed 40 per cent.
- d The deposit should lie within 25 m of the surface, this being taken as the likely maximum working depth under most circumstances. It follows from the second criterion that boreholes are drilled no deeper than 18 m if no sand and gravel has been proved.

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

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



**Figure 1** The location of the resource sheet and its relationship with the adjacent survey area (Bournemouth)

grade material, are placed at  $\frac{1}{16}$  mm and 4 mm respectively (see Appendix C).

The volume and other characteristics are assessed within resource blocks, each of which, ideally, contains approximately 10 km<sup>2</sup> of sand and gravel. No account is taken of any factors, for example, roads, villages and land of 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.*

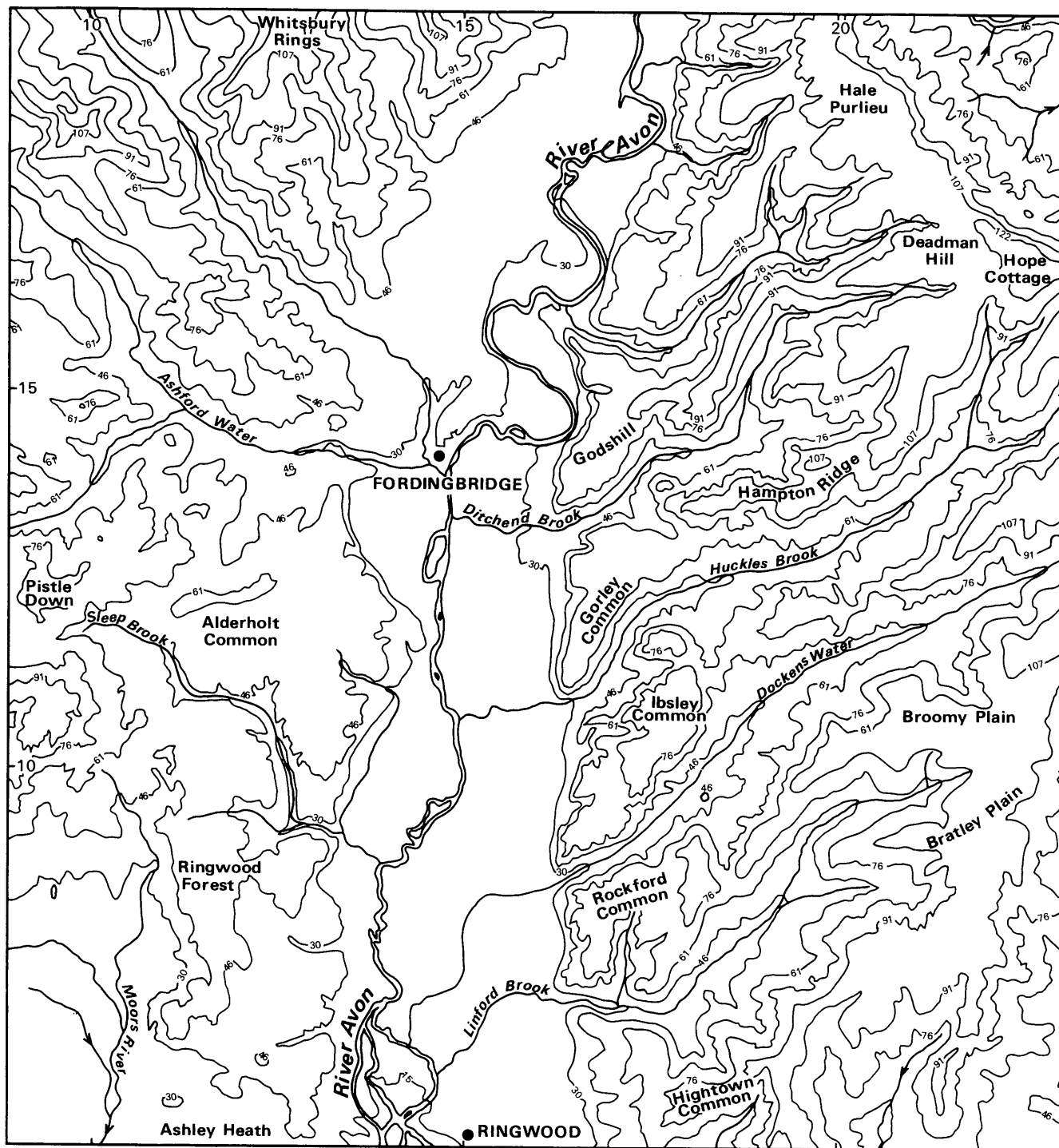


Figure 2 The topography of the resource sheet area

### DESCRIPTION OF THE RESOURCE SHEET

#### GENERAL

The resource sheet covers 210 km<sup>2</sup> of country between the market towns of Fordingbridge in the north, and Ringwood in the south (Figure 1). The fertile lowlying terraces of the River Avon and Moors River, which are used intensively for agriculture, contrast strongly with the sparsely populated high heath and downland encompassing them.

The major resources (59 per cent by volume) of sand and gravel are found in the low-lying River Terrace Deposits (2nd to 6th terraces) which cover 36.1 km<sup>2</sup>

(52 per cent) of the mineral bearing ground. However, the higher-level gravels also provide significant resources which extend over 33.6 km<sup>2</sup> (48 per cent) of the mineral-bearing area. Commercial extraction of sand and gravel has been concentrated in the lower-lying terrace deposits to the north of Ringwood.

This report, together with the adjoining report (Clarke, in press), completes the assessment of sand and gravel resources in the Avon valley.

## TOPOGRAPHY

The River Avon, which as it flows southwards falls from a height of +30 m Ordnance Datum at Breamore [158 181] to about +15 m Ordnance Datum at Ringwood, occupies an ancient valley, flanked by dissected remnants of former high-level terraces. To the east, the open heath and coniferous forest of the New Forest is characterised by sinuous remnant plateau features ranging in height from +82 m Ordnance Datum at Hightown Common [180 058] to +127 m Ordnance Datum at Hope Cottage [227 163]. Separating these flats are deep, steep-sided gullies eroded into the soft bedrock sands and clays by modern streams (Figure 2).

To the north-west of the River Avon the Chalk downlands rise to over +123 m Ordnance Datum at Whitsbury Rings, and form the source area for tributary streams, such as the Allen River, which flow south-eastwards to join the main watercourse. In the south-western corner of the sheet area, the soft bedrock sands are cut into by the Moors River and its associated terraces.

## GEOLOGY

The geological succession of mapped deposits is shown in Table 1 and the relationship between the beds is shown in Figure 3. Structurally the survey area lies within the north-western corner of the Hampshire Basin, an asymmetric syncline defined by the Tertiary outcrop to the north and the Isle of Wight monocline to the south.

**Table 1** Geological sequence and classification

DRIFT		
Quaternary	Recent and Pleistocene	Peat Alluvium Head Chalky Gravel Deposits Dry Valley Deposits Brickearth River Terrace Deposits Older River Gravels
SOLID		
Lower Tertiary (Palaeogene)	Eocene	Barton Sand Barton Clay Bracklesham Beds Bagshot Beds London Clay Reading Beds
	Palaeocene	Reading Beds
Cretaceous		Upper Chalk

The Lower Tertiary formations become thinner and coarser grained towards the margin of the basin of sedimentation in the west. A detailed account of the lithologies encountered in the area is given in the Geological Survey memoir of the country around Ringwood (Reid, 1902).

*Upper Chalk:* The Upper Chalk, which crops out in the north-west of the area, consists of soft white limestone with beds of nodular black flint. Hydrogeological Department borehole 314/29, sited at Fordingbridge, penetrated 150 m of Upper Chalk beneath the Lower Tertiary formations, but a maximum of 1.9 m+ of Upper Chalk was penetrated in only two assessment boreholes (01 NE 2 and 11 NW 6).

*Reading Beds:* The Upper Chalk is unconformably overlain by up to 25 m of Reading Beds whose outcrop

trends NE–SW across the northern part of the sheet. They consist of mottled red and brown clays overlying glauconitic sandy clay with a basal flint pebble bed. Towards the west, near Damerham, [098 158] the beds become sandy and contain seams of well rounded flint gravel; nearby, 12.8 m of Reading Beds were proved in borehole 01 NE 3 [0986 1576].

*London Clay:* A thickness of 36 m has been recorded in Hydrogeological Department borehole 314/29 for the greyish-green and bluish-grey silty clays and nodular mudstones of the London Clay which form a narrow outcrop parallel to that of the underlying Reading Beds. Greyish-green sands occur throughout the formation but are more common near the top. Assessment borehole 11 SW 8 [1442 1293] penetrated 2.0 m of London Clay sand.

*Bagshot Beds:* The Bagshot Beds extend north-east to south-west across the area and were proved to underlie the River Terrace Deposits in 46 assessment boreholes. They comprise a series of fine to medium quartz sands and interbedded 'pipeclay' lenses. Around Fordingbridge and to the north-east, near the base of the formation, 'clayey' and 'very clayey' sands have been sampled, but higher in the succession to the south (between Fordingbridge and Ibsley) the boreholes proved only sandy and silty clays. 'Clayey' sands were recovered from boreholes in the valley of the Moors River and between Ibsley and Ellingham, and further south, around Ringwood, boreholes proved clean sand and, in the case of borehole 10 NW 17, pebbly sand.

*Bracklesham Beds:* The main outcrop of the Bracklesham Beds lies to the east of the Avon valley, where the beds consist of up to 60 m of glauconitic sandy clays and dark green silty clays. They become coarser grained to the west, where grey and buff carbonaceous sands predominate. A pebble bed which crops out at Ashley Heath [120 055] was proved in borehole 11 SE 9 [1719 1263] at the base of 14.3 m of Bracklesham Beds.

*Barton Clay:* In the south-east corner of the area, dark green silty clays of the Barton Clay crop out. Nine assessment boreholes penetrated the clay to a maximum thickness of 9.6 m in 21 SW 2 [2231 1355], although up to 40 m of this formation are believed to exist in this area.

*Barton Sand:* The clayey sands and silty clays of the Barton Sand (largely concealed by the overlying River Terrace Deposits) crop out in the south-east of the area surveyed near Picket Post [191 061], where they attain a thickness of at least 18 m. They were penetrated in 8 assessment boreholes beneath the high level River Terrace Deposits and Older River Gravels; a maximum of 9.8 m of 'very clayey' sand was recorded in borehole 10 NE 8 [1805 0563].

*River Terrace Deposits and Older River Gravels:* Sealy (1955) demonstrated that many of the plateau features in this area represent terraces of the River Avon. Profile studies based on IMAU borehole data, together with a limited amount of geomorphological mapping, confirm this view. In this report and on its accompanying resource map the Plateau Gravel, as mapped on the 1:10 560 Geological Survey sheets, has been reclassified as either Older River Gravels, or River Terrace Deposits and the latter have been numbered sequentially with the



**KEY**

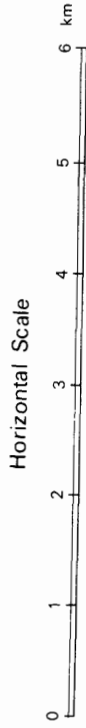
Drift deposits

- Alluvium
- Peat
- River Terrace Deposits- (numbered sequentially)
- Older River Gravels

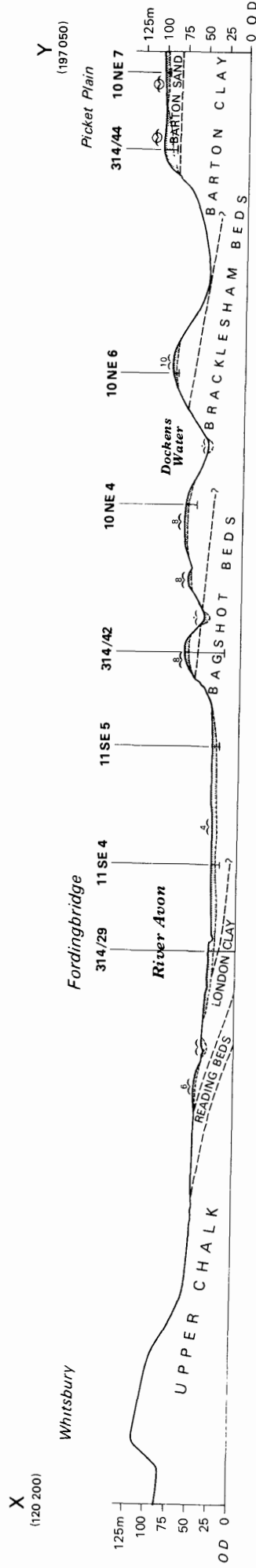
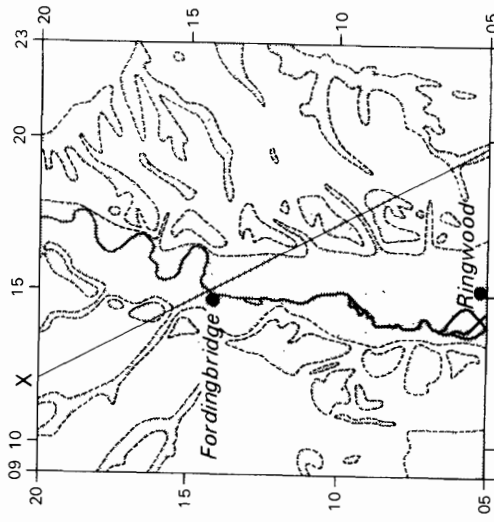
Geological boundaries

- Drift boundary
- Solid boundary

10 NE 4 Position of I.M.A.U. borehole  
(projected onto line of section)



Vertical exaggeration x10



**Figure 3** Geological cross section of the Fordingbridge sheet

lower terraces of the River Avon.

The deposits thus identified, fall into three groups: the oldest and highest (Older River Gravels) ranging in height from 85 m Ordnance Datum to 127 m Ordnance Datum; a middle group (terraces six to ten) ranging from 30 m Ordnance Datum to 85 m Ordnance Datum; and the lower or valley terraces (numbered two to five) ranging from 15 m Ordnance Datum to 35 m Ordnance Datum. The terrace profiles are shown in Figure 4.

The Older River Gravels occur as dissected plateau deposits, mainly to the east of the Avon valley, although Pistle Down [095 107] to the west, is also thought to be a high level remnant. These deposits have a proven range in thickness of 1.0 m to 9.1 m, with a mean of 3 m, and consist mainly of 'clayey' flint gravels. The poor sorting and high 'fines' content of these ancient fluvial (or fluvio-glacial) gravels suggest they may be polygenetic in origin; having been subjected to solifluxion processes and possibly illuviation of 'fines' from a pre-existing cover. It is possible to recognise five main 'levels' at which these deposits occur (see Figure 4).

The 6th to 10th terraces form discontinuous spreads of 'clayey' flint gravel close to the margins of the Avon valley. They range from 2 to 8 m in thickness with an average of about 4 m. Sedimentary structures have been preserved in these gravels and a pit section in the 7th terrace at Plumley Farm [125 092] shows planar and cross-bedding with impersistent lenses of sand and open-work gravel (pebbles with no sand or 'clay' matrix). Similar features have been observed in pits in Ringwood Forest, but there, they are disrupted into pingo-like structures—evidence that the gravels were subjected to permafrost conditions after their deposition.

The 2nd to 5th terraces form continuous spreads of flint gravel within the valley and floodplain of the Avon and the Moors River. The terrace deposits range from 1.1 to 9.3 m in thickness, with a mean of 4.5 m, and are notably coarser than deposits associated with the higher terraces. Reid (1902) found silicified Purbeck limestone pebbles, mammoth teeth, sporadic fresh-water shells and Palaeolithic flint implements in these gravels. During the present survey a small implement was recovered from borehole 11 NE 9, while silicified Purbeck Limestone pebbles were found in samples from borehole 10 NW 11.

*Brickearth:* Reddish-brown sandy clays up to 3 m in thickness have been mapped as Brickearth over a small area near North Charford [198 198]. They are of uncertain age and origin and were not penetrated in any assessment borehole.

*Dry Valley Deposits:* In the north-west of the area Dry Valley Deposits are mapped flooring the coombes of the Chalk downland. These deposits consist principally of pebbly, chalky 'clays' or 'very clayey' gravels. The poor sorting and abundance of unweathered flint and chalk pebbles suggest that the material has not travelled far. The deposits are generally too 'clayey' to be regarded as mineral but south of Damerham a patch of 'clayey' gravel has been proved at the confluence of two valleys. Borehole 11 NW 2, sited in this area, proved an exceptional 13.1 m of 'clayey' sandy gravel, possibly filling a solution-pipe or channel in the Upper Chalk surface.

*Chalky Gravel Deposits* (shown as Head on the resource map): A small pit [162 199] north of Breamore shows 4.2 m of interbedded fine and medium chalky sand and

fine and coarse subangular flint gravel (Plate 1). The deposit is unlike any other seen within the survey area, and is thought to represent a meltwater deposit of late Pleistocene age.

*Head:* Head, comprising fine subangular flint gravel in a brown clayey matrix, is exposed with the Chalky Gravel Deposits in the pit [162 199] north of Breamore.

*Alluvium:* The floodplain of the River Avon is covered with continuous spreads of greyish-green silty clays and sandy Alluvium up to 2.4 m in thickness which conceals the flint gravels of the lower-level River Terrace Deposits. Thin, peaty Alluvium is found in the floodplain of the Moors River and in the valleys of smaller tributary streams.

*Peat:* Peat occurs adjacent to several of the tributary streams draining Ringwood Forest and the New Forest. Typically it overlies waterlogged alluvial and bedrock sands. Records show 1.5 m of peat in Linwood Bog [180 097]; 1.9 m were also penetrated in borehole 10 NW 12 beneath the floodplain gravels of the River Avon.

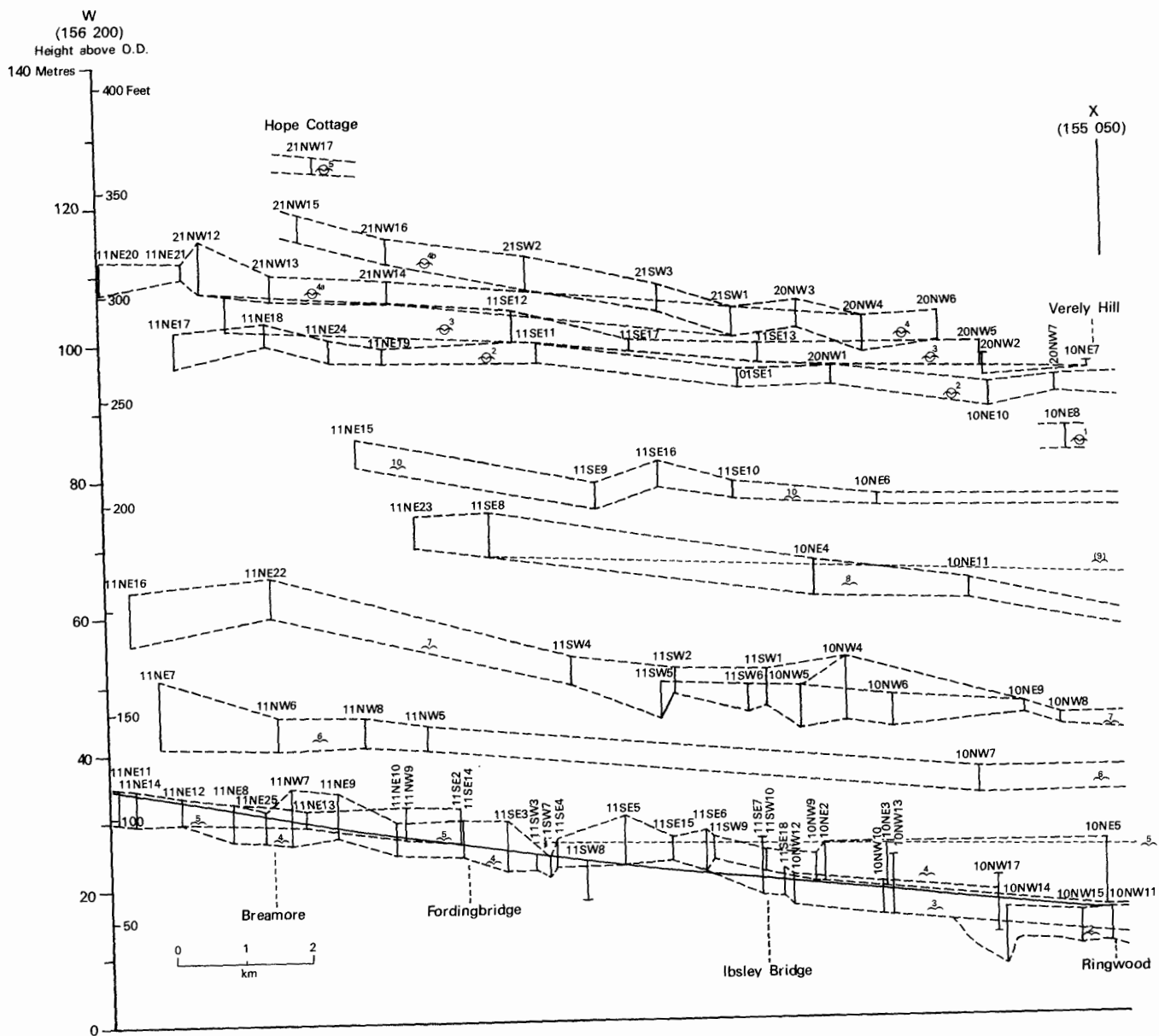
#### COMPOSITION OF THE SAND AND GRAVEL DEPOSITS

The principal sand and gravel resources within the area are the extensive spreads of River Terrace Deposits of the Avon valley. Lower Tertiary bedrock sands may provide resources of aggregate and they have been sampled to shallow depths to give an indication of their lithology, but they have not been included in the statistical assessment. Mean gradings for the mineral deposits sampled are given in Table 2, and the results of pebble count studies of individual borehole samples are given in the borehole records (Appendix F). The specific gravity, absorption and 10 per cent fines values of selected samples (thought to be representative of the deposits within the area) are given in Table 3.

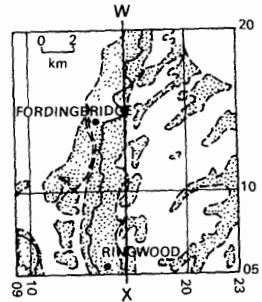
*Lower Tertiary formations:* The Reading Beds and overlying London Clay generally proved to be too 'clayey' for aggregate use, although one borehole in each formation proved mineral. Borehole 01 NE 3 proved 9.3 m of 'clayey' medium and fine sands within the Reading Beds west of Damerham. Borehole 11 SW 8 proved 2.0 m of medium sand at the top of the London Clay. Sands and 'clayey' sands from both the Reading Beds and London Clay are worked in small quantities locally to supply a brickworks [179 199] at North Charford.

Buff, 'clayey' to 'very clayey' fine to medium quartz sands were proved in 33 of the boreholes which penetrated Bagshot Beds. Below the water table the sands are greyish brown and lignitic, and towards the south-west of the sheet the proportion of medium and coarse sand increases. Subangular flint pebbles were found in borehole 10 NW 17, whereas well-rounded white-weathering flints were found in borehole 10 NW 7.

The weighted mean grading for the sampled Bagshot Beds is fines 16 per cent, fine sand 43 per cent, medium sand 38 per cent, coarse sand 1 per cent and gravel 2 per cent. Bagshot Beds are currently being worked as a source of sand for sand/lime bricks in a pit [091 095] near Verwood.



Location map showing the Drift deposits (stippled) in relation to the line of section W-X



KEY

- Thickness of River Terrace Deposits proved in assessment boreholes
- Conjectural line of terrace correlation.
- Extrapolated line of terrace correlation.
- Approximate profile of present-day River Avon
- River Terrace Deposits
- Older River Gravels.

Figure 4 Profile of the River Avon and its terraces

**Table 2** Mean grading of the mineral deposits sampled in the Fordingbridge area

Deposit	Number of data points	Mean grading percentage						
		Fines - $\frac{1}{16}$ mm	Fine sand + $\frac{1}{16}$ - $\frac{1}{4}$ mm	Medium sand + $\frac{1}{4}$ -1 mm	Coarse sand +1-4 mm	Fine gravel +4-16 mm	Coarse gravel +16-64 mm	Cobble gravel +64 mm
DRY VALLEY DEPOSITS	3	14	7	25	9	23	22	0
RIVER TERRACE DEPOSITS								
Avon terraces								
2	3	5	8	13	7	32	34	1
3	6	7	7	19	8	29	30	trace
4	20	8	4	12	11	33	32	trace
5	6	7	6	12	11	35	29	0
6	5	18	5	17	10	27	23	0
7	12	14	8	16	11	31	20	0
8	4	14	3	12	13	36	22	trace
10	5	18	4	11	12	34	21	0
OLDER RIVER GRAVELS								
(level) 1	1	22	5	7	10	36	20	0
2	9	18	4	11	11	33	23	trace
3	6	19	4	12	10	35	20	0
4 (a + b)	13	19	3	13	11	32	22	trace
5	1	43	1	10	7	24	15	0
Moors River terrace 4	7	10	13	27	8	26	16	0
BEDROCK SANDS								
Barton Sands	5	31	68	1	0	0	0	0
Bracklesham Beds	9	17	43	38	1	trace	trace	0
Bagshot Beds	31	16	43	38	1	1	1	0
London Clay	1	9	17	72	2	0	0	0
Reading Beds	1	19	30	50	1	0	0	0

Nine boreholes proved mineral in the Bracklesham Beds, mainly along the western limits of their outcrop. The mean grading is almost identical to that of the Bagshot Beds: 'clayey' fine and medium sand with scattered pebbles. The sands are commonly glauconitic, with a yellow or yellow-green colouration, and have a mean grading of fines 17 per cent, fine sand 43 per cent, medium sand 38 per cent, coarse sand 1 per cent and gravel 1 per cent.

The Barton Sand proved to be mineral in five assessment boreholes. The yellow micaceous quartz sands sampled have a mean grading of: fines 31 per cent, fine sand 68 per cent, medium sand 1 per cent.

The cumulative frequency curves for the mean grading of each bedrock sand formation are shown in Figure 6.

*River Terrace Deposits and Older River Gravels:* The mean grading of each deposit is shown in Table 2; the lower terrace deposits (2nd, 3rd, 4th and 5th terraces), contain 29 to 35 per cent of coarse flint gravel and traces of flint cobbles; they are much richer in these grades than any of the higher deposits which contain only 15 to 23 per cent. The lower terraces also appear to have a much

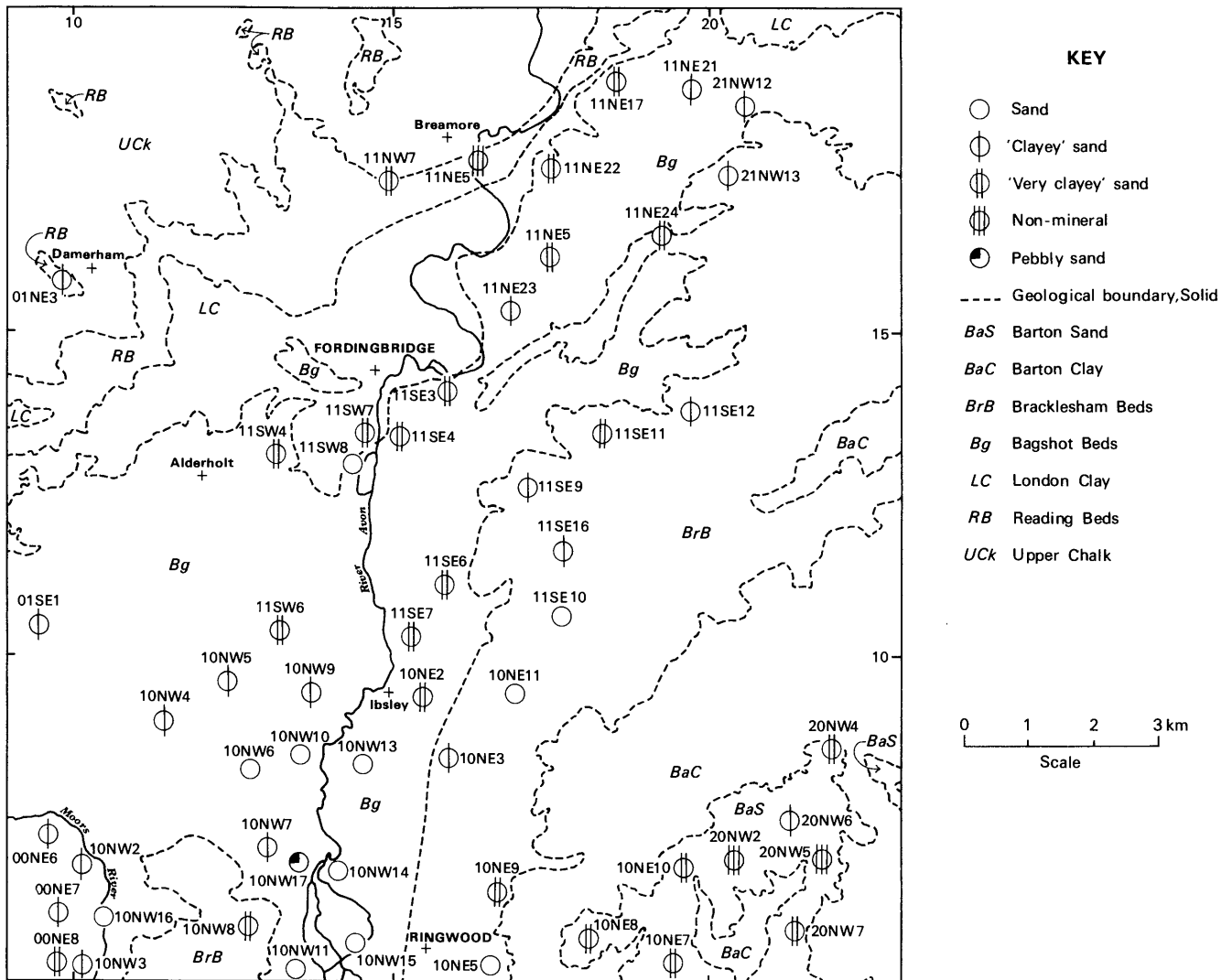
lower fines content than all the higher deposits, although this may be explained, at least in part, by poor fines recovery from the boreholes drilled in the lower terraces which have a high water table.

The fine gravel fraction (+4-16 mm) consists principally of angular to subangular grey and brown flints derived mainly from the Upper Chalk, with minor and variable amounts of well-rounded flint probably derived from the Lower Tertiary gravels. White, porous flint, which Roeder (1975) considers to be deleterious in concreting aggregate, comprises up to 7 per cent of this fraction. Pebbles of Chalk, Purbeck limestone, Lower Cretaceous sandstone and ferruginous sandstones of Tertiary age are found in small amounts, together with well-rounded vein quartz, traces of ironstone and red jasperine flint.

The chalk content of the lower terrace gravels decreases rapidly away from the Chalk outcrop, while the higher deposits (terraces 6 to 10 and the Older River Gravels), which have been decalcified by percolating rainwater, contain little or no limestone or chalk. Similarly sandstone pebbles become rarer to the south away from the Lower Cretaceous outcrops, from which

**Table 3** Specific gravity, absorption and 10 per cent fines values of selected bulk samples

Sample no.	Borehole no.	Specific gravity			Water absorption (per cent)	10 per cent fines value (kN)
		Oven dried	Apparent	Surface dried		
WAV 137-140	21 NW 12	2.30	2.58	2.41	4.8	270
WAV 186-190	11 SE 2	2.38	2.62	2.47	4.0	260
WAV 892-898	10 NW 17	2.39	2.58	2.46	3.1	240
WAV 164-167	11 NE 22	2.47	2.59	2.52	1.9	215



**Figure 5** The grading characteristics of the bedrock sands, based upon the mean grading at 56 boreholes

they were derived. The proportion of well-rounded flints present in these deposits increases towards the south-west, where the Tertiary gravels from which they were derived, crop out. The coarse gravel and cobble fractions consist principally of nodular flints with traces of sandstone pebbles.

The sand fraction varies little between the terraces, making up 25 to 35 per cent of the deposits. Medium and coarse subangular to subrounded (occasionally iron-stained) quartz sands predominate, while angular flint sand is an important constituent of the coarse grade. Quartz sand is the principal constituent of the fine sand grade, while glauconite occurs throughout the sand size range. Lignite, probably derived from the bedrock sands, has been noted in basal samples of the lower terraces, especially beneath the water table.

#### THE MAP

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

*Geological data:* The geological boundary lines shown are taken from the geological maps of the area which were surveyed at the scale of 1:10 560 by F. J. Bennett

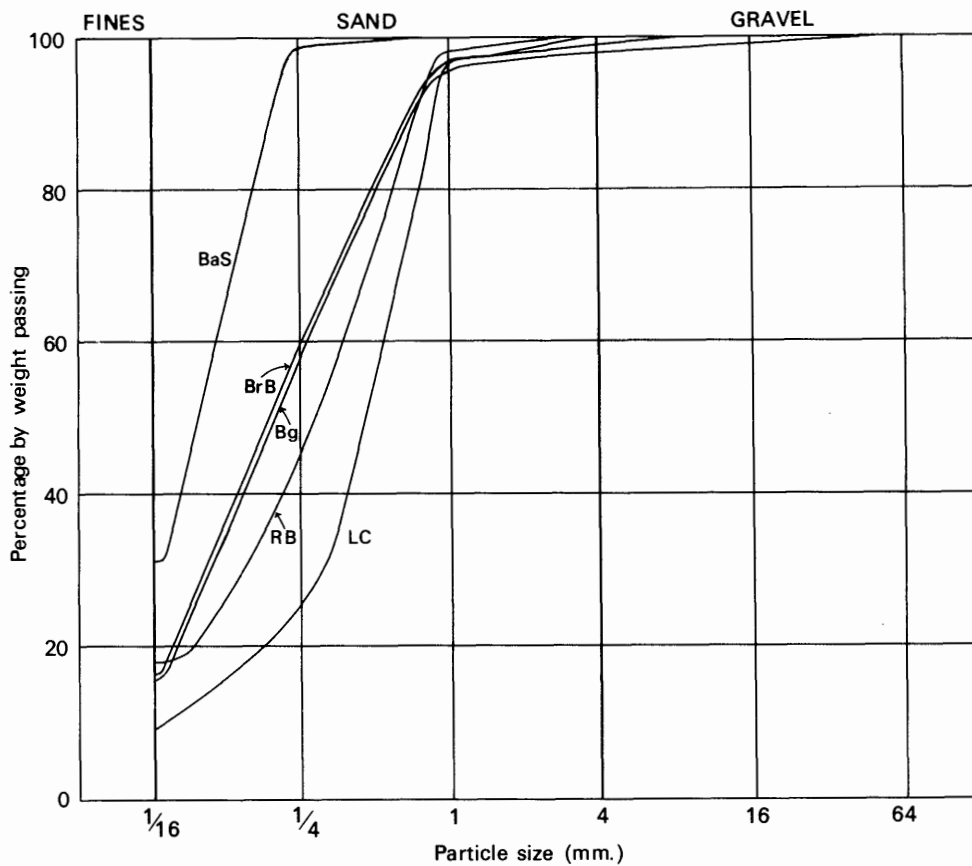
and C. Reid in 1896–1900. Minor amendments and the incorporation of terrace boundaries are based upon river profile studies and additional survey by M. R. Clarke in 1978.

Drift deposits, previously classified as Valley Gravel and Terrace Gravel have been reclassified as a sequence of terrace deposits of the River Avon and the Plateau Gravel as Older River Gravels (Figure 4 and p. 4).

Borehole data, which include the stratigraphical relations and mean particle size distribution of the sand and gravel samples collected during the assessment survey, are also shown.

*Mineral resource information:* For assessment purposes the map is divided into areas of mineral and areas where sand and gravel is either not potentially workable or absent (for definitions of 'mineral' and 'potentially workable' see p. 1).

On this resource sheet the mineral is divided into areas where it crops out and areas where it is present in continuous spreads beneath overburden, however, within these areas there may be patches where sand and gravel is absent or not potentially workable. Areas where bedrock crops out, where superficial deposits are classified as non-mineral, and where sand and gravel is thought to be not potentially workable, are shown uncoloured. Areas of unassessed sand and gravel are indicated by a red stipple.



[Formation symbols are listed in Figure 5.]

**Figure 6** Cumulative particle-size distribution curves for the mean gradings of the bedrock mineral deposits

**Table 4** Sand and gravel resources of the area

1 Statistical assessment

Resource block	Area		Mean thickness		Volume of mineral			Mean grading percentage		
	Block	Mineral	Over-burden	Mineral	Limits at the 95 per cent confidence level			Fines	Sand	Gravel
					$m^3 \times 10^6$	$\pm\%$	$\pm m^3 \times 10^6$			
km <sup>2</sup>	km <sup>2</sup>	m	m							
A	8.6	2.9	0.5	1.4	4	35	1	10	48	42
B	64.9	9.6	0.5	3.4	33	27	9	14	38	48
C	21.9	19.7	1.0	4.3	85	13	11	7	30	63
D	14.7	13.5	1.0	3.7	50	25	13	12	26	62
E	23.9	7.0	0.5	3.6	25	24	6	16	28	56
F	72.1	17.0	0.7	2.9	49	21	10	19	25	56
	2.2	Ringwood	Urban areas not assessed							
	0.9	Fording-bridge								
	0.3	Ashford								
Sheet total	209.5	69.7	0.8	3.5	244	9	21	14	30	56

2 Inferred assessment for the Damerham area not included in block B above

	0.5	0.5	0.4	1.3	0.6	Speculative		14	41	45
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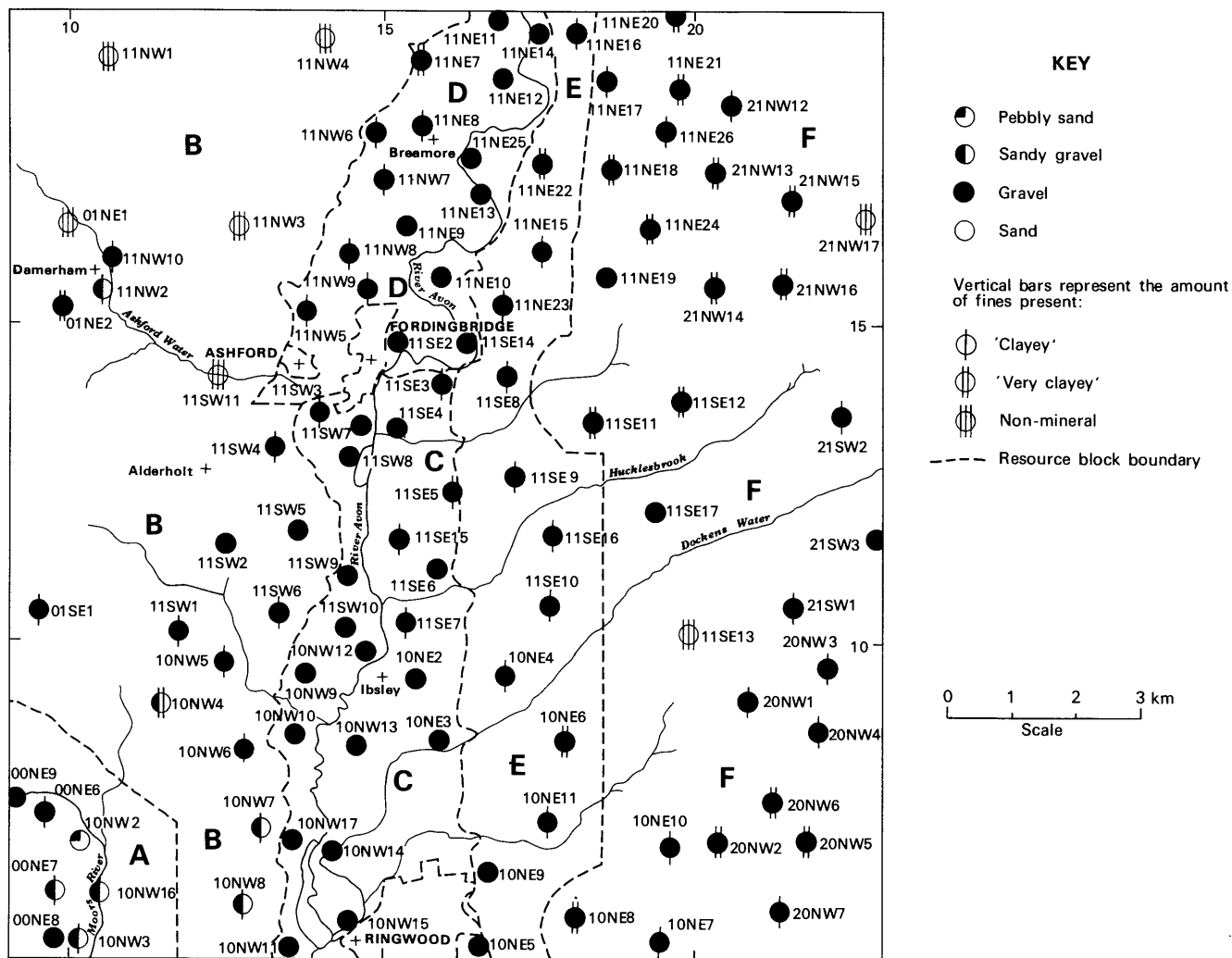


Figure 7 The grading characteristics of the Drift deposits, based on the mean grading at 106 boreholes

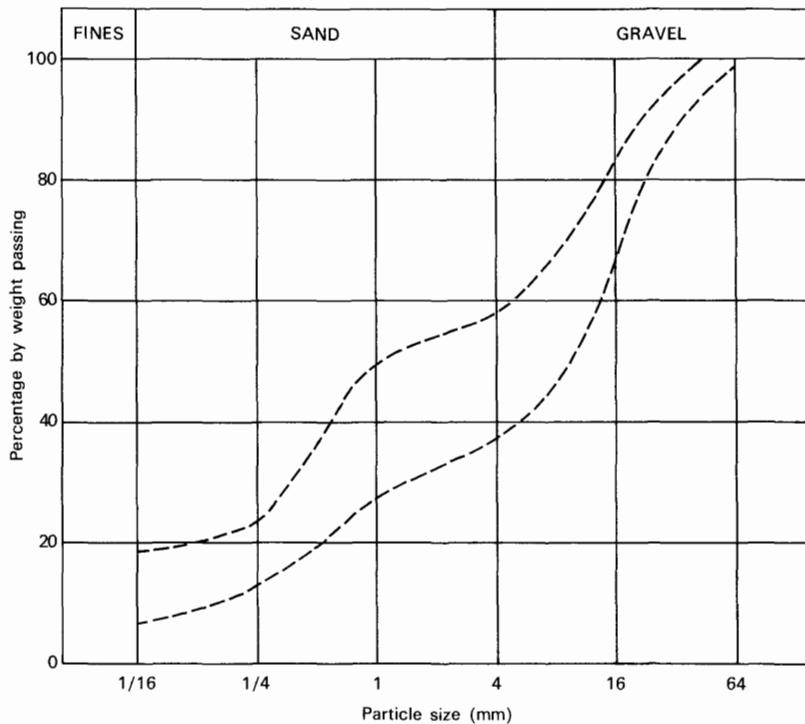
For the most part, the distribution of categories of deposits is based on the mapped geological boundaries. Where there is a transition from one category to another which cannot be related to the geological lines and which could not be delineated accurately during the survey, inferred boundaries, shown by a distinctive symbol, have been used. The symbol is intended to signify an approximate location within a likely zone of occurrence rather than to represent the breadth of the zone, its size being limited only to cartographic considerations. For the purpose of measuring areas the centre line of the symbol is used.

### RESULTS

The statistical results are summarised in Table 4 and Figure 8. Fuller details of the grading for each block are shown in Figure 9.

*Accuracy of results:* For the six resource blocks the accuracy of the results at the 95 per cent probability level varies between 13 and 35 per cent (that is, it is probable that nineteen times out of twenty the true volumes present will be within the stated limits). However, the true values are more likely to be nearer the figure estimated than the limits. Moreover, it is probable that in each block approximately the same percentage limits would

apply for the estimate of volume of a very much smaller parcel of ground (say, 10 hectares) containing similar sand and gravel deposits, if the results from the same number of sample points (as provided by, say, ten boreholes) were used in the calculation. Thus, if closer limits are needed for the quotation of reserves of part of a block, it can be expected that data from more than ten sample points will be required, even if the area is quite small. This point can be illustrated by considering the whole of the potentially workable sand and gravel in resource blocks A to F on this sheet. The volume ( $244 \times 10^6 \text{ m}^3$ ) can be estimated to limits of  $\pm 9$  per cent at the 95 per cent confidence level by a calculation based on 116 sample points spread across six resource blocks. However, it must again be emphasised that the quoted volume of sand and gravel bears no simple relationship with the amount which 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 land for mineral working.



Block	Percentage by weight passing					
	1/16 mm	1/4 mm	1 mm	4 mm	16 mm	64 mm
A	10	23	50	58	83	100
B	14	22	42	52	81	100
C	7	13	28	37	68	100
D	12	16	28	38	70	100
E	16	20	31	44	78	100
F	19	22	33	44	78	100

**Figure 8** Mean particle-size distribution for the assessed thickness of sand and gravel in resource blocks A to F

#### NOTES ON RESOURCE BLOCKS

All the Drift sand and gravel deposits have been assessed except a small area at Alderholt Bridge [117 143], which is too small to be potentially workable, and those patches which lie beneath the urban areas of Ringwood, Fordingbridge and Ashford.

The resource block boundaries have been drawn to distinguish the deposits of the Moors River (Block A) from those of the Avon valley (blocks B, C, D, E and F) and, within the latter, to distinguish the higher level river terrace deposits (Older River Gravels) of Block F from the middle terraces (blocks B and E) and the lowest group of terraces in blocks C and D. Block B also includes deposits in the dry valleys of the Chalk downland in the north-west of the area. These are generally non-mineral but a small area south of Damerham proved to be mineral bearing.

#### Block A

The mineral-bearing deposits in this block occupy 2.9 km<sup>2</sup> in the valley of the Moors River, where they occur as River Terrace Deposits (4th Terrace).

Overburden, which comprises mainly soil and thin sandy loams, ranges in thickness from nil in borehole 00 NE 7 to 0.8 m in borehole 00 NE 9, and has a mean of 0.5 m.

The potentially workable terrace gravels (mineral), which are classified in assessment boreholes as pebbly sand, sandy gravel and gravel range in thickness from

0.8 m in borehole 10 NW 2 to 2.0 m in borehole 00 NE 8 and have a mean of 1.4 m. Deposits within the floodplain area of the Moors River are thought to be non-mineral, but small patches of sand and gravel may be found locally. There are no active workings in the deposits of this block.

Using data from 7 boreholes, the estimated volume of mineral is  $4 \pm 1 \times 10^6$  m<sup>3</sup> at the 95 per cent confidence level; it has a mean grading of fines 10 per cent, sand 48 per cent and gravel 42 per cent.

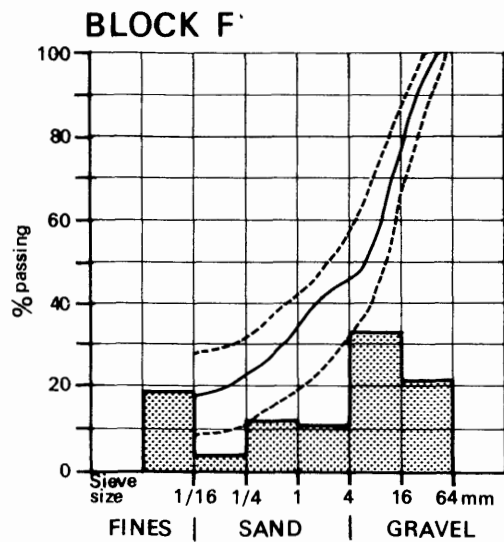
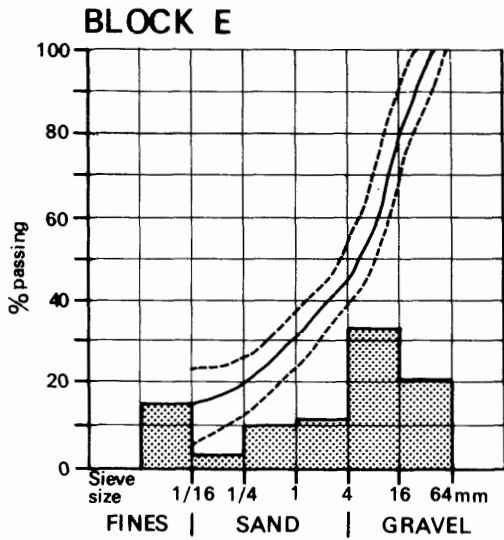
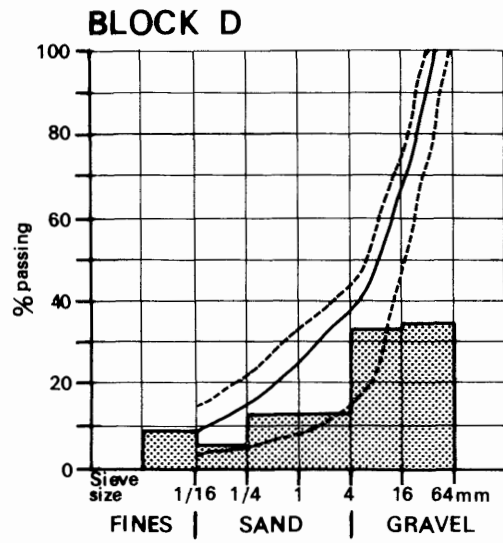
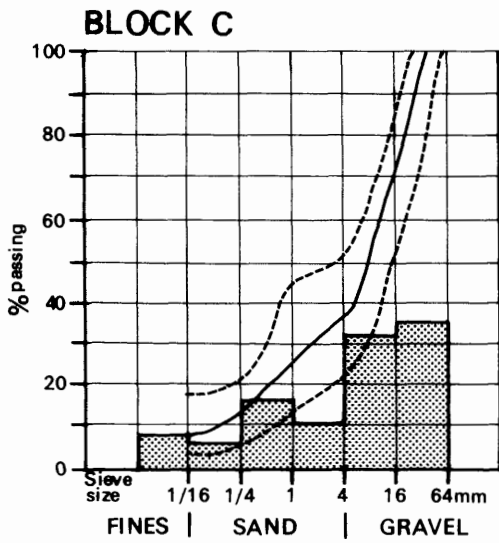
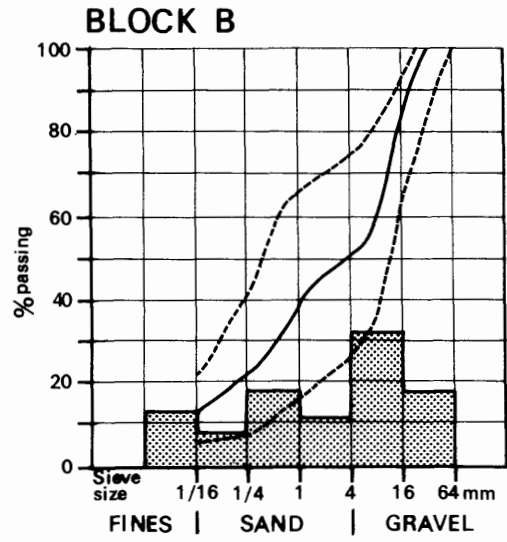
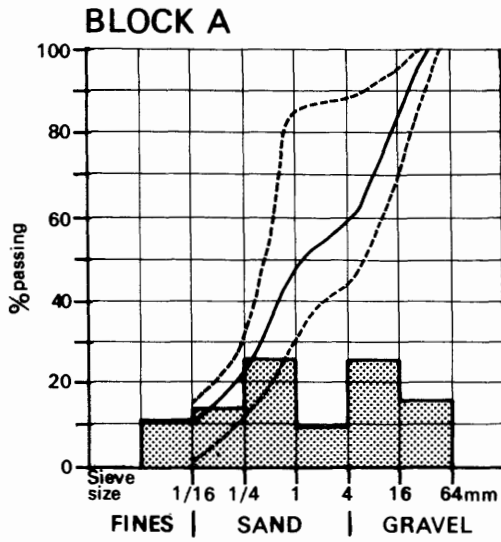
#### Block B

The dissected River Terrace Deposits of the 6th and 7th terraces, and a small area of Older River Gravels make up the 9.6 km<sup>2</sup> of mineral-bearing ground in this block.

Overburden comprises sandy topsoil and subsoil and ranges in thickness from 0.1 m in borehole 01 SE 1 to 1.0 m in borehole 10 NW 5, and has a mean of 0.5 m.

The mineral, which is classified as 'clayey' and 'very clayey' sandy gravels and gravels, ranges in thickness from 1.0 m in borehole 01 NE 2 to 9.3 m in borehole 10 NW 4, and has a mean of 3.4 m. Despite a large range in the mean grading proved at individual borehole sites, no systematic change across the area is apparent. Data from 12 assessment boreholes and 13 other sample points have been used to calculate the total volume of mineral of  $33 \pm 9 \times 10^6$  m<sup>3</sup>; the mean grading is fines 14 per cent, sand 38 per cent and gravel 48 per cent.





KEY :-  Range of particle size distribution

 Mean particle size

Figure 9 Grading characteristics of the mineral in blocks A to F

In the north-west of the block 8 boreholes were drilled into the deposits which floor the dry valleys in the Chalk downland. Five of these boreholes proved the deposit to be white or brown silty clay with flint and chalk pebbles and too 'clayey' to be classified as mineral. At the confluence of the two valleys south of Damerham the deposit was shown to be 'clayey' gravel with a mean grading of fines 14 per cent, sand 41 per cent and gravel 45 per cent. Three boreholes proved mineral in this area and an inferred assessment, based on boreholes 01 NE 2 and 11 NW 10 (but disregarding the anomalous thickness of 13.1 m recorded in borehole 11 NW 2: see p. 00), has been made (Table 4).

The terrace deposits and underlying sandy clays, 'clayey' sands and sands of the Bagshot Beds and 'very clayey' sands of the Bracklesham Beds are extensively worked to a depth of about 15 m in a pit [120 073] in Ringwood Forest and the Bagshot Beds are worked for sand in a pit [091 095] near Boveridge Heath.

#### *Block C*

The extensive and continuous spreads of River Terrace Deposits of the 2nd, 3rd and 4th terraces make up the 19.7 km<sup>2</sup> of mineral in this block; they have been worked in a number of areas to the north of Ringwood.

Overburden, generally consisting of clayey loams, but in the floodplain areas, of silty clays (Alluvium), ranges in thickness from 0.2 m in borehole 10 NW 11 to 2.4 m in borehole 10 NW 15 and has a mean of 1.0 m.

The thickness of the mineral deposits of the floodplain areas range from 1.5 m in borehole 10 NW 12 to 7.3 m in borehole 10 NW 14 with a mean of 3.2 m. They do not appear to be significantly different from those of the flanking terraces, which range in thickness from 2.2 m in borehole 11 SW 3 to 8.8 m in borehole 10 NE 5 and have a mean of 4.3 m.

Twenty three IMAU boreholes, site investigation data, and other commercial data, have been used to calculate the total volume of mineral as  $85 \times 10^6 \text{ m}^3 \pm 11 \times 10^6 \text{ m}^3$  at the 95 per cent confidence level. The mean grading is fines 7 per cent, sand 30 per cent and gravel 63 per cent.

Many of the assessment boreholes proved the underlying bedrock sands to be mineral, particularly in the south of the block.

#### *Block D*

The mineral in this block covers 13.5 km<sup>2</sup> and is distributed as continuous spreads of River Terrace Deposits of the 4th, 5th and 6th terraces. These deposits are concealed beneath Alluvium in the floodplain of the River Avon, but elsewhere within the block occur at the surface.

Soil and silty clays which make up the overburden range in thickness from 0.3 m in borehole 11 NW 5 to 1.9 m in borehole 11 NE 11 and have a mean of 1.0 m for the block as a whole.

The mineral ranges in thickness from 1.9 m in borehole 11 NE 13 to 8.5 m in borehole 11 NE 7 with a mean of 3.7 m. The variation in mean grading between samples collected above the water table and those collected below, is very apparent in this block. Samples from the seven boreholes drilled in the western part (mainly above the water table) have a mean fines content of 16 per cent, whereas those from the remaining boreholes drilled mainly below the water table have a mean fines content of 6 per cent.

The total volume of mineral present is calculated as

$50 \pm 13 \times 10^6 \text{ m}^3$ , using data from 16 assessment boreholes and numerous site investigation records. The mean grading is fines 12 per cent, sand 26 per cent and gravel 62 per cent.

Assessment boreholes proved the mineral deposits in this block to be underlain by a succession of bedrock formations from the Upper Chalk in the north to the Reading Beds, London Clay and Bagshot Beds in the south. However, none of these formations in this area contained any mineral.

#### *Block E*

The dissected spreads of River Terrace Deposits of the 7th, 8th and 10th terraces, on the eastern side of the Avon valley form the 7.0 km<sup>2</sup> of mineral in this block.

Overburden comprises mainly soil and ranges from 0.1 m in borehole 10 NE 9 to 1.1 m in borehole 11 NE 15 with a mean of 0.5 m.

The mineral deposits in this block are generally classified as 'clayey' gravel or 'very clayey' gravel, and in places the clasts contain a heavy surface coating of iron oxides, imparting a strong orange coloration to the deposits. The mineral ranges in thickness from 1.1 m in borehole 10 NE 9 to 7.2 m in borehole 11 NE 16 with a mean of 3.6 m.

Eleven assessment boreholes and a small amount of commercial information enabled the total volume of mineral to be calculated at  $25 \pm 6 \times 10^6 \text{ m}^3$ , with a mean grading of fines 16 per cent, sand 28 per cent and gravel 56 per cent. Some of the assessment boreholes proved mineral in the underlying bedrock sands (Bagshot Beds and Bracklesham Beds), which can be seen exposed at the base of the Drift deposits in the workings on Rockford Common [170 083].

#### *Block F*

The Older River Gravels found to the east of the River Avon make up the 17.0 km<sup>2</sup> of mineral in Block F. The deposits occur as elongate plateaux dissected by south-westerly flowing streams which have cut down into the underlying bedrock sands and clays. The fifth 'terrace' of the Older River Gravels which was sampled in borehole 21 NW 17 [2272 1668], proved to be too 'clayey' to be classified as mineral.

Overburden comprises soil, silty sand and pebbly clay and ranges in thickness from nil in borehole 10 NE 7 to 4.0 m proved in borehole 21 NW 12, with a mean of 0.7 m. It is thickest on Ocknell Plain [220 110] and Fritham Plain [225 135], where it conceals the underlying gravelly deposits (which are exposed elsewhere in this block).

The mineral consists of gravel, 'clayey' gravel and 'very clayey' gravel and ranges in thickness in the assessment boreholes from 1.0 m in borehole 11 SE 17 to 5.1 m in borehole 11 NE 17; exceptionally, Hydrogeological Department borehole 314/44 [1904 0610] proved 9.1 m of sand and gravel. A mean thickness of 2.9 m applies to the deposits of the block as a whole. Only boreholes 21 NW 17 and 11 SE 13 did not prove mineral: both penetrated sandy, pebbly clays. The total volume of mineral has been estimated as  $49 \pm 10 \times 10^6 \text{ m}^3$ , using data principally from 29 assessment boreholes; it has a mean grading of fines 19 per cent, sand 25 per cent and gravel 56 per cent.

The Bagshot Beds, Bracklesham Beds and Barton Sand, which crop out over much of the block, were proved by assessment boreholes to contain mineral consisting principally of 'clayey' and 'very clayey' sand.

## 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 is 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 confidently by the Institute and cannot be disclosed.

The mineral shown on each 1:25 000 sheet is divided into resource blocks. The arbitrary size selected, 10 km<sup>2</sup>, 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.

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

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

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

A continuous series of bulk samples is taken throughout the sand and gravel. Ideally samples are composed exclusively of the whole of the material encountered in the borehole between stated depths. However, care is taken to discard, as far as possible, material which has caved or has been pumped from the bottom of the hole. A new sample is commenced whenever there is an appreciable lithological change within the sand and gravel, or at every 1 m depth. The samples, each weighing between 24 and 45 kg, are despatched in heavy-duty polythene bags to a laboratory for grading. The grading procedure is based on British Standard 1377 (1967). Random checks on the accuracy of the grading are made in the 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, Industrial Minerals Assessment Unit.

## APPENDIX B

### STATISTICAL PROCEDURE

#### *Statistical assessment*

1 A statistical assessment is made of an area of mineral greater than 2 km<sup>2</sup>, 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 ( $l_m$ ) calculated from the individual thicknesses at the sample points. The standard deviations for these variables are related such that

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

4 The above relationship may be transposed such that

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

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

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

5 Given that the number of approximately evenly spaced sample points in the sampled area is  $n$  with mineral thickness measurements  $l_{m1}, l_{m2}, \dots, l_{mn}$ , then the best estimate of mean thickness,  $l_m$ , is given by

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

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

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

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

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

$$S_{l_m} \leq S_V \leq 1.05 S_{l_m} \quad [3]$$

7 The limits on the estimate of mean thickness of mineral,  $L_{l_m}$ , may be expressed in absolute units  $\pm(t/\sqrt{n}) \times S_{l_m}$  or as a percentage  $\pm(t/\sqrt{n}) \times S_{l_m} \times (100/l_m)$  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:  $L_m \leq L_v \leq 1.05 L_m$

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

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

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

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

per cent.

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

#### *Inferred assessment*

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

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

14 No assessment is attempted for an isolated area of mineral less than 0.25 km<sup>2</sup>.

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 thickness at all sample points. If, however, there is a distinctly unequal distribution of points, bias is avoided by dividing the samples area into broad zones, to each of which a value roughly proportional to its area is assigned. This value is then shared between the data points within the zone as the weighting factor.

## APPENDIX C

### CLASSIFICATION AND DESCRIPTION OF SAND AND GRAVEL

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

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

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

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

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

Thus it is possible to classify the mineral into one of twelve descriptive categories (see Figure 12). The procedure is as follows:

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

For example, a deposit grading 11 per cent gravel, 70 per cent sand and 19 per cent fines is classified as 'clayey' pebbly sand. This short description is included in the borehole log (see Note 9, Appendix D).

Many differing proposals exist for the classification of the grain size of sediments (Atterberg, 1905; Udden, 1914; Wentworth, 1922; Wentworth, 1935; Allen, 1936; Twenhofel, 1937; Lane and others, 1947). As Archer (1970a, b) has emphasised, there is a pressing need for a simple metric scale acceptable to both scientific and engineering interests, for which the class limit sizes correspond closely with certain marked changes in the natural properties of mineral particles. For example, there is an important change in the degree of cohesion between particles at about the  $\frac{1}{16}$ -mm size, which approximates to the generally accepted boundary between silt and sand. These and other requirements are met by a system based on Udden's geometric scale and a simplified form of Wentworth's terminology (Table 5), which is used in this Report.

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

The size distribution of borehole samples is determined by sieve analysis, which is presented by the laboratory as logarithmic cumulative curves (see, for example, British Standard 1377: 1967). In this report the grading is tabulated on the borehole record sheets (Appendix F), the intercepts corresponding with the simple geometric scale  $\frac{1}{16}$  mm,  $\frac{1}{4}$  mm,

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

**Area**  
Block: 11.08 km<sup>2</sup>  
Mineral: 8.32 km<sup>2</sup>

**Mean thickness**  
Overburden: 2.5 m  
Mineral: 6.5 m

**Volume**  
Overburden: 21 million m<sup>3</sup>  
Mineral: 54 million m<sup>3</sup>

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<sup>3</sup>

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

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

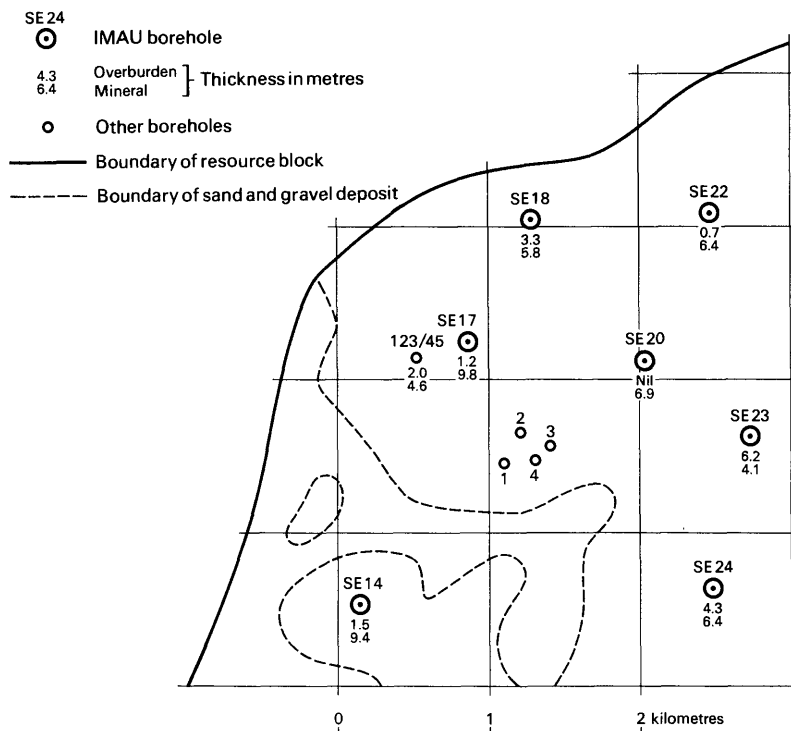
Calculation of confidence limits

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

$\Sigma (wl_m - wl_m)^2 = 15.82$   
 $n = 8$   
 $t = 2.365$

$L_v$  is calculated as  
 $1.05 (t/l_m) \sqrt{[\Sigma (wl_m - wl_m)^2 / n(n-1)]} \times 100$   
 $= 1.05 \times (2.365/6.5) \sqrt{[15.82 / (8 \times 7)]} \times 100$   
 $= 20.3$   
 $\approx 20$  per cent.

**Figure 10** Example of resource block assessment: calculation and results



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

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

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

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

The terms used in the field to describe the degree of rounding of particles, which is concerned with the sharpness of the edges and corners of a classic fragment and not the shape (after Pettijohn, 1975), 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.

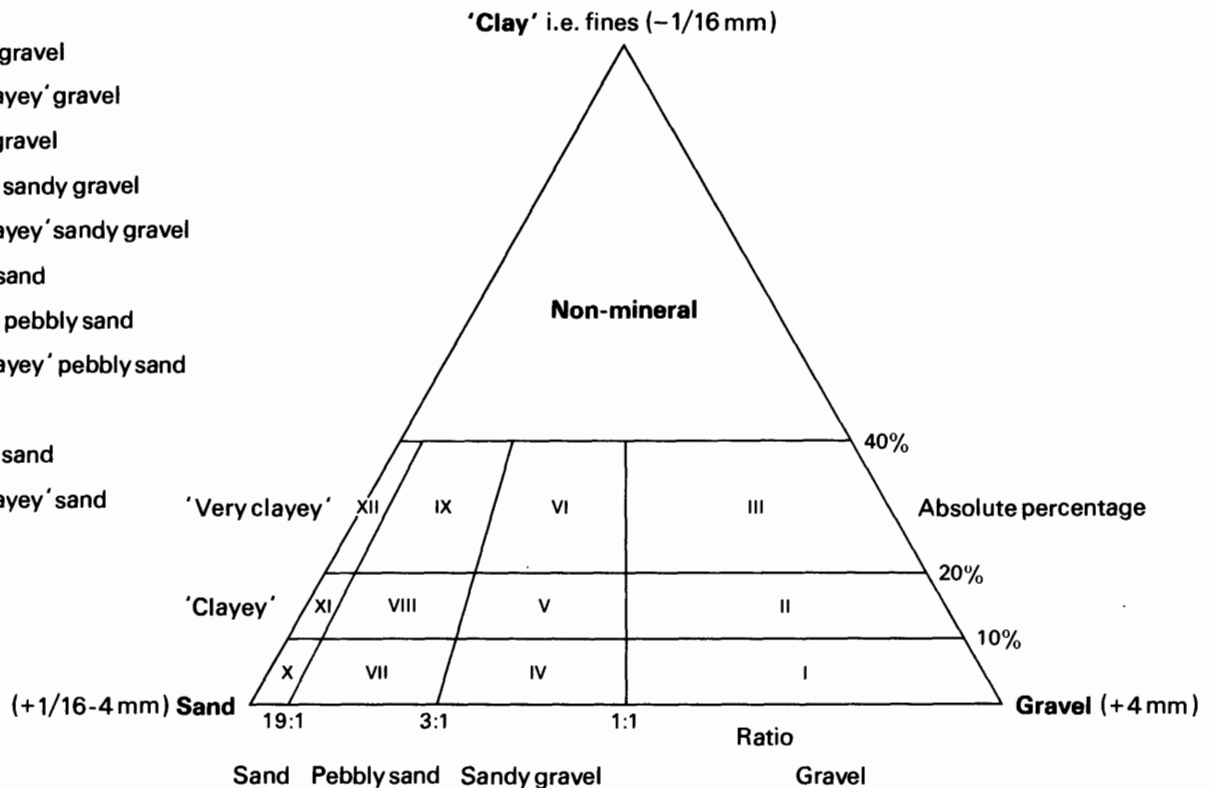
**Rounded:** original faces almost completely destroyed, but some comparatively flat surfaces may still remain. All original edges and corners have been smoothed off to rather broad curves. Original shape is still apparent.

**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 5** Classification of gravel, sand and fines

Size limits	Grain size description	Qualification	Primary classification
64 mm -	Cobble		Gravel
16 mm -	Pebble	Coarse	
4 mm -		Fine	
1 mm -	Sand	Coarse	Sand
¼ mm -		Medium	
⅛ mm -		Fine	
	Fines (silt and clay)		Fines

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



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

## APPENDIX D

### Explanation of the Borehole Records

#### Annotated example

SU 11 NE 9<sup>1</sup> 1533 1658<sup>2</sup> Upper Burgate<sup>3</sup>

Block D

Surface level +33.4 m<sup>4</sup> (+110 ft)  
 Water struck +29.0 m<sup>5</sup>  
 Shell and auger 152-mm diameter  
 May 1976<sup>6</sup>

Overburden<sup>7</sup> 1.2 m  
 Mineral 5.3 m  
 Bedrock 2.5 m+<sup>8</sup>

#### LOG

Geological classification	Lithology <sup>9</sup>	Thickness m	Depth m
	Soil, silty loam with flints	1.2	1.2
River Terrace Deposits 4th Terrace	Gravel Gravel: coarse and fine, angular to subrounded flint with some sandstone Sand: coarse and medium quartz and flint	5.3	6.5
London Clay	Clay, carbonaceous with silty laminae, blue-grey, brown, mottled at top	2.5+	9.0

#### GRADING<sup>10</sup>

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand		Gravel			
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
7	27	66	1.2-2.1	13	7	10	8	23	39	
			2.1-3.3	2	6	15	15	32	30	
			3.3-3.9	13	4	11	12	39	21	
			3.9-5.0*	4	3	11	8	36	38	
			5.0-5.5*	5	3	12	15	36	29	
			5.5-5.9*	2	2	10	12	25	49	
			5.9-6.5*	11	2	7	16	31	33	
			Mean*	7	4	11	12	32	34	

#### COMPOSITION<sup>11</sup>

Depth below surface (m)	Percentages by weight in gravel fraction						
	Flint— subangular	Flint— rounded	Sandstone	Quartz and Quartzite	Limestone	Ironstone	Others
1.2-2.1	98	0	2	0	0	0	0
2.1-3.3	87	0	3	0	10	0	0
3.3-3.9	94	0	2	0	4	0	0
3.9-5.0	94	0	1	0	5	trace	0
5.0-5.5	94	0	1	0	5	0	0
5.5-5.9	93	0	2	0	5	0	0
5.9-6.5	97	0	2	1	0	0	trace

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

#### 1 Borehole Registration Number

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

- 1 The number of the 1:25 000 sheet on which the borehole lies, here SU 11
- 2 The quarter of the 1:25 000 sheet on which the borehole lies and the number of the borehole in a series for that quarter, here NE 9.

Thus the full Registration Number is SU 11 NE 9. Usually this is abbreviated to 11 NE 9 in the text.

#### 2 The National Grid reference

All National Grid references fall in the 100-km square identified by the first two letters of the Registration Number. 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 the borehole 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 metres and approximate conversions to feet are given in brackets.

#### 5 Groundwater conditions

If groundwater was present the level at which it was encountered or the level at which it stood on completion of drilling is normally given (in metres relative to Ordnance Datum).

#### 6 Type of drill and Date of drilling

All assessment boreholes were drilled by a conventional Dando shell and auger rig using 152-mm diameter casing and modified sampling equipment. The month and year of completion of drilling 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 usually not be found. Waste is any material other than bedrock or mineral. Where waste occurs between the surface and mineral it is classified as overburden.

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

#### 9. Lithological description

When sand and gravel is recorded a general description based on the grading characteristics (for details see Appendix C) is followed by more detailed particulars of the gravel and sand fractions. Where more than one mineral unit is recognised each is designated by a letter e.g. a, b, etc. The description of other deposits is based on visual examination in the field.

#### 10 Grading data

A continuous series of bulk samples is taken throughout the thickness of sand and gravel. A new sample is commenced whenever there is appreciable lithological change or at every 1 m of depth. For each bulk sample the percentages of fines ( $- \frac{1}{16}$  mm), fine sand ( $+ \frac{1}{16}$ – $\frac{1}{4}$  mm), medium sand ( $+ \frac{1}{4}$ –1 mm), coarse sand ( $+ 1$ –4 mm), fine gravel ( $+ 4$ –16 mm), coarse gravel ( $+ 16$ –64 mm) and cobble gravel ( $+ 64$  mm) are stated.

The mean grading of groups of samples making up an identified bed of mineral is also given in detail and in summary. Where more than one unit is recognised the mean grading for the whole of the mineral in the borehole may be given. Where necessary, in calculating mean gradings, data for individual samples are weighted by the thickness represented.

If, exceptionally, grading results are not available for a sample, an attempt may be made to estimate the grading by comparing the grading and field descriptions of adjacent samples with the sample in question.

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

Where an asterisk follows the depth range for a particular sample that sample was recovered from beneath the water table by conventional 'bailing' techniques and has probably undergone some loss of the fines content. The mean fines content for a group of samples thus affected may be similarly reduced.

#### 11 Composition

Details of the composition of selected samples or groups of samples may be given. Where appropriate the calculated weighted mean composition of groups of samples may be quoted.



**APPENDIX E**

**LIST OF BOREHOLES USED IN THE ASSESSMENT OF RESOURCES**

Borehole number*	Grid reference†	Page	Borehole number*	Grid reference†	Page	Borehole number*	Grid reference†	Page
<b>IMAU BOREHOLES</b>								
00 NE	6 0960 0729	22	11 NW	9 1473 1559	<b>54</b>	11 SE	12 1976 1381	<b>83</b>
	7 0973 0605	23		10 1056 1605	54		13 1989 1014	<b>83</b>
	8 0972 0531	23	11 NE	7 1560 1917	55		14 1633 1474	84
	9 0901 0751	24		8 1560 1818	56		15 1523 1163	84
01 NE	1 0993 1661	24		9 1533 1658	57		16 1771 1168	85
	2 0987 1530	25		10 1597 1577	58		17 1933 1206	85
	3 0986 1576	25		11 1688 1982	58		18 1508 1001	86
01 SE	1 0946 1049	26		12 1693 1890	59	20 NW	1 2082 0904	86
10 NW	2 1012 0681	27		13 1658 1705	<b>59</b>		2 2035 0686	87
	3 1016 0537	27		14 1753 1958	60		3 2207 0958	87
	4 1141 0902	28		15 1753 1617	61		4 2197 0859	88
	5 1242 0967	29		16 1810 1960	62		5 2176 0686	<b>88</b>
	6 1280 0831	30		17 1858 1884	62		6 2122 0745	<b>89</b>
	7 1304 0704	31		18 1864 1744	63		7 2133 0579	<b>90</b>
	8 1273 0584	32		19 1856 1576	<b>63</b>	21 NW	12 2058 1845	<b>91</b>
	9 1375 0950	32		20 1972 1998	<b>64</b>		13 2036 1740	<b>92</b>
	10 1358 0852	33		21 1974 1871	64		14 2028 1562	<b>92</b>
	11 1351 0519	34		22 1755 1752	65		15 2158 1696	<b>93</b>
	12 1471 0988	35		23 1692 1535	66		16 2141 1562	<b>93</b>
	13 1460 0837	36		24 1927 1652	67		17 2272 1668	<b>94</b>
	14 1419 0671	37		25 1638 1767	68	21 SW	1 2151 1054	<b>94</b>
	15 1447 0560	38		26 1952 1806	68		2 2231 1355	<b>95</b>
	16 1048 0600	39	11 SW	1 1171 1018	69		3 2288 1166	<b>95</b>
	17 1352 0686	40		2 1246 1155	69			
10 NE	2 1551 0941	41		3 1396 1363	70	<b>OTHER IGS REGISTERED BOREHOLES</b>		
	3 1591 0847	42		4 1324 1307	<b>70</b>	314/17	1978 1968	
	4 1692 0946	43		5 1360 1173	<b>71</b>	314/25	1494 1829	
	5 1654 0523	44		6 1335 1045	71	314/28	1338 1349	
	6 1790 0842	45		7 1463 1348	72	314/29	1448 1410	
	7 1940 0529	45		8 1442 1293	73	314/32(b)	1845 1873	
	8 1805 0563	46		9 1444 1103	74	314/39	1332 0789	
	9 1669 0635	47		10 1441 1025	<b>74</b>	314/40	1770 1747	
	10 1961 0677	47		11 1231 1420	75	314/42	1667 1210	
	11 1761 0716	48	11 SE	2 1521 1475	75	314/44	1904 0610	
11 NW	1 1059 1925	48		3 1593 1409	76	314/95	1330 1313	
	2 1048 1557	49		4 1520 1338	77	314/107	1636 1614	
	3 1269 1657	50		5 1609 1236	78	314/118	1695 1769	
	4 1408 1953	50		6 1587 1113	79			
	5 1376 1523	50		7 1536 1032	80	<b>CONFIDENTIAL RECORDS</b>		
	6 1485 1809	51		8 1695 1421	80	Fifty nine other records held in confidence by the Institute were used in the assessment of resources.		
	7 1499 1730	52		9 1719 1263	81			
	8 1444 1615	53		10 1767 1058	82			
				11 1837 1347	82			

\*By sheet quadrant.  
†All fall in 100-km square SU.

**APPENDIX F**

**INDUSTRIAL MINERALS ASSESSMENT UNIT  
BOREHOLE RECORDS**

**SU 00 NE 6 0960 0729 Potterne Farm, Verwood**

**Block A**

Surface level +22.6 m (+ 74 ft)  
Water struck +20.6 m  
Shell and auger 152-mm diameter  
July 1976

Overburden 0.4 m  
Mineral 1.7 m  
Bedrock 3.0 m +

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, fine sandy loam	0.4	0.4
River Terrace Deposits (4th Terrace)	'Clayey' gravel Gravel: fine and coarse, subrounded to rounded flint Sand: medium with fine and coarse quartz with some flint	1.7	2.1
Bagshot Beds	'Clayey' sand Sand: medium with fine quartz, clay laminations	3.0+	5.1

**GRADING**

Mean for deposit <i>percentages</i>			Bulk samples depth below surface (m)	<i>percentages</i>						
Fines	Sand	Gravel		Fines			Gravel			
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
10	38	52	0.4-1.4	10	6	19	10	37	18	0
			1.4-2.1	10	16	20	6	23	25	0
			<b>Mean</b>	10	10	20	8	31	21	0
<i>Bedrock</i>			2.1-5.1*	13	18	67	2	0	0	0

SU 00 NE 7 0973 0605 Lower Common

Block A

Surface level +21.7 m (+71 ft)  
 Water struck +20.1 m  
 Shell and auger 152-mm diameter  
 July 1976

Mineral 1.6 m  
 Bedrock 3.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
River Terrace Deposits (4th Terrace)	'Clayey' sandy gravel Gravel: fine with coarse, rounded flint, brown Sand: medium with fine and some coarse, subrounded to rounded quartz	1.6	1.6
Bagshot Beds	'Clayey' sand Sand: medium with fine quartz, yellow	3.0+	4.6

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Gravel			
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
14	52	34	0.0-0.6	18	16	24	4	21	17	0
			0.6-1.6	11	14	36	7	23	9	0
			Mean	14	15	31	6	22	12	0
<i>Bedrock</i>			1.6-4.6*	18	24	57	1	0	0	0

SU 00 NE 8 0972 0531 Near Woolsbridge Farm

Block A

Surface level +19.5 m (+64 ft)  
 Water struck +17.4 m  
 Shell and auger 152-mm diameter  
 July 1976

Overburden 0.6 m  
 Mineral 2.0 m  
 Bedrock 4.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, grey leached with some flints	0.6	0.6
River Terrace Deposits (4th Terrace)	Gravel Gravel: fine and coarse, subangular to rounded flint, black and brown Sand: medium with fine and coarse quartz, yellowish brown and flint	2.0	2.6
Bagshot Beds	'Very clayey' sand Sand: fine with medium quartz, grey with some wood fragments	4.0+	6.6

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Gravel			
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
56	35	9	0.6-1.6	13	9	19	7	29	23	0
			1.6-2.6*	4	5	21	10	34	26	0
			Mean*	9	7	20	8	31	25	0
<i>Bedrock</i>			2.6-6.6*	33	57	8	2	0	0	0

SU 00 NE 9 0901 0751 Near Potterne Farm

Block A

Surface level +24.7 m (+81 ft)  
 Water struck +23.1 m  
 Shell and auger 152-mm diameter  
 July 1976

Overburden 0.8 m  
 Mineral 0.9 m  
 Bedrock 4.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, light brown loam	0.8	0.8
River Terrace Deposits (4th Terrace)	Gravel Gravel: fine and coarse, subrounded to rounded flint, brown Sand: medium with coarse and fine quartz, yellow with flint	0.9	1.7
Bagshot Beds	Clay, dark bluish grey, silty	4.0+	5.7

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
1	44	55	0.8-1.7*	1	9	23	12	29	26	0
			Mean	1	9	23	12	29	26	0

SU 01 NE 1 0993 1661 Near North End, Damerham

Block B

Surface level +46.2 m (+152 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 April 1976

Waste 4.0 m  
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark brown loam with scattered flints	1.5	1.5
Dry Valley Deposits	Clay, pebbly, sandy	2.5	4.0
Upper Chalk	Soft, white limestone	1.0+	5.0

SU 01 NE 2 0987 1530 Cornpit Farm

Block B

Surface level +44.3 m (+145 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 October 1976

Overburden 0.5 m  
 Mineral 1.0 m  
 Bedrock 1.9 m +

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, brown pebbly loam	0.5	0.5
Dry Valley Deposits	'Very Clayey' gravel Gravel: fine and coarse, angular to subrounded to rounded flint, grey and black Sand: medium quartz and flint with chalk. White chalky clay towards base	1.0	1.5
Upper Chalk	Soft white limestone with flints	1.9+	3.4

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
21	31	48	0.5-1.5	21	9	14	8	26	22	0
			Mean	21	9	14	8	26	22	0

SU 01 NE 3 0986 1576 Near White's Copse

Block B

Surface level +76.0 m (+249 ft)  
 Water struck +74.2 m  
 Shell and auger 152-mm diameter  
 October 1976

Overburden 0.3 m  
 Bedrock a 12.8 m  
 Bedrock b 0.5 m +

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, clayey loam with flints	0.3	0.3
Reading Beds	Clay, laminated with scattered flints	3.5	3.8
	'Clayey' sand Sand: medium and fine, angular to subangular quartz. Glauconite and very 'clayey' at base. Laminated sandy clay from 5.8 m to 6.8 m	9.3	13.1
Upper Chalk	Fine-grained limestone, firm, white	0.5+	13.6

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
Bedrock 19	81	0	3.8-13.1	19	30	50	1	0	0	0

Surface level +94.5 m (+310 ft)  
 Water struck +79.8 m and +76.7 m  
 Shell and auger 204-mm diameter  
 September 1976

Overburden 0.1 m  
 Mineral 2.6 m  
 Bedrock a 27.0 m  
 Bedrock b 2.4 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty loam	0.1	0.1
Older River Gravels	'Clayey' gravel Gravel: fine and coarse, angular to subrounded flint with some vein quartz and traces of sandstone Sand: medium quartz with some coarse angular flint	2.6	2.7
Bagshot Beds	'Clayey' sand with interbedded clays Sand: medium and coarse with fine quartz, yellow-buff with thin clay laminae. Silty clay, orange, grey and lilac with scattered leaf impressions 10.7 m to 11.7 m, 15.2 m to 16.7 m, 20.8 m to 22.8 m, 23.8 m to 25.2 m	27.0	29.7
London Clay	Clay, dark grey, firm with sporadic grey-green silty sand laminae	2.4+	32.1

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
11	30	59	0.1-0.5	13	5	13	7	33	29	0
			0.5-1.5	13	9	15	7	27	26	3
			1.5-2.7	9	5	19	7	33	27	0
			Mean	11	7	16	7	31	27	1
<i>Bedrock</i>			2.7-10.7	10	43	47	0	0	0	0
			11.7-15.2	11	24	62	3	0	0	0
			16.7-20.8*	20	67	13	0	0	0	0
			22.8-23.8*	36	49	15	0	0	0	0
			25.2-29.7*	7	78	15	0	0	0	0
			Mean	13	52	34	1	0	0	0

SU 10 NW 2 1012 0681 Near Rushmoor Pond

Block A

Surface level +21.8 m (+72 ft)  
 Water struck +19.6 m  
 Shell and auger 152-mm diameter  
 July 1976

Overburden 0.4 m  
 Mineral 0.8 m  
 Bedrock 3.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, sandy, silty, black	0.4	0.4
River Terrace Deposits (4th Terrace)	Pebbly sand Gravel: coarse with fine, rounded flint with some vein quartz Sand: medium with fine quartz, red-brown and white	0.8	1.2
Bagshot Beds	'Clayey' sand Sand: medium with fine quartz, yellow with some carbonaceous material	3.8+	5.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
8	80	12	0.4-1.2	8	17	61	2	2	10	0
			Mean	8	17	61	2	2	10	0
			Bedrock	18	21	60	1	0	0	0

SU 10 NW 3 1016 0537 Woolsbridge

Block A

Surface level +19.0 m (+62.5 ft)  
 Water struck +16.8 m  
 Shell and auger 152-mm diameter  
 July 1976

Overburden 0.7 m  
 Mineral 1.8 m  
 Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, sandy loam	0.7	0.7
River Terrace Deposits (4th Terrace)	'Clayey' sandy gravel Gravel: fine with coarse, rounded flint with trace of vein quartz Sand: medium with fine and coarse quartz, yellow-brown	1.8	2.5
Bagshot Beds	'Clayey' sand Sand: fine quartz with some organic matter	3.0+	5.5

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
14	49	37	0.7-1.5	16	10	25	12	28	9	0
			1.5-2.5*	13	18	24	8	25	12	0
			Mean	14	15	24	10	26	11	0
			Bedrock	13	79	7	1	0	0	0

Surface level +52.2 m (+171 ft)  
 Water struck +45.3 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.2 m  
 Mineral 9.3 m  
 Bedrock 2.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty, brown	0.2	0.2
River Terrace Deposits (7th Terrace)	'Very clayey' sandy gravel Gravel: fine and coarse, subangular to subrounded flint Sand: medium and fine quartz with some subangular flint. Clay matrix from 4.5 m to 6.0 m	9.3	9.5
Bagshot Beds	'Clayey' sand Sand: medium with fine quartz, carbonaceous, yellowish brown	2.0+	11.5

**GRADING**

Mean for deposit <i>percentages</i>			Bulk samples depth below surface (m)	<i>percentages</i>						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				- 1/16	+ 1/16 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16 - 64	+ 64
22	55	23	0.2-1.0	27	38	28	1	4	2	0
			1.0-2.0	31	31	27	3	7	1	0
			2.0-3.0	31	25	25	4	11	4	0
			3.0-3.5	16	24	36	5	15	4	0
			3.5-4.5	10	32	49	5	3	1	0
			4.5-5.5	39	31	29	1	0	2	0
			5.5-6.0	42	30	21	1	5	1	0
			6.0-7.0	16	6	25	7	30	16	0
			7.0-8.0*	8	6	30	10	33	13	0
			8.0-9.0*	9	7	19	10	40	15	0
			9.0-9.5*	14	3	28	8	30	17	0
			Mean	22	21	29	5	16	7	0
<i>Bedrock</i>			9.5-11.5*	14	23	60	2	1	0	0



Surface level +48.0 m (+158 ft)  
 Water struck +40.6 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 1.0 m  
 Mineral 4.8 m  
 Bedrock 2.2 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, clayey loam	1.0	1.0
River Terrace Deposits (7th Terrace)	'Clayey' gravel Gravel: fine and coarse, subangular to well-rounded flint with some jasperine flint and sandstone Sand: medium and coarse quartz, yellow-brown with some subangular flint	4.8	5.8
Bagshot Beds	'Clayey' sand Sand: medium with fine, subrounded quartz, yellow	2.2+	8.0

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines			Gravel			
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
15	34	51	1.0-2.0	16	6	12	12	34	20	0
			2.0-3.0	13	4	13	19	40	11	0
			3.0-4.0	22	3	11	11	35	18	0
			4.0-5.0	13	6	15	17	37	12	0
			5.0-5.8	12	5	20	17	36	10	0
			Mean	15	5	14	15	36	15	0
<i>Bedrock</i>			5.8-8.0*	15	15	69	1	0	0	0

Surface level +46.7 m (+153 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.5 m  
 Mineral 4.3 m  
 Bedrock 5.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam	0.5	0.5
River Terrace Deposits (7th Terrace)	'Clayey' gravel Gravel: fine and coarse, subangular to well rounded flint with some glauconitic sandstone and trace of red, iron cemented sandstone Sand: medium and coarse quartz, orange and subangular flint	4.3	4.8
Bagshot Beds	Sand Sand: fine with medium quartz, buff-yellow	5.0+	9.8

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
10	33	57	0.5-1.5	13	5	12	15	37	18	0
			1.5-2.5	8	4	13	17	41	17	0
			2.5-3.5	12	5	12	16	42	13	0
			3.5-4.5	8	5	13	14	43	17	0
			4.5-4.8	9	6	22	13	39	11	0
			Mean	10	5	13	15	41	16	0
<i>Bedrock</i>			4.8-9.8	4	62	33	0	0	1	0

Surface level +35.8 m (+118 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.2 m  
 Mineral 3.1 m  
 Bedrock 3.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark peaty	0.2	0.2
River Terrace Deposits (6th Terrace)	'Clayey' sandy gravel Gravel: fine with some coarse, sub-rounded to well-rounded flint Sand: medium with fine and coarse quartz, yellow with some subangular flint	3.1	3.3
Bagshot Beds	'Clayey' sand Sand: fine with medium quartz, yellow-brown	3.0+	6.3

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
12	50	38	0.2-0.5	10	17	23	8	31	11	0
			0.5-0.9	17	16	18	9	32	8	0
			0.9-1.9	13	13	23	11	33	7	0
			1.9-2.9	10	11	37	9	25	8	0
			2.9-3.3	11	8	28	11	28	14	0
			Mean	12	12	28	10	29	9	0
<i>Bedrock</i>			3.3-6.3	16	64	20	0	0	0	0

SU 10 NW 8 1273 0584 Near Baker's Hanging

Block B

Surface level +43.7 m (+143 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.5 m  
 Mineral 1.5 m  
 Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty, sandy	0.5	0.5
River Terrace Deposits (7th Terrace)	'Clayey' sandy gravel Gravel: fine with coarse, subangular to well-rounded patinated flint with some soft sandstone, reddish brown Sand: medium and fine coarse quartz, yellow and coarse subangular flint	1.5	2.0
Bracklesham Beds	'Very clayey' sand Sand: Fine with some medium quartz, yellowish buff	3.0+	5.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
12	48	40	0.5-1.5	11	12	21	15	32	9	0
			1.5-2.0	14	17	21	10	25	13	0
			Mean	12	14	21	13	30	10	0
<i>Bedrock</i>			2.0-5.0	21	70	9	0	0	0	0

SU 10 NW 9 1375 0950 Turner

Block C

Surface level +23.2 m (+76 ft)  
 Water struck +21.3 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.5 m  
 Mineral 3.2 m  
 Bedrock 2.6 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam	0.5	0.5
River Terrace Deposits (4th Terrace)	Gravel Gravel: coarse and fine, sub to well-rounded flint with trace of sandstone Sand: medium and coarse with some fine quartz with flint and trace of organic matter	3.2	3.7
Bagshot Beds	'Clayey' sand Sand: medium with fine quartz, greenish-brown with grey clay laminae	2.6+	6.3

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
5	25	70	0.5-1.9	6	6	11	12	31	34	0
			1.9-3.0*	1	1	3	8	38	49	0
			3.0-3.7*	10	7	21	10	24	28	0
			Mean	5	5	10	10	32	38	0
<i>Bedrock</i>			4.0-4.8*	15	28	51	4	2	0	0

Surface level +19.9 m (+65 ft)  
 Water struck +18.4 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 1.5 m  
 Mineral 4.2 m  
 Bedrock 3.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
Made ground		1.5	1.5
River Terrace Deposits (3rd Terrace)	Gravel Gravel: coarse and fine, subrounded to well-rounded flint with some sandstone, greyish yellow and reddish brown Sand: medium with coarse and some fine quartz, grey. Trace of organic material	4.2	5.7
Bagshot Beds	Sand Sand: medium with fine quartz, grey with some organic material	3.0+	8.7

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
5	19	76	1.5-2.5*	3	1	5	10	45	36	0
			2.5-3.5*	1	1	7	7	51	33	0
			3.5-4.7*	5	3	22	3	20	47	0
			4.7-5.7*	10	4	13	2	29	42	0
			Mean	5	2	12	5	36	40	0
Bedrock			5.7-8.7*	5	20	72	1	1	1	0

Surface level +15.5 m (+51 ft)  
 Water struck +13.0 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.2 m  
 Mineral 5.1 m  
 Bedrock 4.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, sandy peat	0.2	0.2
River Terrace Deposits (2nd Terrace)	Gravel Gravel: coarse and fine, subrounded to well-rounded flint, grey with some bioclastic limestone Sand: fine and medium quartz, buff with subangular flint	5.1	5.3
Bagshot Beds	Sand Sand: fine and medium quartz, grey with some organic material	4.0+	9.3

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
4	41	55	0.2-0.8	7	63	21	2	5	2	0
			0.8-1.9	6	16	14	10	36	18	0
			1.9-2.9*	0	6	16	11	38	29	0
			2.9-3.9*	3	3	19	9	32	34	0
			3.9-4.9*	5	6	19	3	28	39	0
			4.9-5.3*	5	23	27	4	20	21	0
			Mean	4	16	18	7	29	26	0
<i>Bedrock</i>			5.3-9.3*	3	70	27	0	0	0	0

Surface level +20.6 m (+68 ft)  
 Water struck +19.5 m and 16.1 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 1.1 m  
 Mineral 1.5 m  
 Waste 1.9 m  
 Bedrock 1.6 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty, dark brown	0.1	0.1
Alluvium	Silty mud, soft grey-green, yellow-mottled	1.0	1.1
River Terrace Deposits (3rd Terrace)	Gravel Gravel: fine and coarse, angular to subangular flint, greyish white with some fine buff sandstone Sand: medium and coarse quartz, grey	1.5	2.6
Peat	Hard compact dark brown with some fibrous plant remains	1.9	4.5
Bagshot Beds	Clay, dark brown and greyish white	1.6+	6.1

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- 1/8	+ 1/16 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16 - 64	+ 64
4	31	65	1.1-2.1	6	2	15	16	37	24	0
			2.1-2.6	0	2	19	8	41	30	0
			Mean	4	2	16	13	39	26	0

SU 10 NW 13 1460 0837 Near Ellingham

Block C

Surface level +23.0 m (+76 ft)  
 Water struck +18.1 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.9 m  
 Mineral 7.4 m  
 Bedrock 2.7 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, sandy loam	0.9	0.9
River Terrace Deposits (3rd Terrace)	Gravel Gravel: coarse and fine, subangular to rounded flint, grey and brown  Sand: medium with fine and coarse quartz, yellow with flint. Organic material at base	7.4	8.3
Bagshot Beds	Sand Sand: medium with fine quartz, grey-brown with organic material and some flint at top	2.7+	11.0

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				-1/8	+1/8-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
7	37	56	0.9-1.9	9	6	12	12	31	30	0
			1.9-3.0	4	4	11	16	41	24	0
			3.0-4.1	5	7	17	13	35	23	0
			4.1-5.0	4	8	14	12	31	31	0
			5.0-6.0*	3	5	9	5	35	43	0
			6.0-7.0*	7	13	32	4	11	33	0
			7.0-8.3*	16	15	39	2	5	23	0
			Mean	7	8	20	9	27	29	0
<i>Bedrock</i>			8.3-11.0*	8	15	76	1	0	0	0



Surface level +15.8 m (+52 ft)  
 Water struck +14.7 m  
 Shell and auger 152-mm diameter  
 September 1976

Overburden 1.1 m  
 Mineral 7.3 m  
 Bedrock 4.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, clayey loam, dark brown	0.2	0.2
Alluvium	Silty clay, pale grey-green	0.9	1.1
River Terrace Deposits (2nd Terrace)	Gravel Gravel: fine and coarse with scattered cobbles, subangular to well- rounded flint with some sandstone, yellow and vein quartz Sand: medium and coarse quartz, greyish yellow with some subangular flint	7.3	8.4
Bagshot Beds	Sand Sand: medium with fine quartz, greyish brown with some organic material and clay laminae Clay, silty, stiff grey-green	1.8 2.2+	10.2 12.4

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				-1/8	+1/8-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
4	22	74	1.1-2.1*	6	3	11	8	36	36	0
			2.1-3.1*	3	2	16	6	34	34	5
			3.1-4.1*	3	2	11	13	24	44	3
			4.1-5.1*	4	7	9	7	27	45	1
			5.1-6.1*	4	3	5	7	55	21	5
			6.1-7.1*	2	2	3	3	37	53	0
			7.1-8.4*	5	5	18	9	24	39	0
			Mean	4	3	11	8	33	39	2
Bedrock			8.4-10.2*	7	14	77	2	0	0	0

SU 10 NW 15 1447 0560 Near Up Mead

Block C

Surface level +14.7 m (+48 ft)  
 Water struck +12.3 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 2.4 m  
 Mineral 2.4 m  
 Bedrock 3.4 m +

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, sandy, with scattered flints, brown	0.2	0.2
Alluvium	Silty clay, dark greyish green, red-mottled with shell debris	2.2	2.4
River Terrace Deposits (2nd Terrace)	Gravel Gravel: fine and coarse, subrounded to well-rounded with some subangular flint and scattered sandstone Sand: medium quartz, grey-green	2.4	4.8
Bagshot Beds	Sand Sand: fine with medium quartz, grey-brown with some organic material	3.4+	8.2

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- 1/16	+ 1/16 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16 - 64	+ 64
10	21	69	2.4-3.4*	5	3	14	9	38	31	0
			3.4-4.8*	13	5	9	4	30	39	0
			Mean	10	4	11	6	33	36	0
<i>Bedrock</i>			4.8-8.2*	4	70	25	1	0	0	0

Surface level +19.7 m (+65 ft)  
 Water struck +17.9 m  
 Shell and auger 152-mm diameter  
 July 1976

Overburden 0.7 m  
 Mineral 0.9 m  
 Bedrock 4.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, sandy, silty with scattered flints	0.7	0.7
River Terrace Deposits (4th Terrace)	Sandy gravel Gravel: fine with some coarse subrounded to rounded flint with trace of vein quartz Sand: medium and fine quartz, yellow and flint	0.9	1.6
Bagshot Beds	Sand Sand: fine and medium quartz, greyish yellow with some organic material	4.0+	5.6

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- 1/16	+ 1/16 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16 - 64	+ 64
9	59	32	0.7-1.6	9	21	26	12	27	5	0
			Mean	9	21	26	12	27	5	0
<i>Bedrock</i>			1.6-5.6*	9	47	43	1	0	0	0

Surface level +19.9 m (+65 ft)  
 Water struck +16.2 m  
 Shell and auger 152-mm diameter  
 October 1976

Overburden 0.5 m  
 Mineral a 2.0 m  
 Mineral b 5.5 m  
 Bedrock 5.7 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, sandy, dark grey	0.5	0.5
River Terrace Deposits (3rd Terrace)	<b>a</b> Sand Sand: fine and medium, subangular to subrounded quartz, greyish yellow	2.0	2.5
	<b>b</b> Gravel Gravel: fine and coarse with scattered cobbles, subangular to subrounded flint with trace of vein quartz and sandstone Sand: medium with coarse, angular to subrounded quartz with flint	5.5	8.0
Bagshot Beds	Pebbly sand Gravel: fine and coarse with scattered cobbles, angular to subrounded flint Sand: fine and medium quartz with flint and some organic material	5.7+	13.7

**GRADING**

	Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
	Fines	Sand	Gravel		Fines			Gravel			
					-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
<b>a</b>	8	92	0	0.5-1.5	3	42	54	1	0	0	0
				1.5-2.5	13	47	40	0	0	0	0
				Mean	8	44	47	1	0	0	0
<b>b</b>	3	25	72	2.5-3.6	6	9	19	9	36	21	0
				3.6-4.6*	5	2	11	8	42	32	0
				4.6-5.6*	2	2	14	7	38	37	0
				5.6-7.0*	2	2	13	7	35	37	4
				7.0-8.0*	1	0	13	9	31	42	4
				Mean	3	3	14	8	36	34	2
<b>a+b</b>	4	43	53	Mean	4	14	23	6	27	25	1
<i>Bedrock</i>				8.0-13.7*	2	38	38	3	10	8	1

Surface level +25.0 m (+82 ft)  
 Water struck +22.0 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.3 m  
 Mineral 5.9 m  
 Bedrock 3.2 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty, dark brown with flints	0.3	0.3
River Terrace Deposits (4th Terrace)	Gravel Gravel: coarse and fine, subangular to rounded flints, grey and brown with some rounded vein quartz and subrounded sandstone, yellow Sand: medium and coarse quartz with flint	5.9	6.2
Bagshot Beds	'Very clayey' sand Sand: medium quartz, grey-brown with organic material and silty clay laminae	3.2+	9.4

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
9	29	62	0.3-1.3	35	2	6	9	26	22	0
			1.3-2.3	14	2	12	14	29	29	0
			2.3-3.3*	1	2	17	20	40	20	0
			3.3-4.3*	1	1	22	16	32	28	0
			4.3-5.3*	0	3	11	6	29	51	0
			5.3-6.2*	4	4	20	4	15	53	0
			Mean	9	2	15	12	29	33	0
<i>Bedrock</i>			6.2-9.4*	34	5	56	2	2	1	0

Surface level +25.5 m (+84 ft)  
 Water struck +20.5 m  
 Shell and auger 152-mm diameter  
 September 1976

Overburden 0.4 m  
 Mineral 7.0 m  
 Bedrock 3.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, sandy loam, light brown with flints	0.4	0.4
River Terrace Deposits (4th Terrace)	Gravel Gravel: fine and coarse, subangular to rounded flint with some vein quartz and trace of glauconitic sandstone Sand: medium and fine quartz with coarse angular flint	7.0	7.4
Bagshot Beds	'Clayey' sand Sand: fine and medium carbonaceous quartz, grey-brown with some silty clay laminae	3.0+	10.4

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- 1/16	+ 1/16-1/4	+ 1/4-1	+ 1-4	+ 4-16	+ 16-64	+ 64
6	31	63	0.4-1.4	9	8	19	13	31	20	0
			1.4-2.4	8	11	24	12	29	16	0
			2.4-3.4	6	6	16	12	35	25	0
			3.4-4.4	5	6	15	12	37	25	0
			4.4-5.4*	10	5	11	12	36	26	0
			5.4-6.4*	1	0	3	10	43	43	0
			6.4-7.4*	7	10	7	4	25	47	0
			Mean	6	6	14	11	34	29	0
Bedrock			7.4-10.4*	15	50	31	2	1	1	0

Surface level +66.3 m (+218 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.3 m  
 Mineral 4.9 m  
 Bedrock 3.1 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam, dark brown with flints	0.3	0.3
River Terrace Deposits (8th Terrace)	Clayey gravel Gravel: fine and coarse, subrounded to well-rounded flint with some subrounded sandstone Sand: coarse and medium quartz and flint	4.9	5.2
Bracklesham Beds	Sand, pebbly at top Sand: fine and medium quartz, buff, yellow and orange. Iron-cemented band above clay laminar at 5.5 m	3.1 +	8.3

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
10	30	60	0.3-1.3	17	1	12	18	36	16	0
			1.3-2.3	9	2	15	16	32	26	0
			2.3-3.3	8	3	11	17	38	23	0
			3.3-4.3	7	2	9	14	41	27	0
			4.3-5.2	9	3	11	12	35	30	0
			Mean	10	2	12	16	36	24	0
<i>Bedrock</i>			5.2-8.3	5	56	35	0	1	3	0

Surface level +25.0 m (+82 ft)  
 Water struck +19.1 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.8 m  
 Mineral 8.8 m  
 Bedrock 1.9 m +

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty, light brown	0.8	0.8
River Terrace Deposits (4th Terrace)	Gravel Gravel: fine and coarse, subrounded flint with a trace of vein quartz Sand: medium with fine and coarse quartz and flint	8.8	9.6
Bracklesham Beds	Sand Sand: medium with fine quartz, yellow with silty clay laminae, grey and brown	1.9+	11.5

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/8	+1/8-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
6	44	50	0.8-1.8	9	10	17	13	32	19	0
			1.8-2.8	11	15	19	13	31	11	0
			2.8-3.8	3	11	17	12	33	24	0
			3.8-4.8	8	10	14	9	35	24	0
			4.8-5.8	6	7	19	12	39	17	0
			5.8-6.8*	2	2	10	11	53	22	0
			6.8-7.5*	2	5	18	11	39	25	0
			7.5-8.6*	7	25	59	4	2	3	0
			8.6-9.6*	8	11	25	3	20	33	0
			Mean	6	11	23	10	31	19	0
Bedrock			9.6-11.5*	4	27	66	2	1	0	0



SU 10 NE 6 1790 0842 Red Shoot Plain

Block E

Surface level +75.7 m (+248 ft)  
 Water struck +70.3 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.5 m  
 Mineral 2.4 m  
 Bedrock 3.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, dark, peaty with flints	0.5	0.5
River Terrace Deposits (10th Terrace)	'Very clayey' gravel Gravel: fine with coarse, subangular to rounded flint Sand: coarse and medium quartz with flint	2.4	2.9
Barton Clay	Silty clay, bright green mottled to yellow-brown at top	3.1	6.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				- 1/16	+ 1/16-1/4	+ 1/4-1	+ 1-4	+ 4-16	+ 16-64	+ 64
24	23	53	0.5-1.5	22	2	9	14	39	14	0
			1.5-2.5	28	1	8	13	30	20	0
			2.5-2.9	16	1	14	12	35	22	0
			Mean	24	1	9	13	35	18	0

SU 10 NE 7 1940 0529 Near Vereley Hill

Block F

Surface level +94.5 m (+310 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 July 1976

Mineral 2.9 m  
 Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Older River Gravels	'Clayey' gravel Gravel: fine with coarse, subangular to subrounded flint with trace of vein quartz and jasperine flint Sand: medium and coarse quartz and flint, yellow-orange and mottled grey, clay partings common towards base	2.9	2.9
Barton Sand	Sandy clay, reddish orange with grey sandy laminae	1.0	3.9
	'Very clayey' sand Sand: fine quartz, pinkish grey or greenish grey with yellow-orange laminae and trace of carbonaceous spots	2.0+	5.9

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				- 1/16	+ 1/16-1/4	+ 1/4-1	+ 1-4	+ 4-16	+ 16-64	+ 64
18	30	52	0.0-0.6	14	6	13	8	34	25	0
			0.6-1.6	22	4	14	9	32	19	0
			1.6-2.9	16	3	18	12	34	17	0
			Mean	18	4	16	10	33	19	0
Bedrock			3.9-5.9	29	70	1	0	0	0	0

Surface level +85.0 m (+279 ft)  
 Water struck +73.0 m  
 Shell and auger 152-mm diameter  
 September 1976

Overburden 0.8 m  
 Mineral 1.9 m  
 Bedrock a 9.8 m  
 Bedrock b 2.1 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, clay with scattered pebbles becoming peaty loam at top	0.8	0.8
Older River Gravels	'Very clayey' gravel Gravel: fine and coarse, subangular to subrounded flint with trace of vein quartz Sand: coarse with medium and fine subangular quartz and angular flint	1.9	2.7
Barton Sand	'Very clayey' sand Sand: fine subangular to subrounded quartz, orange-yellow with sporadic clay laminae	9.8	12.5
Barton Clay	Clay, sandy at top, grey-green with scattered bivalve fossils	2.1+	14.6

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples depth below surface (m) percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
22	22	56	0.8-1.8	22	4	5	10	36	23	0
			1.8-2.7	21	6	9	11	36	17	0
			Mean	22	5	7	10	36	20	0
<i>Bedrock</i>			2.7-12.5	30	69	1	0	0	0	0

SU 10 NE 9 1669 0635 Near Hangersley Hill

Block E

Surface level +44.9 m (+147 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.1 m  
 Mineral 1.1 m  
 Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty	0.1	0.1
River Terrace Deposits (7th Terrace)	Gravel Gravel: fine and coarse, subrounded to well-rounded flint, grey and brown Sand: medium with fine and coarse quartz, orange	1.1	1.2
Bracklesham Beds	'Very clayey' sand Sand: fine with some coarse subrounded to rounded quartz with sporadic grey clay laminae	3.0+	4.2

GRADING

	Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
	Fines	Sand	Gravel		Fines			Sand			Gravel
					-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
	6	41	53	0.1-1.2	6	9	23	9	29	24	0
				Mean	6	9	23	9	29	24	0
Bedrock				1.2-4.2	34	57	9	0	0	0	0

SU 10 NE 10 1961 0677 Near Picket Post

Block F

Surface level +91.8 m (+301 ft)  
 Water struck +87.8 m  
 Shell and auger 152-mm diameter  
 October 1976

Overburden 0.1 m  
 Mineral 2.9 m  
 Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty, black, with rootlets	0.1	0.1
Older River Gravels	'Clayey' gravel Gravel: fine with medium, subangular to subrounded flint with trace of sandstone Sand: medium and coarse, angular to subangular quartz with some flint	2.9	3.0
Barton Sand	'Very clayey' sand Sand: fine, subangular to subrounded quartz, yellow-orange. Clayey matrix	3.0+	6.0

GRADING

	Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
	Fines	Sand	Gravel		Fines			Sand			Gravel
					-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
	17	27	56	0.1-0.7	9	4	11	10	42	24	0
				0.7-1.7	23	2	11	10	34	20	0
				1.7-3.0	15	5	14	12	33	21	0
				Mean	17	4	12	11	35	21	0
Bedrock				3.0-6.0*	36	63	1	0	0	0	0

**SU 10 NE 11 1761 0716 Highwood Farm**

**Block E**

Surface level +63.2 m (+207 ft)  
 Water struck +60.7 m  
 Shell and auger 152-mm diameter  
 September 1976

Overburden 0.2 m  
 Mineral 2.8 m  
 Bedrock 2.0 m +

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty loam, black	0.2	0.2
River Terrace Deposits (8th Terrace)	'Clayey' gravel Gravel: fine and coarse, subangular to subrounded flint with traces of jasperine flint, vein quartz and fractured flint cobble Sand: coarse and medium quartz with angular to subangular flint. Clayey at base	2.8	3.0
Barton Clay	Laminated, silty, sandy clay, ferruginous orange-brown. Coarse sand lamina at 4.8 m	2.0+	5.0

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
17	26	57	0.2-1.2	27	5	8	12	24	20	4
			1.2-2.2	7	3	11	15	37	27	0
			2.2-2.6*	9	4	17	9	41	20	0
			2.6-3.0*	22	3	7	11	37	20	0
			Mean	17	4	10	12	33	23	1

**SU 11 NW 1 1059 1925 Glere Farm**

**Block B**

Surface level +51.5 m (+169 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 April 1976

Waste 1.8 m  
 Bedrock 0.4 m +

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam, brown with flints	0.9	0.9
Dry Valley Deposits	Clay, silty, pebbly with chalk and broken flint pebbles	0.9	1.8
Upper Chalk	Soft limestone, white	0.4+	2.2

Surface level +41.9 m (+137 ft)  
 Water struck +38.6 m  
 Shell and auger 152-mm diameter  
 April 1976

Overburden 0.4 m  
 Mineral 13.1 m  
 Waste 0.5 m  
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, sandy loam, light brown with angular flints	0.4	0.4
Dry Valley Deposits	'Clayey' sandy gravel Gravel: fine and coarse, angular to rounded flint with some well-rounded flint and chalk and trace of sandstone and ironstone Sand: medium quartz and flint	13.1	13.5
	Clay, laminated, silty, brown	0.5	14.0
Upper Chalk	Limestone soft, white with flints	1.0+	15.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
14	43	43	0.4-1.4	27	5	12	7	27	22	0
			1.4-2.4	18	3	11	7	21	40	0
			2.4-3.3	11	6	15	10	25	33	0
			3.3-4.4*	16	7	27	14	21	15	0
			4.4-5.4	3	8	30	8	34	17	0
			5.4-7.5*	25	6	40	6	14	9	0
			7.5-9.0*	11	8	31	9	20	21	0
			9.0-10.0*	8	18	42	5	14	13	0
			10.0-11.0*	14	13	28	6	17	22	0
			11.0-12.0*	10	6	35	8	19	22	0
			12.0-13.0*	7	1	10	17	38	27	0
			13.0-13.5*	7	11	27	9	20	26	0
			Mean	14	7	27	9	22	21	0

COMPOSITION

Depth below surface (m)	Percentages by weight						
	Flint—subangular	Flint—rounded	Sandstone	Quartz and Quartzite	Limestone	Ironstone	Others
0.4-1.4	89	5	trace	2	0	2	2
1.4-2.4	91	4	trace	0	3	2	trace
2.4-3.3	93	1	trace	1	trace	4	trace
3.3-4.4	86	6	1	trace	trace	4	2
4.4-5.4	96	1	2	0	trace	1	trace
5.4-7.5	79	8	1	1	5	5	1
7.5-9.0	94	2	4	trace	0	0	0
9.0-10.0	67	9	2	0	9	13	trace
10.0-11.0	65	18	3	1	3	10	trace
11.0-12.0	87	7	2	0	trace	3	trace
12.0-13.0	72	15	2	1	3	7	trace
13.0-13.5	64	15	1	1	5	14	trace

SU 11 NW 3 1269 1657 Sweatfords Water

Block B

Surface level +38.1 m (+125 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 April 1976

Waste 4.1 m  
 Bedrock 0.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Alluvium	Soil, sandy loam, mottled brown	0.2	0.2
	Clay, silty, sandy with scattered flints	1.2	1.4
	Clay, sandy, medium quartz with scattered flint and chalk pebbles	2.7	4.1
Upper Chalk	Limestone, soft, white	0.9+	5.0

SU 11 NW 4 1408 1953 Down Farm Whitsbury

Block B

Surface level +52.2 m (+171 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 April 1976

Waste 1.6 m  
 Bedrock 0.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Dry Valley Deposits	Soil, silty loam with flints	0.8	0.8
	Clay, brownish white with subangular to well-rounded flint and chalk pebbles	0.8	1.6
Upper Chalk	Soft limestone, white with flint	0.8+	2.4

SU 11 NW 5 1376 1523 Sandle Farm

Block D

Surface level +43.1 m (+141 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 April 1976

Overburden 0.3 m  
 Mineral 2.8 m  
 Bedrock 3.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
River Terrace Deposits (6th Terrace)	Soil, silty loam with flints	0.3	0.3
	'Clayey' gravel Gravel: fine and coarse, subangular to subrounded flint with some sandstone and well-rounded flint Sand: medium and coarse quartz and angular flint	2.8	3.1
	London Clay Silty clay, micaceous with shell debris including <i>Turritella</i> sp., blue-grey mottled brown at top	3.1+	6.2

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
13	29	58	0.3-1.3	21	3	11	9	24	32	0
			1.3-2.4	8	5	14	13	35	25	0
			2.4-3.1	9	4	14	13	40	20	0
			Mean	13	4	13	12	32	26	0

Surface level +45.1 m (+148 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 April 1976

Overburden 0.6 m  
 Mineral 4.4 m  
 Bedrock 1.9 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
Made ground	Silty loam with flint chalk and bricks	0.6	0.6
River Terrace Deposits (6th Terrace)	'Clayey' gravel Gravel: fine and coarse, subangular to subrounded with some well- rounded flint Sand: medium with quartz with some coarse flint	4.4	5.0
Upper Chalk	Limestone, soft white	1.9+	6.9

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
14	28	58	0.6-1.6	24	4	12	8	25	27	0
			1.6-2.6	15	4	23	3	28	27	0
			2.6-3.6	16	5	24	5	26	24	0
			3.6-5.0	5	5	10	8	42	30	0
			Mean	14	5	17	6	31	27	0

Surface level +34.4 m (+113 ft)  
 Water struck +30.4 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.4 m  
 Mineral 7.9 m  
 Bedrock a 2.7 m  
 Bedrock b 1.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with flint	0.4	0.4
River Terrace Deposits (4th Terrace)	'Clayey' gravel Gravel: fine and coarse, subangular to subrounded with some well- rounded flint with traces of sandstone, ironstone and vein quartz Sand: medium and coarse quartz and flint, glauconitic	7.9	8.3
Reading Beds	Clay, blue-green and brownish buff with fine quartz sand, glauconitic and scattered fine angular flint pebbles, especially at top. Pebbly base with shell debris	2.7	11.0
Upper Chalk	Limestone, soft, white	1.0+	12.0

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
13	29	58	0.4-1.2	28	5	16	11	23	17	0
			1.2-2.5	34	4	14	7	21	20	0
			2.5-3.3	32	2	20	6	22	18	0
			3.3-4.2*	3	3	12	11	36	35	0
			4.2-5.1*	4	4	12	14	36	30	0
			5.1-6.1*	0	2	12	6	38	32	0
			6.1-7.0*	4	3	8	8	48	29	0
			7.0-8.3*	3	6	15	11	29	36	0
			Mean	13	4	14	11	31	27	0



Surface level +44.5 m (+147 ft)  
 Water struck +40.6 m  
 Shell and auger 152-mm diameter  
 April 1976

Overburden 0.6 m  
 Mineral 3.4 m  
 Bedrock 4.1 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with flints	0.6	0.6
River Terrace Deposits (6th Terrace)	'Very Clayey' gravel Gravel: fine and coarse, angular to subrounded flint with some sandstone Sand: coarse with medium quartz and flint, yellow-brown	3.4	4.0
London Clay	Clay, silty, fossiliferous, dark grey	4.1+	8.1

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
20	29	51	0.6-1.6	16	4	11	16	31	22	0
			1.6-2.7	10	2	9	17	37	25	0
			2.7-3.5	39	2	9	16	22	12	0
			3.5-4.0*	19	4	10	15	15	37	0
			Mean	20	3	10	16	28	23	0

**COMPOSITION**

Depth below surface (m)	Percentages by weight in gravel fraction						
	Flint—subangular	Flint rounded	Sandstone	Quartz and Quartzite	Limestone	Ironstone	Others
0.6-1.6	96	trace	3	0	trace	trace	0
1.6-2.7	98	1	1	0	0	0	0
2.7-3.5	82	4	6	2	4	2	trace
3.5-4.0	no data						

SU 11 NW 9 1473 1559 Near Avon Vale Nurseries

Block D

Surface level +31.5 m (+103 ft)  
 Water struck +28.2 m  
 Shell and auger 152-mm diameter  
 April 1976

Overburden 1.1 m  
 Mineral 3.8 m  
 Bedrock 1.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, clayey silt with flint	1.1	1.1
River Terrace Deposits (5th Terrace)	'Clayey' gravel Gravel: fine and coarse, subangular to subrounded flint with some sandstone Sand: medium with some coarse quartz	3.8	4.9
London Clay	Clay, silty, fossiliferous, blue-grey	1.9+	6.8

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
14	25	61	1.1-1.6	37	8	20	4	19	12	0
			1.6-3.1	17	4	17	6	26	30	0
			3.1-4.2*	4	1	11	12	42	30	0
			4.2-4.9*	6	2	9	8	33	42	0
			Mean	14	3	14	8	31	30	0

SU 11 NW 10 1056 1605 East End, Damerham

Block B

Surface level +40.0 m (+131 ft)  
 Water struck +38.7 m  
 Shell and auger 152-mm diameter  
 April 1976

Overburden 0.2 m  
 Mineral 1.5 m  
 Bedrock 1.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, sandy with flints	0.2	0.2
Dry Valley Deposits (4th Terrace)	'Clayey' gravel Gravel: coarse and fine, angular and subangular flint Sand: medium quartz	1.5	1.7
Upper Chalk	Limestone, soft white, with flints	1.7+	3.4

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
11	27	62	0.2-1.1	15	6	9	6	23	41	0
			1.1-1.7*	5	6	23	8	30	28	0
			Mean	11	6	14	7	26	36	0

Surface level +50.9 m (+167 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.8 m  
 Mineral 8.5 m  
 Bedrock 1.2 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with scattered flints	0.8	0.8
River Terrace Deposits (6th Terrace)	'Very clayey' gravel Gravel: fine and coarse, angular to subrounded flint with some sandstone and traces of conglomerate and chalk Sand: medium and fine quartz, orange-brown with coarse angular flint	8.5	9.3
Upper Chalk	Limestone soft, white with flints	1.2+	10.5

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
22	31	47	0.8-1.8	31	6	26	2	16	19	0
			1.8-2.8	44	3	24	2	7	20	0
			2.8-3.8	34	8	33	4	14	7	0
			3.8-4.8	20	8	15	6	27	24	0
			4.8-5.8	19	5	16	16	22	22	0
			5.8-6.8	13	3	9	13	30	32	0
			6.8-7.8	12	3	8	13	34	30	0
			7.8-8.8	13	3	9	11	32	32	0
			8.8-9.3	2	5	9	12	39	33	0
			Mean	22	5	17	9	23	24	0

**COMPOSITION**

Depth below surface (m)	Percentages by weight in gravel fraction						
	Flint—subangular	Flint—rounded	Sandstone	Quartz and Quartzite	Limestone	Ironstone	Others
0.8-1.8	78	4	15	3	trace	0	trace
1.8-2.8	72	0	24	4	0	trace	trace
2.8-3.8	76	0	23	trace	0	1	0
3.8-4.8	89	0	5	0	5	0	trace
4.8-5.8	91	0	0	0	9	0	0
5.8-6.8	92	0	2	0	6	0	0
6.8-7.8	94	0	1	0	5	0	0
7.8-8.8	93	2	1	0	4	0	0
8.8-9.3	96	trace	1	0	3	0	0

SU 11 NE 8 1560 1818 Braemore

Block D

Surface level +32.3 m (+106 ft)  
 Water struck +30.5 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 1.8 m  
 Mineral 3.5 m  
 Bedrock 0.9 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam, light brown	0.2	0.2
Alluvium	Clay, silty with pebbles, brown and green mottled	1.6	1.8
River Terrace Deposits (4th Terrace)	'Clayey' gravel Gravel: fine and coarse, angular to subrounded flint with traces of jasper, chalk and sandstone Sand: medium and coarse glauconitic quartz with flint and chalk	3.5	5.3
Upper Chalk	Limestone, soft, white	0.9+	6.2

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
13	25	62	1.8-2.8*	15	3	14	12	38	18	0
			2.8-3.8*	4	3	7	10	40	36	0
			3.8-4.8*	20	4	15	9	19	33	0
			4.8-5.3*	17	2	7	12	29	33	0
			Mean	13	3	11	11	32	30	0

Surface level +33.4 m (+110 ft)  
 Water struck +29.0 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 1.2 m  
 Mineral 5.3 m  
 Bedrock 2.5 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with flints	1.2	1.2
River Terrace Deposits (4th Terrace)	Gravel Gravel: coarse and fine, angular to subrounded flint with some sandstone Sand: coarse and medium quartz and flint	5.3	6.5
London Clay	Clay, carbonaceous with silty laminae blue-grey, brown mottled at top	2.5+	9.0

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
7	27	66	1.2-2.1	13	7	10	8	23	39	0
			2.1-3.3	2	6	15	15	32	30	0
			3.3-3.9	13	4	11	12	39	21	0
			3.9-5.0*	4	3	11	8	36	38	0
			5.0-5.5*	5	3	12	15	36	29	0
			5.5-5.9*	2	2	10	12	25	49	0
			5.9-6.5*	11	2	7	16	31	33	0
			Mean	7	4	11	12	32	34	0

**COMPOSITION**

Depth below surface (m)	Percentages by weight in gravel fraction						
	Flint—subangular	Flint rounded	Sandstone	Quartz and Quartzite	Limestone	Ironstone	Others
1.2-2.1	98	0	2	0	0	0	0
2.1-3.3	87	0	3	0	10	0	0
3.3-3.9	94	0	2	0	4	0	0
3.9-5.0	94	0	1	0	5	trace	0
5.0-5.5	94	0	1	0	5	0	0
5.5-5.9	93	0	2	0	5	0	0
5.9-6.5	97	0	2	1	0	0	trace

**SU 11 NE 10 1597 1577 Near Folds Farm**

**Block D**

Surface level +29.1 m (+96 ft)  
 Water struck +27.5 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 1.6 m  
 Mineral 2.9 m  
 Bedrock 2.1 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
Made ground	Silty loam with flints and broken bricks	1.6	1.6
River Terrace Deposits (4th Terrace)	Gravel Gravel: fine and coarse, subangular to rounded flint with some sandstone, buff Sand: coarse and medium quartz and flint	2.9	4.5
London Clay	Clay, silty, blue-green	2.1+	6.6

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
8	19	73	1.6-2.6*	2	1	4	7	50	36	0
			2.6-3.6*	4	1	10	16	36	33	0
			3.6-4.5*	18	1	6	11	36	28	0
			Mean	8	1	7	11	41	32	0

**SU 11 NE 11 1688 1982 Near Charford House**

**Block D**

Surface level +34.7 m (+114 ft)  
 Water struck +32.7 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 1.9 m  
 Mineral 3.1 m  
 Bedrock 1.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam, dark brown with flints and some sandstone	1.9	1.9
River Terrace Deposits (5th Terrace)	Gravel Gravel: fine and coarse, angular to subrounded flint with some sandstone and chalk Sand: medium and coarse quartz, buff, glauconitic and flint	3.1	5.0
Upper Chalk	Limestone, soft, white	1.0+	6.0

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
5	31	64	1.9-3.0*	9	4	15	14	35	23	0
			3.0-4.0*	1	2	11	12	34	40	0
			4.0-5.0*	3	4	17	16	34	26	0
			Mean	5	3	14	14	34	30	0

SU 11 NE 12 1693 1890 South Charford Farm

Block D

Surface level +33.5 m (+110 ft)  
 Water struck +32.3 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 1.2 m  
 Mineral 2.8 m  
 Bedrock 1.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
River Terrace Deposits (5th Terrace)	Soil, silty loam with flints and chalk pebbles	0.4	0.4
	Clay, silty with pebbles, dark brown-green	0.7	1.1
	Loam with flints and chalk pebbles	0.1	1.2
	Gravel Gravel: coarse and fine, subangular to subrounded flint with some sandstone Sand: coarse and medium quartz and flint	2.8	4.0
Upper Chalk	Limestone, soft, white	1.0+	5.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
2	29	69	1.2-2.2*	3	4	13	9	38	33	0
			2.2-3.2*	1	1	10	18	33	37	0
			3.2-4.0*	3	4	11	16	31	35	0
			Mean	2	3	12	14	34	35	0

SU 11 NE 13 1658 1705 Near Shallow Farm

Block D

Surface level +30.8 m (+101 ft)  
 Water struck +28.8 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.5 m  
 Mineral 1.9 m  
 Bedrock 3.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
River Terrace Deposits (5th Terrace)	Soil, silty loam, brown with angular flints	0.5	0.5
	Gravel Gravel: fine and coarse, angular to subrounded flint with some sandstone Sand: medium and coarse quartz and flint, buff	1.9	2.4
London Clay	Clay, silty with shell fragments, blue and greenish grey mottled brown at top	1.6	4.0
	Clay grey-green with silt laminae	2.1+	6.1

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
6	30	64	0.5-1.7	7	4	15	12	35	27	0
			1.7-2.4*	4	3	11	15	36	31	0
			Mean	6	4	13	13	35	29	0

Surface level +34.2 m (+112 ft)  
 Water struck +32.5 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 1.7 m  
 Mineral 3.1 m  
 Bedrock 0.5 m +

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silt, brown with chalk pebbles	0.1	0.1
River Terrace Deposits (5th Terrace)	Clayey silt with pebbles, yellowish-grey	1.6	1.7
	Gravel Gravel: fine and coarse, subangular to well-rounded flint with some sandstone Sand: medium and coarse glauconitic quartz and flint	3.1	4.8
Upper Chalk	Limestone, hard, white with flint	0.5+	5.3

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
3	25	72	1.7-2.7*	1	4	9	10	45	31	0
			2.7-4.0*	6	5	16	9	31	33	0
			4.0-4.8*	1	2	7	12	46	32	0
			Mean	3	4	11	10	40	32	0



Surface level +85.2 m (+280 ft)  
 Water struck +81.0 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 1.1 m  
 Mineral 3.0 m  
 Bedrock 5.8 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty	0.1	0.1
	Clay, pebbly, subangular to subrounded flints with coarse and medium quartz and flint sand	1.0	1.1
River Terrace Deposits (10th Terrace)	'Clayey' gravel Gravel: fine and coarse, angular to subrounded flint with traces of sandstone Sand: medium and coarse quartz with flint	3.0	4.1
Bagshot Beds	Clay, laminated silty, greyish lilac becoming sandy at top	2.7	6.8
	'Very clayey' sand Sand: medium with fine quartz, yellowish brown with thin clay laminae	3.1+	9.9

**GRADING**

Mean for deposit <i>percentages</i>			Bulk samples depth below surface (m)	<i>percentages</i>						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
14	31	55	1.1-2.1	12	3	12	10	33	30	0
			2.1-3.1	15	6	14	14	33	18	0
			3.1-4.1	14	4	18	12	30	22	0
			Mean	14	4	15	12	32	23	0
Bedrock			6.8-9.1*	29	24	45	1	0	1	0
			9.1-9.9	No grading data						
			Mean	29	24	45	1	0	1	0

SU 11 NE 16 1810 1960 Searchfield Farm

Block E

Surface level +63.3 m (+208 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.7 m  
 Mineral 7.2 m  
 Bedrock 0.5 m +

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with flints	0.7	0.7
River Terrace Deposits (7th Terrace)	'Clayey' gravel Gravel: fine and coarse, angular to subangular flint with some subrounded sandstone Sand: coarse and medium quartz and flint	7.2	7.9
Upper Chalk	Limestone, soft, white	0.5+	8.4

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				- 1/16	+ 1/16 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16 - 64	+ 64
16	24	60	0.7-1.7	22	3	15	8	30	22	0
			1.7-2.8	10	14	9	19	40	8	0
			2.8-5.7	20	1	10	12	27	30	0
			5.7-6.7	8	0	6	11	37	38	0
			6.7-7.9	11	2	4	9	42	32	0
			Mean	16	3	9	12	33	27	0

SU 11 NE 17 1858 1884 Near Home Farm

Block F

Surface level +101.8 m (+334 ft)  
 Water struck +89.8 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.5 m  
 Mineral 5.1 m  
 Bedrock a 11.4 m  
 Bedrock b 1.0 m

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with angular flints	0.5	0.5
Older River Gravels	'Clayey' gravel Gravel: fine and coarse, angular to subrounded flint with some sandstone Sand: medium and coarse quartz and flint in orange-brown clay matrix	5.1	5.6
Bagshot Beds	Sandy clay, laminated yellowish brown, orange and buff	11.4	17.0
London Clay	Clay, silty, blue-grey	1.0+	18.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				- 1/16	+ 1/16 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16 - 64	+ 64
19	23	58	0.5-1.5	8	2	10	11	30	39	0
			1.5-2.5	29	2	8	11	28	22	0
			2.5-3.5	19	7	16	11	31	16	0
			3.5-4.5	20	4	12	6	35	23	0
			4.5-5.6	20	1	6	12	41	20	0
			Mean	19	3	10	10	34	24	0

SU 11 NE 18 1864 1744 Warren Farm

Block F

Surface level +102.1 m (+333 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.4 m  
 Mineral 2.2 m  
 Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with flints	0.4	0.4
Older River Gravels	'Very clayey' gravel Gravel: fine and coarse, subangular to subrounded flint, grey and white Sand: coarse and medium quartz and flint	2.2	2.6
Bagshot Beds	Clay, silty, greyish lilac weathered orange-brown at top	3.0+	5.6

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
27	20	53	0.4-1.4	24	1	10	10	32	23	0
			1.4-2.6	30	1	7	11	31	20	0
			Mean	27	1	8	11	32	21	0

SU 11 NE 19 1856 1576 Godshill Ridge

Block F

Surface level +98.5 m (+323 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.4 m  
 Mineral 1.6 m  
 Bedrock 4.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty with pebbly subsoil	0.4	0.4
Older River Gravels	Gravel Gravel: fine and coarse, angular to subangular with some well-rounded flint with traces of vein quartz Sand: medium and coarse quartz orange-brown	1.6	2.0
Bracklesham Beds	Silty, glauconitic clay, orange-brown, grey or green, sandy at base	4.1+	6.1

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
9	32	59	0.4-1.5	3	4	18	14	37	24	0
			1.5-2.0	22	2	9	14	33	20	0
			Mean	9	3	15	14	36	23	0

SU 11 NE 20 1972 1998 Little Woodfalls Farm

Block F

Surface level +112.4 m (+369 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 1.5 m  
 Mineral 3.4 m  
 Bedrock 1.4 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Made ground	Silty loam with flints and brick debris	0.5	0.5
Older River Gravels	Clay, sandy, pebbly with angular to subangular flints and trace of sandstone	1.0	1.5
	'Very clayey' gravel Gravel: fine and coarse, angular to subrounded flint with some sandstone Sand: coarse and medium quartz and flint, orange-brown	3.4	4.9
London Clay	Silty clay, blue-grey weathered orange-brown at top	1.4+	6.3

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
28	21	51	1.5-2.5	13	2	8	15	40	22	0
			2.5-3.5	51	3	15	3	12	16	0
			3.5-4.5	24	1	6	10	31	28	0
			4.5-4.9	15	1	6	13	40	25	0
			Mean	28	2	9	10	29	22	0

SU 11 NE 21 1974 1871 South of Hatchet Green

Block F

Surface level +111.5 m (+366 ft)  
 Water struck +106.5 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.6 m  
 Mineral 1.4 m  
 Bedrock 4.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with angular flints	0.6	0.6
Older River Gravels	'Very clayey' gravel Gravel: fine and coarse, angular to subrounded flint with traces of jasperine flint Sand: coarse and medium quartz orange-brown	1.4	2.0
Bagshot Beds	Clay, silty	0.3	2.3
	'Very clayey' sand Sand: medium with fine quartz with thin silt laminae. Orange-brown, buff and grey	3.7+	6.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
23	20	57	0.6-1.6	19	1	9	11	31	29	0
			1.6-2.0	33	1	7	9	25	25	0
			Mean	23	1	8	11	29	28	0
Bedrock			2.3-6.0*	37	16	43	4	0	0	0

Surface level +65.2 m (+214 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.4 m  
 Mineral a 1.0 m  
 Waste 1.2 m  
 Mineral b 2.6 m  
 Bedrock 1.8 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with flints	0.4	0.4
River Terrace Deposits (7th Terrace)	a 'Very clayey' gravel Gravel: fine and coarse, angular to subrounded flint Sand: coarse with medium and fine quartz,	1.0	1.4
	Clay, silty, red-brown	1.2	2.6
	b 'Clayey' gravel Gravel: fine and coarse, subangular to subrounded flint with some fine subrounded sandstone Sand: coarse with medium quartz and flint	2.6	5.2
Bagshot Beds	'Very Clayey' sand Sand: fine quartz, buff-yellow with thin buff clay laminae and scattered pebbles	1.8+	7.0

**GRADING**

	Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
	Fines	Sand	Gravel		Fines		Sand		Gravel		
					- 1/16	+ 1/16 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16 - 64	+ 64
<b>a</b>	21	30	49	0.4-1.4	21	8	8	14	28	21	0
				Mean	21	8	8	14	28	21	0
<b>b</b>	19	26	55	2.6-3.6	17	2	9	14	33	25	0
				3.6-4.5	23	2	8	7	33	27	0
				4.5-5.2	16	12	10	16	27	19	0
				Mean	19	5	9	12	31	24	0
<b>a+b</b>	19	28	53	Mean	19	6	9	13	30	23	0
<i>Bedrock</i>				5.9-7.0	36	60	1	1	2	0	0

Surface level +73.9 m (+243 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.6 m  
 Mineral 4.3 m  
 Bedrock 6.2 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with pebbles	0.6	0.6
River Terrace Deposits (8th Terrace)	'Clayey' gravel Gravel: fine and coarse, angular to subrounded flint with some sandstone Sand: medium and coarse quartz with flint orange-brown	4.3	4.9
Bagshot Beds	Clay, sandy, pebbly, yellowish grey	1.9	6.8
	'Clayey' sand Sand: medium and fine quartz yellowish buff with thin white clay laminae	4.3+	11.1

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
12	33	55	0.6-1.6	22	6	22	10	27	13	0
			1.6-2.6	10	6	16	9	30	29	0
			2.6-3.6	3	4	11	18	39	25	0
			3.6-4.6	14	4	11	14	36	21	0
			4.6-4.9	12	7	17	12	37	15	0
			Mean	12	5	15	13	33	22	0
<i>Bedrock</i>			6.8-10.0	14	40	46	0	0	0	0

Surface level +100.0 m (+328 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 September 1976

Overburden 0.1 m  
 Mineral 3.5 m  
 Bedrock 3.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam, sandy with scattered pebbles	0.1	0.1
Older River Gravels	'Very clayey' gravel Gravel: fine with coarse, subangular to subrounded flint with traces of sandstone and vein quartz Sand: coarse with medium quartz and angular flint. Matrix of yellow-brown and grey mottled clay from 2.0 m to 3.0 m	3.5	3.6
Bracklesham Beds	'Very clayey' sand Sand: fine with medium quartz, yellowish orange with grey clay laminae	3.0+	6.6

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
20	24	56	0.1-1.0	10	5	8	13	38	26	0
			1.0-2.0	23	2	9	15	32	19	0
			2.0-3.0	23	3	7	15	37	15	0
			3.0-3.6	27	5	3	9	30	26	0
			Mean	20	4	7	13	35	21	0
<i>Bedrock</i>			3.6-6.6	21	63	14	2	0	0	0

**SU 11 NE 25 1638 1767 Near Norton's Hole**

**Block D**

Surface level +31.2 m (+102 ft)  
 Water struck +29.9 m  
 Shell and auger 152-mm diameter  
 September 1976

Overburden 0.5 m  
 Mineral 3.9 m  
 Bedrock a 3.1 m  
 Bedrock b 0.5 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
Alluvium	Clayey loam, light brown	0.5	0.5
River Terrace Deposits (4th Terrace)	Gravel Gravel: fine and coarse with scattered cobbles, subangular to rounded flint with some sandstone and chalk Sand: coarse and medium quartz and angular flint. Coarse cobbly base to deposit	3.9	4.4
Reading Beds	Clay, yellow-green or dark green with fine glauconitic sand and pebbly base	3.1	7.5
Upper Chalk	Limestone, soft, white	0.5+	8.0

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
8	23	69	0.5-1.3	26	3	6	7	28	30	0
			1.3-2.3*	4	2	6	9	38	41	0
			2.3-3.3*	5	1	13	19	32	30	0
			3.3-4.4*	1	2	8	14	38	31	6
			Mean	8	2	8	13	34	33	2

**SU 11 NE 26 1952 1806 Hale Purlieu**

**Block F**

Surface level +106.6 m (+350 ft)  
 Water struck +102.6 m  
 Shell and auger 152-mm diameter  
 October 1976

Overburden 0.3 m  
 Mineral 4.9 m  
 Bedrock 1.9 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, loam with flints	0.3	0.3
Older River Gravels	'Clayey' gravel Gravel: fine with coarse, angular to subrounded flint with traces of sandstone and vein quartz Sand: coarse and medium quartz and flint	4.9	5.2
Bagshot Beds	Clay, silty, laminated grey-mauve with yellow-brown weathered top	1.9+	7.1

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
16	24	60	0.3-1.3	28	1	6	10	29	26	0
			1.3-2.3	23	2	8	12	35	20	0
			2.3-3.3	11	6	15	11	39	18	0
			3.3-4.3	10	6	14	13	39	18	0
			4.3-5.2*	7	1	7	7	31	47	0
			Mean	16	3	10	11	35	25	0



SU 11 SW 1 1171 1018 Near Plumley Wood

Block B

Surface level +50.9 m (+167 ft)  
 Water struck +47.1 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.8 m  
 Mineral 5.0 m  
 Bedrock 4.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, sandy	0.8	0.8
River Terrace Deposits (7th Terrace)	'Clayey' gravel Gravel: fine with coarse, subangular to rounded flint with traces of vein quartz and sandstone Sand: medium quartz with some flint	5.0	5.8
Bagshot Beds	Clay, silty, grey-brown and black	4.2+	10.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
15	38	47	0.8-1.8	39	20	21	5	11	4	0
			1.8-2.8	14	9	21	10	32	14	0
			2.8-3.8	14	5	25	10	34	12	0
			3.8-4.8*	6	3	19	12	34	26	0
			4.8-5.8*	2	3	20	10	38	27	0
			Mean	15	8	21	9	30	17	0

SU 11 SW 2 1246 1155 Near Warren Park Farm

Block B

Surface level +51.0 m (+167 ft)  
 Water struck +48.2 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.5 m  
 Mineral 3.1 m  
 Bedrock 2.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with flints	0.5	0.5
River Terrace Deposits (7th Terrace)	Gravel Gravel: fine and coarse, angular to subrounded flint with trace of sandstone Sand: medium with coarse quartz and angular flint	3.1	3.6
Bagshot Beds	Clay, silty, grey-green	2.1+	6.5

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
5	35	60	0.5-1.5	2	2	21	17	40	18	0
			1.5-2.5	4	0	18	10	34	34	0
			2.5-3.6*	9	2	21	15	33	20	0
			Mean	5	1	20	14	36	24	0

SU 11 SW 3 1396 1363 Near St Ives Nursery

Block C

Surface level +24.6 m (+81 ft)  
 Water struck +22.2 m  
 Shell and auger 152-mm diameter  
 September 1976

Overburden 0.8 m  
 Mineral 2.2 m  
 Bedrock 3.0 m +

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, clayey loam with scattered flints	0.4	0.4
Alluvium	Clay, silty, grey-green mottled	0.4	0.8
River Terrace Deposits (4th Terrace)	'Clayey' gravel Gravel: coarse and fine, subangular to rounded flint Sand: coarse and medium quartz and angular flint	2.2	3.0
London Clay	Clay, sandy, pale grey-green	3.0+	6.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
10	22	68	0.8-1.3	20	3	11	12	39	15	0
			1.3-2.3	9	3	11	8	30	39	0
			2.3-3.0*	6	2	5	11	32	44	0
			Mean	10	3	9	10	33	35	0

SU 11 SW 4 1324 1307 Near Wolvercrate Copse

Block B

Surface level +53.4 m (+175 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.6 m  
 Mineral 3.7 m  
 Bedrock 2.7 m +

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with flints	0.6	0.6
River Terrace Deposits (7th Terrace)	'Clayey' gravel Gravel: fine with coarse, angular to rounded flint with trace of sandstone Sand: medium and coarse quartz and flint, orange-brown	3.7	4.3
Bagshot Beds	'Very clayey' sand Sand: fine with medium quartz with clay laminae becoming more common with depth	2.7+	7.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
11	32	57	0.6-1.5	9	3	21	14	35	18	0
			1.5-2.5	14	2	17	9	38	20	0
			2.5-3.6	13	2	10	19	36	20	0
			3.6-4.3	9	6	14	12	39	20	0
			Mean	11	3	15	14	37	20	0
Bedrock			4.3-7.0	35	44	19	0	2	0	0

SU 11 SW 5 1360 1173 Near Drove End Farm

Block B

Surface level +49.1 m (+161 ft)  
 Water struck +45.7 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.5 m  
 Mineral 5.2 m  
 Bedrock 1.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with flints	0.5	0.5
River Terrace Deposits (7th Terrace)	Gravel Gravel: coarse and fine, angular to subrounded flint Sand: coarse and medium quartz and flint	5.2	5.7
Bagshot Beds	Clay, grey-white	1.3+	7.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines			Gravel			
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
7	21	72	0.5-1.5	13	1	12	11	30	33	0
			1.5-2.5	7	1	12	11	46	23	0
			2.5-3.4	12	2	13	15	33	25	0
			3.4-4.5*	1	1	6	9	35	48	0
			4.5-5.7*	6	1	4	8	32	49	0
			Mean	7	1	9	11	35	37	0

SU 11 SW 6 1335 1045 Breach Plantation

Block B

Surface level +48.1 m (+158 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.4 m  
 Mineral 3.3 m  
 Bedrock 4.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with flints	0.4	0.4
River Terrace Deposits (7th Terrace)	'Clayey' gravel Gravel: fine with coarse, angular to subrounded flint Sand: coarse and medium quartz and flint	3.3	3.7
Bagshot Beds	Clay, laminated with medium quartz sand seams	4.0+	7.7

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines			Gravel			
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
11	34	55	0.4-1.5	16	5	6	13	42	18	0
			1.5-2.5	5	8	16	15	36	20	0
			2.5-3.5	12	6	16	18	31	17	0
			3.5-3.7	6	11	13	11	25	34	0
			Mean	11	7	12	15	36	19	0

SU 11 SW 7 1463 1348 Near St Ives Nursery

Block C

Surface level +23.9 m (+79 ft)  
 Water struck +23.1 m  
 Shell and auger 152-mm diameter  
 September 1976

Overburden 0.8 m  
 Mineral 2.5 m  
 Bedrock 3.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
Made ground	Loam with flints	0.3	0.3
Alluvium	Clay, silty with scattered flints	0.5	0.8
River Terrace Deposits (4th Terrace)	Gravel Gravel: coarse and fine, subangular to subrounded flint with some sandstone and vein quartz Sand: medium and coarse quartz and angular flint	2.5	3.3
London Clay	Clay, laminated with carbonaceous quartz sand	3.0+	6.3

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
6	25	69	0.8-1.8*	8	3	11	9	38	31	0
			1.8-2.8*	4	3	13	9	31	40	0
			2.8-3.3*	7	8	11	9	24	31	0
			Mean	6	4	12	9	32	37	0

Surface level +23.7 m (+78 ft)  
 Water struck +22.2 m  
 Shell and auger 152-mm diameter  
 September 1976

Overburden 0.6 m  
 Mineral 5.7 m  
 Bedrock 3.4 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, clayey loam	0.3	0.3
Alluvium	Silty clay, grey-green and orange-mottled	0.3	0.6
River Terrace Deposits (4th Terrace)	Gravel Gravel: coarse and fine with scattered cobbles, subangular to well rounded flint with some sandstone Sand: medium with some coarse quartz and angular flint	5.7	6.3
London Clay	Sand Sand: medium with fine quartz, greyish brown, carbonaceous with some clay laminae	2.0	8.3
	Clay, silty with sandy laminae	1.4+	9.7

**GRADING**

Mean for deposit <i>percentages</i>			Bulk samples depth below surface (m)	<i>percentages</i>						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
3	21	76	0.6-1.6	6	3	8	8	35	40	0
			1.6-2.6*	2	2	14	10	30	42	0
			2.6-3.6*	2	2	13	7	31	45	0
			3.6-4.6*	3	2	4	7	44	35	5
			4.6-5.7*	2	1	6	4	54	33	0
			5.7-6.3*	4	6	39	3	18	24	6
			Mean	3	2	12	7	37	37	2
<i>Bedrock</i>			6.8-8.3*	9	17	72	2	0	0	0

**SU 11 SW 9 1444 1103 Harbridge Green**

**Block C**

Surface level +26.5 m (+87 ft)  
 Water struck +23.8 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.8 m  
 Mineral 2.9 m  
 Bedrock 3.9 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, clayey loam with flints	0.8	0.8
River Terrace Deposits (4th Terrace)	Gravel Gravel: coarse and fine, angular to sub-rounded with some well-rounded flint Sand: medium and coarse quartz and angular flint	2.9	3.7
Bagshot Beds	Clay, silty, sandy and carbonaceous	3.9+	7.6

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
7	26	67	0.8-1.8	10	1	12	9	31	37	0
			1.8-2.8	9	3	14	10	31	33	0
			2.8-3.7*	2	3	11	16	38	30	0
			Mean	7	2	12	12	33	34	0

**SU 11 SW 10 1441 1025 Harbridge**

**Block C**

Surface level +23.9 m (+78 ft)  
 Water struck +21.3 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.7 m  
 Mineral 2.4 m  
 Bedrock 1.4 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, sandy loam with flint	0.7	0.7
River Terrace Deposits (4th Terrace)	Gravel Gravel: fine and coarse, angular to subrounded flint with trace of vein quartz Sand: coarse and medium quartz and angular flint	2.4	3.1
Bagshot Beds	Clay, silty with sand laminae	1.4+	4.5

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
7	30	63	0.7-1.7	9	2	12	14	33	30	0
			1.7-2.6	8	3	12	13	34	30	0
			2.6-3.1*	2	1	18	16	32	31	0
			Mean	7	2	14	14	33	30	0

SU 11 SW 11 1231 1420 East of Aldersholt Mill Farm

Block B

Surface level +31.7 m (+104 ft)  
 Water struck +29.2 m  
 Shell and auger 152-mm diameter  
 May 1976

Waste 3.3 m  
 Bedrock 9.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Alluvium	Soil, orange-brown	0.7	0.7
	Clay, silty, sandy at base	0.7	1.4
	Pebbly, sandy clay with subangular flints	1.9	3.3
London Clay	Clay, silty, grey, green and yellow-brown	9.2+	12.5

SU 11 SE 2 1521 1475 Near Burgate House

Block D

Surface level +31.1 m (+102 ft)  
 Water struck +26.0 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.8 m  
 Mineral 4.3 m  
 Bedrock 2.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
River Terrace Deposits (5th Terrace)	Soil, silty loam with flints	0.8	0.8
	Gravel	4.3	5.1
	Gravel: fine and coarse, angular to subrounded flint Sand: fine and medium quartz with medium and coarse flint		
London Clay	Clay, silty, blue-grey	2.9+	8.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
8	32	60	0.8-1.8	5	45	5	0	27	18	0
			1.8-2.8	8	3	11	7	43	28	0
			2.8-3.8	6	4	12	13	35	30	0
			3.8-4.8	13	6	15	8	41	17	0
			4.8-5.1	3	3	16	17	43	18	0
			Mean	8	14	11	7	37	23	0

Surface level +29.2 m (+96 ft)  
 Water struck +24.4 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.7 m  
 Mineral a 3.2 m  
 Waste 0.9 m  
 Mineral b 1.3 m  
 Waste 0.7 m  
 Mineral c 1.0 m  
 Bedrock 2.2 m +

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam, dark brown, with flints	0.7	0.7
River Terrace Deposits (4th Terrace)	<b>a</b> 'Very clayey' gravel Gravel: fine and coarse, subangular to subrounded flint with some sandstone and vein quartz Sand: medium and coarse quartz and flint	3.2	3.9
	Clay, sandy laminae of grey clay and red-brown medium quartz sand	0.9	4.8
	<b>b</b> 'Gravel' Gravel: fine and coarse, angular to subrounded flint with some sandstone Sand: coarse with medium, quartz and flint	1.3	6.1
	Clay, greyish white	0.7	6.8
	<b>c</b> 'Very clayey' gravel Gravel: coarse with fine angular to subangular flint with some sandstone Sand: fine to coarse quartz and flint. Deposit iron stained and locally iron-cemented	1.0	7.8
Bagshot Beds	'Very clayey' sand Sand: fine quartz, lilac and grey-green interlaminated with dark grey silty clay	2.2+	10.0

**GRADING**

	Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
	Fines	Sand	Gravel		Fines			Gravel			
					- 1/16	+ 1/16 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16 - 64	+ 64
<b>a</b>	20	25	55	0.7-2.0	16	3	8	9	26	38	0
				2.0-3.0	7	8	12	16	30	27	0
				3.0-3.9	40	2	12	7	26	13	0
				Mean	20	4	10	11	28	27	0
<b>b</b>	3	17	80	4.8-5.6*	2	2	6	14	44	32	0
				5.6-6.1*	4	1	2	6	43	44	0
				Mean*	3	2	4	11	44	36	0
<b>c</b>	22	11	67	6.8-7.8*	22	4	4	3	17	50	0
				Mean*	22	4	4	3	17	50	0
<b>a+b+c</b>	16	21	63	Mean	16	4	7	10	30	33	0
Bedrock				7.8-10.0	37	57	1	4	1	0	0



Surface level +26.6 m (+87 ft)  
 Water struck +24.4 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.4 m  
 Mineral 4.0 m  
 Bedrock 3.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty, with flints	0.4	0.4
River Terrace Deposits (4th Terrace)	Gravel Gravel: coarse and fine, subangular to subrounded flint with trace of sandstone Sand: coarse and medium quartz and flint, glauconitic	4.0	4.4
Bagshot Beds	'Very clayey' sand Sand: fine and medium quartz, grey and yellow-green, with clay laminae towards base	3.0+	7.4

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines		Sand			Gravel	
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
5	32	63	0.4-1.4	8	4	15	21	28	24	0
			1.4-2.4	2	4	13	13	33	35	0
			2.4-3.7*	8	2	10	22	34	24	0
			3.7-4.4*	3	8	4	6	20	59	0
			Mean	5	4	11	17	30	33	0
<i>Bedrock</i>			4.4-7.4*	24	55	21	0	0	0	0

Surface level +29.7 m (+98 ft)  
 Water struck +27.6 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 1.2 m  
 Mineral 3.6 m  
 Bedrock 3.2 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty with flints	1.2	1.2
River Terrace Deposits (4th Terrace)	'Clayey' gravel Gravel: fine and coarse, subangular to rounded flint with trace of sandstone Sand: coarse with medium quartz and flint	3.6	4.8
Bagshot Beds	Clay, silty laminated, green-grey	3.2+	8.0

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	$+1-4$	$+4-16$	$+16-64$	$+64$
11	27	62	1.2-2.2	27	2	11	17	30	13	0
			2.2-3.2*	1	2	7	8	37	45	0
			3.2-4.2*	6	1	13	24	33	23	0
			4.2-4.8*	10	2	8	11	34	35	0
			Mean	11	2	10	15	34	28	0

Surface level +27.2 m (+89 ft)  
 Water struck +25.2 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 2.0 m  
 Mineral 4.2 m  
 Bedrock 2.6 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with flint	0.9	0.9
Alluvium	Clay, sandy, pebbly	1.1	2.0
River Terrace Deposits (4th Terrace)	Gravel Gravel: coarse and fine, subangular to subrounded flint with some sandstone Sand: coarse and medium quartz and flint	4.2	6.2
Bagshot Beds	'Very clayey' sand Sand: fine and medium quartz, carbonaceous	2.6+	8.8

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
3	18	79	2.0-3.1*	5	2	7	14	35	37	0
			3.1-4.0*	1	2	12	7	32	46	0
			4.0-5.0*	2	1	2	6	30	59	0
			5.0-6.2*	5	2	8	7	26	52	0
			Mean	3	2	7	9	31	48	0
<i>Bedrock</i>			6.2-8.8*	21	47	30	2	0	0	0

SU 11 SE 7 1536 1032 South of Auckles Bridge

Block C

Surface level +25.8 m (+85 ft)  
 Water struck +21.5 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 1.3 m  
 Mineral 6.6 m  
 Bedrock 2.3 m +

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, light brown, with flints	1.3	1.3
River Terrace Deposits (3rd Terrace)	'Clayey' gravel Gravel: fine and coarse, angular to subrounded flint Sand: medium with coarse quartz and flint Deposit becomes gravel-free below 7.3 m	6.6	7.9
Bagshot Beds	Clay, very sandy	2.3+	10.2

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- 1/16	+ 1/16 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16 - 64	+ 64
11	25	65	1.3-2.4	11	2	18	6	32	31	0
			2.4-3.6	4	3	12	12	39	30	0
			3.6-4.3	15	4	12	13	30	26	0
			4.3-4.7*	26	2	9	7	29	27	0
			4.7-5.8*	7	1	20	8	28	36	0
			5.8-6.8*	1	1	4	8	42	44	0
			6.8-7.9*	23	12	12	6	29	18	0
			Mean	11	4	13	8	33	31	0

SU 11 SE 8 1695 1421 Near Sandy Balls

Block E

Surface level +74.0 m (+243 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.5 m  
 Mineral 5.8 m  
 Bedrock 4.7 m +

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam with flints	0.5	0.5
River Terrace Deposits (8th Terrace)	'Clayey' gravel Gravel: fine with coarse, subangular to subrounded, flint with sandstone Sand: coarse and medium quartz and flint, orange-brown	5.8	6.3
Bagshot Beds	Clay, laminated with silts and fine quartz sand	4.7+	11.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				- 1/16	+ 1/16 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16 - 64	+ 64
17	26	57	0.5-1.5	17	6	17	11	33	16	0
			1.5-2.5	21	3	14	10	36	16	0
			2.5-3.5	25	2	10	12	35	16	0
			3.5-4.5	11	6	8	15	43	17	0
			4.5-5.5	17	2	7	12	39	23	0
			5.5-6.3	12	1	9	13	39	26	0
			Mean	17	3	11	12	38	19	0

Surface level +78.4 m (+257 ft)  
 Water struck +74.4 m  
 Shell and auger 204-mm diameter  
 September 1976

Overburden 0.1 m  
 Mineral 3.5 m  
 Bedrock a 14.3 m  
 Bedrock a 3.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty loam with flints	0.1	0.1
River Terrace Deposits (10th Terrace)	'Clayey' gravel Gravel: fine and coarse, angular to subrounded flint with trace of vein quartz and glauconitic sandstone Sand: coarse and medium subangular to subrounded quartz and angular flint	3.5	3.6
Bracklesham Beds	Clay, laminated with thin sand and silt seams. Pebbly at base, grey-green and orange-brown	14.3	17.9
Bagshot Beds	Sand Sand: fine and medium subrounded quartz with silty clay laminae	3.0+	20.9

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
17	27	56	0.1-1.1	23	4	5	10	35	23	0
			1.1-1.5	16	6	11	13	33	21	0
			1.5-2.2	15	7	14	9	31	24	0
			2.2-3.2	13	6	12	13	32	24	0
			3.2-3.6	17	6	7	12	33	25	0
			Mean	17	6	10	11	33	23	0
<i>Bedrock</i> <b>b</b>			17.9-20.9*	10	62	25	3	0	0	0

**SU 11 SE 10 1767 1058 Ibsley Common**

**Block E**

Surface level +78.2 m (+257 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.3 m  
 Mineral 2.3 m  
 Bedrock 3.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty, with flints	0.3	0.3
River Terrace Deposits (10th Terrace)	'Clayey' gravel Gravel: fine with coarse, subrounded flint with some sandstone Sand: coarse and medium quartz with flint with some thin silty clay laminae	2.3	2.6
Bracklesham Beds	Sand Sand: medium with fine quartz, yellow-brown with some clay laminae	3.0+	5.6

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples depth below surface (m) percentages						
Fines	Sand	Gravel		Fines				Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
20	31	49	0.3-1.3	13	7	10	14	38	18	0
			1.3-2.3	26	6	12	13	36	7	0
			2.3-2.6	22	6	21	11	27	13	0
			Mean	20	6	12	13	36	13	0
<i>Bedrock</i>			2.6-5.6	7	26	67	0	0	0	0

**SU 11 SE 11 1837 1347 Hampton Ridge**

**Block F**

Surface level +98.9 m (+325 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.6 m  
 Mineral 2.4 m  
 Bedrock 6.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty with flints	0.6	0.6
Older River Gravels	'Very clayey' gravel Gravel: fine and coarse, subangular to subrounded flint with some sandstone Sand: medium with fine quartz and coarse, angular flint	2.4	3.0
Bracklesham Beds	Clay, sandy, buff, yellow and orange laminated	6.0+	9.0

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples depth below surface (m) percentages						
Fines	Sand	Gravel		Fines				Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
26	23	51	0.6-1.6	34	2	10	5	22	27	0
			1.6-2.5	24	0	8	12	35	21	0
			2.5-3.0	17	18	12	5	21	27	0
			Mean	26	5	10	8	26	25	0

SU 11 SE 12 1976 1381 Hampton Ridge

Block F

Surface level +103.7 m (+340 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 1.3 m  
 Mineral 3.1 m  
 Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Older River Gravels	Soil, silty, with flints	0.3	0.3
	Clay, orange-brown with flints	1.0	1.3
	'Very clayey' gravel Gravel: fine with coarse, subangular to subrounded flint with some sandstone Sand: coarse and medium quartz with flint	3.1	4.4
Bracklesham Beds	'Clayey' sand Sand: medium quartz orange-brown with clay laminae	3.0+	7.4

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
22	21	57	1.3-2.3	22	1	7	15	32	23	0
			2.3-3.3	15	1	9	10	39	26	0
			3.3-4.4	28	0	9	10	30	23	0
			Mean	22	1	8	12	33	24	0
			Bedrock	4.4-7.4	17	5	78	0	0	0

SU 11 SE 13 1989 1014 Near Milkham Inclosure

Block F

Surface level +98.3 m (+322 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 June 1976

Waste 2.7 m  
 Bedrock 2.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Older River Gravels	Soil, peaty, with flints	0.6	0.6
	Clay, yellow-brown and grey, laminated	1.0	1.6
	Clay with coarse flint pebbles and medium quartz and flint sand	1.1	2.7
Barton Clay	Clay, orange and blue-grey	2.9+	5.6

SU 11 SE 14 1633 1474 West of Sandy Balls

Block D

Surface level +27.4 m (+90 ft)  
 Water struck +26.4 m  
 Shell and auger 152-mm diameter  
 October 1976

Overburden 1.0 m  
 Mineral 2.3 m  
 Bedrock 2.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Alluvium	Soil, peaty loam, dark brown	0.8	0.8
	Clay, dark greyish green	0.2	1.0
River Terrace Deposits (4th Terrace)	Gravel Gravel: coarse and fine, subangular to subrounded flint with trace of vein quartz Sand: coarse with medium quartz and angular flint	2.3	3.3
London Clay	Clay, silty, laminated, dark grey	2.9+	6.2

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples depth below surface (m) percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
3	11	86	1.0-2.0*	5	2	2	4	37	50	0
			2.0-3.3*	1	3	4	6	34	52	0
			Mean	3	3	3	5	35	51	0

SU 11 SE 15 1523 1163 West of North Gorley

Block C

Surface level +26.5 m (+87 ft)  
 Water struck +24.3 m  
 Shell and auger 152-mm diameter  
 October 1976

Overburden 0.4 m  
 Mineral 3.4 m  
 Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, silty loam	0.4	0.4
River Terrace Deposits (4th Terrace)	'Clayey' gravel Gravel: coarse and fine, angular to subrounded flint with some sandstone and vein quartz Sand: coarse with medium angular to subangular quartz and flint	3.4	3.8
Bagshot Beds	Clay, silty with lignite laminae, dark grey	3.0+	6.8

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples depth below surface (m) percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
11	24	65	0.4-1.4	27	5	11	12	18	27	0
			1.4-2.4	4	3	8	12	36	37	0
			2.4-3.8*	4	1	10	10	38	37	0
			Mean	11	3	10	11	31	34	0



SU 11 SE 16 1771 1168 Dorridge Hill

Block E

Surface level +81.4 m (+267 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 October 1976

Overburden 0.1 m  
 Mineral 3.7 m  
 Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, peat, pebbly	0.1	0.1
River Terrace Deposits (10th Terrace)	'Clayey' gravel Gravel: fine and coarse, subangular to subrounded flint with some jasper, vein quartz and sandstone Sand: coarse with medium quartz and angular flint	3.7	3.8
Bracklesham Beds	'Clayey' sand Sand: fine and medium, subangular to subrounded quartz, yellow- orange	3.0+	6.8

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Gravel			
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
16	27	57	0.1-1.1	11	8	13	11	34	23	0
			1.1-2.1	21	2	7	12	40	18	0
			2.1-3.1	14	3	9	15	31	28	0
			3.1-3.8	17	3	11	13	32	24	0
			Mean	16	4	10	13	34	23	0
<i>Bedrock</i>			3.8-6.8	14	58	27	1	0	0	0

SU 11 SE 17 1933 1206 Hasley Inclosure

Block F

Surface level +99.1 m (+325 ft)  
 Water struck +98.2 m  
 Shell and auger 152-mm diameter  
 October 1976

Overburden 0.3 m  
 Mineral 1.0 m  
 Bedrock 2.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty loam	0.3	0.3
Older River Gravels	Gravel Gravel: fine and coarse, subangular to subrounded flint with some vein quartz Sand: medium and coarse quartz with flint	1.0	1.3
Bracklesham Beds	Clay, with silt laminae, orange and pale green	2.7+	4.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Gravel			
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
9	30	61	0.3-1.3*	9	7	12	11	35	26	0
			Mean	9	7	12	11	35	26	0

**SU 11 SE 18 1508 1001 North of Ibsley Bridge**

**Block C**

Surface level +21.7 m (+71 ft)  
 Water at +19.9 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 1.8 m  
 Mineral 2.3 m  
 Bedrock 3.9 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
Made ground	Silty topsoil with gravelly subsoil	0.6	0.6
Alluvium	Clay, silty, dark green mottled	1.2	1.8
River Terrace Deposits (3rd Terrace)	Gravel Gravel: coarse with fine, angular and subangular flint Sand: medium quartz with some coarse, angular flint	2.3	4.1
Bagshot Beds	Clay, sandy, laminated	3.0	7.1
	'Very clayey' sand Sand: medium quartz, carbonaceous	0.9+	8.0

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
5	47	48	1.8-2.8*	3	1	9	9	30	48	0
			2.8-4.1*	7	3	55	10	9	16	0
			Mean	5	2	35	10	18	30	0
<i>Bedrock</i>			7.1-8.0*	23	6	71	0	0	0	0

**SU 20 NW 1 2082 0904 King's Garden**

**Block F**

Surface level +94.8 m (+311 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 June 1976

Mineral 2.5 m  
 Bedrock 3.4 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
Older River Gravel	'Clayey' gravel Gravel: fine and coarse, subangular to rounded flint Sand: coarse and medium quartz and angular flint, very peaty at top	2.5	2.5
Barton Clay	Clay, silty with fine quartz sand laminae	3.4+	5.9

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
18	26	56	0.0-0.9	8	1	10	15	42	24	0
			0.9-1.9	16	1	16	13	33	21	0
			1.9-2.5	37	1	10	9	37	6	0
			Mean	18	1	12	13	37	19	0

SU 20 NW 2 2035 0686 Ridley Plain

Block F

Surface level +96.3 m (+316 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 July 1976

Mineral 3.6 m  
 Bedrock 3.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
Older River Gravels	'Very clayey' gravel Gravel: fine with coarse, angular to subrounded flint with trace of vein quartz Sand: medium with coarse subrounded quartz with angular flint	3.6	3.6
Barton Sand	Clay, silty, orange and grey mottled	3.0+	6.6

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Gravel			
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
22	31	47	0.0-0.3	32	2	6	8	31	21	0
			0.3-1.3	31	3	11	9	27	19	0
			1.3-2.1	22	4	12	11	35	16	0
			2.1-3.6	15	7	24	11	35	8	0
			Mean	22	5	16	10	33	14	0

SU 20 NW 3 2207 0958 Near Sluffers Inclosure

Block F

Surface level +104.4 m (+343 ft)  
 Water struck +97.4 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 0.6 m  
 Mineral 3.2 m  
 Bedrock 3.2 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty with flints	0.6	0.6
Older River Gravels	'Clayey' gravel Gravel: fine with coarse subangular to subrounded flint Sand: medium and coarse quartz and angular flint	3.2	3.8
Barton Clay	Clay, silty, sandy	3.2+	7.0

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines			Gravel			
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
13	29	58	0.6-1.6	15	1	12	16	28	28	0
			1.6-2.6	14	1	14	12	37	22	0
			2.6-3.8	7	7	16	11	38	21	0
			Mean	13	3	14	13	35	23	0

SU 20 NW 4 2197 0859 Near Sandy Ridge

Block F

Surface level +101.7 m (+334 ft)  
 Water struck +95.1 m  
 Shell and auger 152-mm diameter  
 July 1976

Overburden 0.1 m  
 Mineral 5.0 m  
 Bedrock 2.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, peat	0.1	0.1
Older River Gravels	'Clayey' gravel Gravel: fine with coarse, subangular to subrounded flint Sand: medium quartz and flint	5.0	5.1
Barton Sand	'Very clayey' sand Sand: fine quartz, orange	2.7+	7.8

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
19	38	43	0.1-0.5	26	9	18	7	24	16	0
			0.5-1.5	22	4	15	10	25	24	0
			1.5-2.5	25	11	30	5	19	10	0
			2.5-3.5	13	6	35	8	25	13	0
			3.5-4.5	14	4	19	11	37	15	0
			4.5-5.1	14	3	20	9	27	27	0
			Mean	19	6	24	8	26	17	0
<i>Bedrock</i>			5.1-7.8*	39	60	1	0	0	0	0

SU 20 NW 5 2176 0686 Backley Plain

Block F

Surface level +97.9 m (+321 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 July 1976

Mineral 3.2 m  
 Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Older River Gravels	'Very clayey' gravel Gravel: fine with coarse, angular to subrounded flint with trace of sandstone and vein quartz Sand: medium and coarse flint and quartz	3.2	3.2
Barton Sand	Clay, silty with fine quartz sand, laminated	3.0+	6.2

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
20	25	55	0.0-0.8	16	6	7	9	44	18	0
			0.8-1.8	21	6	12	10	36	15	0
			1.8-2.8	22	3	11	8	40	16	0
			2.8-3.2	21	4	17	11	32	15	0
			Mean	20	5	11	9	39	16	0

Surface level +102.2 m (+335 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 July 1976

Overburden 1.5 m  
 Mineral 2.5 m  
 Bedrock 3.0 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, 'clayey' loam with flints	0.1	0.1
Older River Gravels	Clay, silty, brown	0.4	0.5
	Clay, sandy, pebbly	1.0	1.5
	'Very clayey' gravel Gravel: fine and coarse, subrounded to rounded flint with trace of vein quartz and sandstone Sand: medium and coarse flint with some quartz	2.5	4.0
Barton Sand	Clay, sandy	3.0+	7.0

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
21	29	50	1.5-2.5	26	3	11	11	34	15	0
			2.5-3.5	18	4	16	13	35	14	0
			3.5-4.0	18	3	16	12	39	12	0
			Mean	21	3	14	12	36	14	0

Surface level +93.0 m (+305 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 October 1976

Overburden 0.2 m  
 Mineral 2.3 m  
 Bedrock 3.5 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty loam	0.2	0.2
Older River Gravels	'Clayey' gravel Gravel: fine and coarse, angular to subrounded flint with some sandstone and vein quartz Sand: medium and coarse subangular quartz and flint	2.3	2.5
Barton Sand	Clay, laminated, silty	1.6	4.1
	'Clayey' sand Sand: fine, subangular to subrounded quartz, orange-yellow and brown	1.9+	6.0

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines		Sand		Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
12	31	57	0.2-0.8	7	5	12	9	33	34	0
			0.8-1.8	14	3	18	11	34	20	0
			1.8-2.5	15	3	17	12	35	18	0
			Mean	12	4	16	11	34	23	0
<i>Bedrock</i>			4.1-6.0	17	82	1	0	0	0	0

Surface level +115.0 m (+377 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 4.0 m  
 Mineral 3.7 m  
 Bedrock 3.3 m+

**LOG**

Geological classification	Lithology	Thickness m	Depth m
Older River Gravels	Soil, peaty	0.4	0.4
	Clay, sandy with flints	1.7	2.1
	Gravel	0.3	2.4
	Gravel: fine and coarse flints Sand: medium quartz		
	Clay, sandy, orange-brown	1.6	4.0
Bagshot Beds	'Clayey' gravel	3.7	7.7
	Gravel: fine and coarse, angular to subrounded flint with some sandstone Sand: coarse and medium quartz and flint, orange-brown		
	'Very clayey' sand Sand: fine and medium quartz	3.3+	11.0

**GRADING**

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- 1/16	+ 1/16 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16 - 64	+ 64
13	31	56	4.0-4.9	11	1	8	12	35	33	0
			4.9-6.0	13	4	13	13	32	25	0
			6.0-7.3	12	4	12	18	29	25	0
			7.3-7.7	21	9	28	7	23	12	0
			Mean	13	4	13	14	31	25	0
Bedrock			7.7-11.0	22	39	38	1	0	0	0

SU 21 NW 13 2036 1740 Turf Hill Inclosure

Block F

Surface level +109.7 m (+360 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.2 m  
 Mineral 4.0 m  
 Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, sandy loam with flints	0.2	0.2
Older River Gravels	'Very clayey' gravel Gravel: fine and coarse, subangular to subrounded flint Sand: medium with coarse quartz and flint	4.0	4.2
Bracklesham Beds	'Very clayey' sand Sand: medium with fine quartz, orange-buff	3.0+	7.2

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples depth below surface (m) percentages						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
21	27	52	0.2-1.4	33	2	7	10	22	26	0
			1.4-2.4	18	5	14	8	27	28	0
			2.4-3.1	2	2	20	19	33	24	0
			3.1-4.2	20	1	12	15	29	23	0
			Mean	24	3	12	12	27	25	0
Bedrock			4.2-7.2	30	19	50	1	0	0	0

SU 21 NW 14 2028 1562 Leaden Hall

Block F

Surface level +108.1 m (+355 ft)  
 Water struck +103.4 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.4 m  
 Mineral 2.7 m  
 Bedrock 3.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty with flints	0.4	0.4
Older River Gravels	'Very clayey' gravel Gravel: fine with coarse and scattered cobbles, angular to subrounded flint Sand: coarse and medium quartz and flint	2.7	3.1
Bracklesham Beds	Clay, sandy, laminated, buff-yellow	3.3+	6.4

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	Bulk samples depth below surface (m) percentages						
Fines	Sand	Gravel		Fines			Sand		Gravel	
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
25	28	47	0.4-1.5	21	3	13	19	31	13	0
			1.5-2.5	29	2	7	13	33	16	0
			2.5-3.1	23	2	11	16	24	15	9
			Mean	25	2	10	16	30	15	2



SU 21 NW 15 2158 1696 Deadman Hill

Block F

Surface level +118.6 m (+389 ft)  
 Water struck +114.9 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 2.7 m  
 Mineral 1.4 m  
 Bedrock 3.9 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty	0.3	0.3
Older River Gravels	Clay, sandy, pebbly	2.4	2.7
	'Very clayey' gravel Gravel: fine with coarse, angular to subrounded flints Sand: coarse with medium quartz and flint, yellow-brown	1.4	4.1
Bracklesham Beds	Clay, silty, laminated	3.9+	8.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
30	25	45	2.7-3.7	26	3	9	13	31	18	0
			3.7-4.1*	40	3	7	16	28	6	0
			Mean	30	3	8	14	30	15	0

SU 21 NW 16 2141 1562 The Butts

Block F

Surface level +114.7 m (+376 ft)  
 Water struck +111.4 m  
 Shell and auger 152-mm diameter  
 May 1976

Overburden 0.2 m  
 Mineral 3.6 m  
 Bedrock 11.7 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty, sandy	0.2	0.2
Older River Gravels	'Very clayey' gravel Gravel: fine and coarse, angular to subrounded flint with traces of vein quartz and sandstone Sand: coarse with medium quartz and flint	3.6	3.8
	Bracklesham Beds	Clay, silty, sandy, laminated	11.7+

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-1/16	+1/16-1/4	+1/4-1	+1-4	+4-16	+16-64	+64
22	22	56	0.2-1.0	30	2	7	9	32	20	0
			1.0-2.5	21	2	9	14	30	24	0
			2.5-3.5*	19	2	10	13	33	23	0
			3.5-3.8*	17	1	3	9	44	26	0
			Mean	22	2	8	12	33	23	0

SU 21 NW 17 2272 1668 Bramshaw Telegraph

Block F

Surface level +126.9 m (+416 ft)  
 Water not struck  
 Shell and auger 152-mm diameter  
 May 1976

Waste 2.1 m  
 Bedrock 2.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, sandy loam	0.1	0.1
Older River Gravels	Clay, yellow mottled	0.6	0.7
	Clay, sandy, pebbly	1.4	2.1
Bracklesham Beds	Clay, silty, laminated, greenish grey	2.2+	4.3

SU 21 SW 1 2151 1054 South of Broomy Bottom

Block F

Surface level +103.5 m (+340 ft)  
 Water struck +101.1 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 1.4 m  
 Mineral 2.5 m  
 Bedrock 2.1 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil, peaty	0.4	0.4
Older River Gravels	Clay, pebbly	1.0	1.4
	'Clayey' gravel Gravel: fine with coarse, subangular to rounded flint with trace of sandstone Sand: medium with coarse quartz and angular flint	2.5	3.9
Barton Clay	Clay, carbonaceous, blue-green	2.1+	6.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- 1/16	+ 1/16 - 1/4	+ 1/4 - 1	+ 1 - 4	+ 4 - 16	+ 16 - 64	+ 64
15	35	50	1.4-2.4	23	0	17	7	37	16	0
			2.4-3.4*	9	2	22	15	31	21	0
			3.4-3.9*	8	4	28	18	20	22	0
			Mean	15	2	21	12	31	19	0

SU 21 SW 2 2231 1355 Fritham Plain

Block F

Surface level +112 m (+367 ft)  
 Water struck +108 m  
 Shell and auger 204-mm diameter  
 September 1976

Overburden 1.2 m  
 Mineral 4.0 m  
 Bedrock (1) 9.6 m  
 Bedrock (2) 3.9 m +

LOG

Geological classification	Lithology	Thickness m	Depth m
Older River Gravels	Soil, sand, clayey, pebbly	0.2	0.2
	Clay, sandy, pebbly	1.0	1.2
	'Clayey' gravel Gravel: fine and coarse, angular to subrounded flint with some glauconitic sandstone and vein quartz Sand: coarse and medium, quartz and angular flint	4.0	5.2
Barton Clay	Clay, silty, laminated, blue-green	9.6	14.8
Bracklesham Beds	Clay with sand laminae, fossiliferous	3.9+	18.7

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
18	17	65	1.2-2.2	29	2	6	6	35	22	0
			2.2-3.2	26	1	9	8	30	26	0
			3.2-4.2*	5	3	7	12	38	35	0
			4.2-5.2*	11	2	3	9	44	31	0
			Mean	18	2	6	9	37	28	0

SU 21 SW 3 2288 1166 Ocknell Plain

Block F

Surface level +107.1 m (+351 ft)  
 Water struck +103.9 m  
 Shell and auger 152-mm diameter  
 June 1976

Overburden 1.8 m  
 Mineral 2.2 m  
 Bedrock 2.0 m +

LOG

Geological classification	Lithology	Thickness m	Depth m
Made ground	Peaty, rubbly	0.4	0.4
Older River Gravels	Clay, pebbly	1.4	1.8
	Gravel Gravel: fine with coarse, subangular to subrounded flint Sand: coarse and medium: quartz and flint	2.2	4.0
Barton Clay	Clay, laminated, green	2.0+	6.0

GRADING

Mean for deposit percentages			Bulk samples depth below surface (m)	percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				- $\frac{1}{16}$	+ $\frac{1}{16}$ - $\frac{1}{4}$	+ $\frac{1}{4}$ -1	+1-4	+4-16	+16-64	+64
9	20	71	1.8-2.9	15	1	9	12	32	31	0
			2.9-4.0*	3	3	7	9	59	19	0
			Mean	9	2	8	10	46	25	0

**APPENDIX G**  
**LIST OF WORKINGS**

**Active (November 1976)**

<i>Location</i>	<i>Grid Reference</i>	<i>Deposit worked</i>
Pistle Down	092 103	Older River Gravels
Verwood	097 091	Bagshot Sand
Ringwood Forest	122 070	7th Terrace
Ringwood Forest	121 072	7th Terrace
Hamer Warren	130 097	7th Terrace
Blashford	146 074	3rd Terrace
Blashford	144 077	4th Terrace
Rockford Common	168 082	8th Terrace
Ellingham Airfield	158 090	4th Terrace
Poulner	156 068	4th Terrace
North Gorley	153 113	3rd/4th Terrace

**Worked out or abandoned**

<i>Location</i>	<i>Grid Reference</i>	<i>Deposit worked</i>
Blashford	145 072	3rd Terrace
Blashford	152 066	4th Terrace
Blashford	155 075	4th Terrace
Rockford	156 074	4th Terrace
Ibsley Common	168 098	8th Terrace
Poulner Common	168 063	7th Terrace
Ringwood	154 064	4th Terrace
Ringwood Forest	123 066	7th Terrace
Plumley Farm	125 092	7th Terrace
Abbots Well	178 128	10th Terrace
Hyde Common	165 126	8th Terrace
Gorley Common	165 115	8th Terrace

There are also numerous small hand workings scattered throughout the area, for which no records are available.

**APPENDIX H**

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

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

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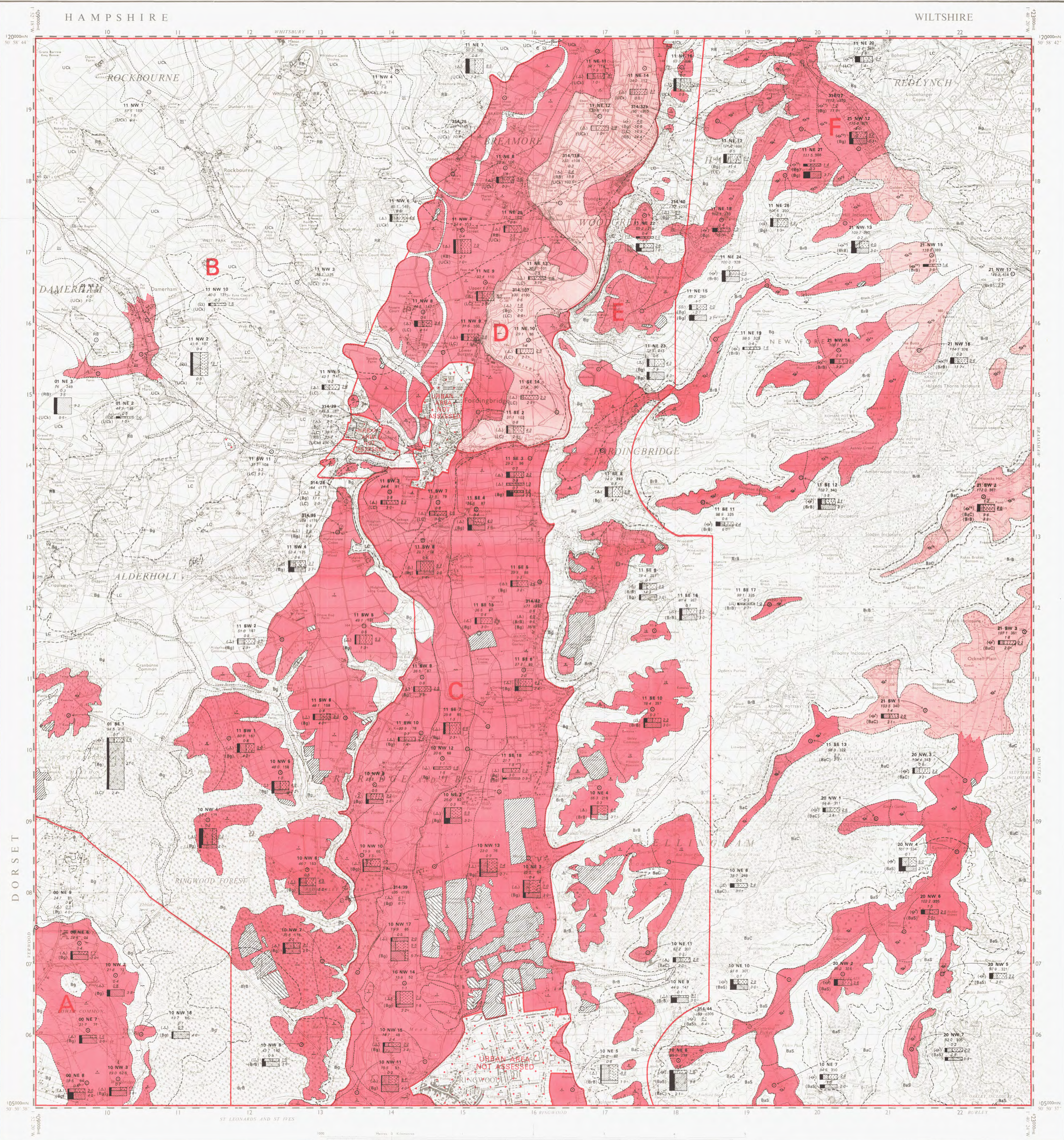
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# THE SAND AND GRAVEL RESOURCES OF THE COUNTRY AROUND FORDINGBRIDGE, HAMPSHIRE

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

PARTS OF FIRST SERIES SHEETS SU 00,10,20 AND  
PARTS OF SECOND SERIES SHEETS SU 01/11 AND SU 21/31



### EXPLANATION OF SYMBOLS AND ABBREVIATIONS

- DRIFT**
- P-4 Peat — dark brown partially decomposed organic matter.
  - A-33 Alluvium — silty and sandy clays.
  - H-23 Head (undifferentiated) — soliflucted deposits of clayey flint gravel.
  - DV-4 Dry Valley Deposits — subangular flint gravels in a chalky sand matrix.
  - B-10 Brickearth — red-brown sandy clay.
  - RT-10 River Terrace Deposits — subangular flint gravels of the 2nd to 10th terraces.
  - OR-15 Older River Gravels — levels 1 to 5; clayey, subangular flint gravels.
- SOLID**
- BaS Barton Sand — orange and yellow, fine, silty sands.
  - BaC Barton Clay — dark green silty clay.
  - BrB Bracksham Beds — glauconitic sands and sandy clays.
  - Bg Bagshot Beds — buff sands and clayey sands with thin pipe clay lenses.
  - LC London Clay — bluish-grey silty clay with thin interbedded sands.
  - RB Reading Beds — variable, mottled red-brown clays with basal sands.
  - UCL Upper Chalk — soft white limestone with dark nodular flints.

- MG-2 Made Ground
- W0-9 Worked out areas of sand and gravel

- BOUNDARY LINES**
- Geological boundary, Drift.
  - Geological boundary, Solid.
  - Inferred boundary between recognized categories of deposits.
  - Resource Block boundary.
- Broken lines denote uncertainty

- BOREHOLE DATA**
- SITE LOCATIONS**
- Industrial Minerals Assessment Unit (IMAU) boreholes.
  - Other boreholes.

- I.M.A.U. BOREHOLES**
- Borehole Registration Number — 11 NE 22  
Borehole Site — 68 2 214
- Geological Classification — (L) Mineral (sand and gravel)  
Grading Diagram — (Bg) Fines (sand and gravel) / (B) Backrock
- Thickness in metres

- Grading Diagrams**
- Each grading diagram shows the mean particle size distribution of a distinct deposit of mineral.
- Sand (+175-4mm) — The height of the diagram is proportional to the mineral thickness.
  - Fines (Gravel) (-175mm) — The width of the divisions shows the proportions of Fines, Sand and Gravel.

- OTHER BOREHOLES**
- The layout of information is the same as for I.M.A.U. boreholes although data available may not be as comprehensive. They are registered in the same series, except for records in the Hydrogeological Department, for example 314/44 signifies Hydrogeological Department borehole 44 on New Series One-Inch Geological Sheet 314.

- CATEGORIES OF DEPOSITS**
- Exposed mineral, assessed. CAT-EZ
  - Continuous or almost continuous spreads of mineral beneath overburden. CAT-C1
  - Sand and gravel either not potentially workable (see Report) or absent. CAT-A2
  - Sand and gravel not assessed. CAT-N1
- Where appropriate on other sheets a fifth category 'Discontinuous spreads of sand and gravel beneath overburden' is recognised.

- RESOURCE BLOCKS**
- For assessment purposes the mineral-bearing land is divided into Resource Blocks (see report). Each is designated by a letter.
- Detailed records may be consulted on application to the Head, Industrial Minerals Assessment Unit, Institute of Geological Sciences, Keyworth, Nottingham, NG12 5GG.

Made and published by the Director General of the Ordnance Survey, Southampton, for the Institute of Geological Sciences, Natural Environment Research Council.

298	299
SU 02	SU 12
SU 01	SU 11
SU 00	SU 10
329	330

Diagram showing the relationship of the National Grid 1:25 000 sheets with the One-Inch New Series Geological Sheets 298, 299, 314, 315, 329 and 330.

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

Geological lines from a survey at the scale of six inches to one mile by F. J. Bennett, E. L. Dixon and C. Reed in 1891-1900. St. Andrew's Geology, F.R.S., Director General. Boundaries amended by M. R. Clarke in 1976.

Sand and Gravel surveys by M. R. Clarke, A. J. Dixon, M. Kubila and R. A. Sobey in 1976-77. 1:25 000 Sand and Gravel Resource Sheet published in 1979. P. G. Thurler, Head, Industrial Minerals Assessment Unit. Austin W. Woodland, C.B.E., Director, Institute of Geological Sciences, 1980.

The GRID lines on this sheet are at 1 Kilometre intervals. Heights are in feet above Mean Sea Level as shown. 1 figure on the map represents 10 000 feet 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 materials as variable as sand and gravel. However, estimates of the volume and mean grading of the mineral as a whole in each Resource Block are given in the Report.

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