

NATURAL ENVIRONMENT RESEARCH COUNCIL

INSTITUTE OF GEOLOGICAL SCIENCES

Report No. 73/5

ASSESSMENT OF BRITISH SAND AND GRAVEL RESOURCES No. 6

The sand and gravel resources of the country around Terling, Essex

Description of 1 : 25 000 resource sheet TL 71

C.H.Eaton, BSc, DIC

London: Her Majesty's Stationery Office 1973

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It is recommended that reference to this report be made in the following form:

EATON, C. H. 1973. The sand and gravel resources of the country around Terling, Essex: Description of 1 : 25 000 resource sheet TL 71. *Rep. No. 73/5, Inst. Geol. Sci.* 120 pp.

SBN 11 880608 4

Preface

It has become increasingly clear in recent years that resources of many minerals should be assessed. This is another Report of the Mineral Assessment Unit which was set up in May 1968 to undertake such work. It describes and quantifies the sand and gravel resources of 100 km² of country around Terling, Essex, shown on the accompanying 1:25 000 resource sheet TL 71.

This survey of sheet TL71 is concerned with assessing sand and gravel resources on a regional scale at the indicated level; the deposits are not outlined completely nor their grade established throughout. The work may be regarded as the application to a large area of methods used commercially for evaluating reserves on small sites. It may also be regarded as an extension of geological mapping by providing information about the thickness and quality of deposits.

Some of the drilling programme was conducted in 1966 and 1967 by Dr. R. G. Thurrell as part of a feasibility project; the remainder was carried out in 1968 and 1969, principally by Mr. H. J. E. Haggard assisted by Mr. E. F. P. Nickless, Mr. J. D. Ambrose, Mr. A. R. Clayton and Mr. J. A. Gray as field officers. The work is based on a geological survey at the scale of 1:10 560 in 1966 and 1969 by Dr. C. R. Bristow and Mr R. D. Lake of the East Anglia and South-East England Field Unit.

The Introduction and Appendix B were written largely by Mr. E. F. P. Nickless, and Appendix A originally by Mr. H. J. E. Haggard, and later revised by Mr. J. H. Hull, Mr. E. F. P. Nickless and the author. Essentially these sections are common to all the Sand and Gravel Resource Reports published to date by the Mineral Assessment Unit. This Report is, therefore, a compilation and interpretation by the author of data gathered from various sources.

Mr. J. W. Gardner, C.B.E. (Land Agent) was responsible for negotiating access to land for most of the drilling. The ready cooperation of land owners and tenants in this work is gratefully acknowledged. Special thanks are due to Dr. T. L. Thomas of the Royal School of Mines, London, for his advice on methods of resource calculation.

Financial support for the survey was provided by the Department of the Environment.

Kingsley Dunham
Director

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

1 November 1972

Any enquiries concerning this report may be addressed to Head, Mineral Assessment Unit, Institute of Geological Sciences, Exhibition Road, London SW7 2DE

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Summary

Geological maps prepared by the Institute of Geological Sciences, data from 121 boreholes drilled during a feasibility study in 1966-67 and for the Mineral Assessment Unit in 1968-69, and other pre-existing borehole information form the basis for the assessment of sand and gravel resources in the Terling area, Essex (1:25 000 sheet TL 71).

The sheet is divided into resource blocks, each ideally containing 10 km² of mineral (potentially workable sand and gravel). A simple statistical method has been applied to estimate the mineral volume in each block where at least five sample points are available. The reliability of the volume estimates is given at the 95 per cent confidence level. For each block the inferred area of mineral, the estimated average thickness of overburden and of mineral and the calculated mean grading of mineral samples are also given. The geology of the various deposits occurring in the sheet and details of each resource block are described.

Borehole positions, the geology and topography, and mineral resource information are shown on the accompanying 1:25 000 map TL 71. Detailed borehole data are given.

Sommaire

Les cartes géologiques, préparées par l'Institute of Geological Sciences, les données de 121 trous de sonde forés pendant une étude de praticabilité en 1966-67 et pour le Mineral Assessment Unit en 1968-69, et des autres renseignements sur des trous de sonde, qui existaient déjà, constituent la base d'évaluation des ressources en sable et en gravier dans la région de Terling, Essex (1:25 000 feuille TL 71).

La feuille est divisée en blocs de ressources, chacun d'eux ayant idéalement 10 km² de minéral (de sable et de gravier qui pourraient être exploités).

Les évaluations de volume de minéral sont tenues d'être à 95 pour cent exactes. On s'est servi d'une méthode statistique simple pour évaluer le volume de minéral de chaque block où il y a au moins cinq points d'échantillonnage.

On donne aussi pour chaque bloc l'étendue estimée de minéral, l'épaisseur moyenne de recouvrement et de minéral, et la gradation calculée moyenne d'échantillons de minéral. On décrit la géologie des dépôts divers qui sont sur la feuille, et des détails de chaque block de ressources sont donnés.

La situation des trous de sonde, la géologie et la topographie, et des renseignements sur les ressources de minéral sont montrés sur la carte 1:25 000 TL 71.

Des données détaillées des trous de sonde sont présentées.

Zusammenfassung

Die geologischen Karten von der Institute of Geological Sciences, Daten von den 121 Bohrlöchern, die während einer Möglichkeitsarbeit in 1966-67 und für die Mineral Assessment Unit in 1968-69 gebohrt wurden, und andere vorherexistierende Information bilden zusammen den Grund für die Einschätzung der Sand- und Schottermittel im Terling Gebiet, Essex (1:25 000 Blatt TL 71).

Man teilte das Blatt in Mittelsblöcke, wovon jeder ungefähr 10 km² von Mineral (möglich bearbeitbarer Sand und Schotter) theoretisch einschliesst.

Man benutzt eine einfache statistische Methode, um das Mineralvolumen in jedem Block zu schätzen, wo wenigstens fünf Probepunkte vorhanden sind. Man gibt die Zuverlässigkeit der Volumenschätzungen mit 95 Prozent Vertrauensgrenzwerten. Für jeden Block gibt man auch das angenommene Mineralgebiet, die geschätzte Durchschnitts dicke von Überlastung und das geschätzte Durchschnittsbewertung. Man beschreibt die Geologie von den verschiedenen Ablagerungen, die im Blatt vorkommen, auch Kleinigkeiten von jedem Mittelsblock.

Man zeigt auf der 1:25 000 Begleitkarte TL 71 Lagen von Bohrlöchern, die Geologie und Topographie und Information über Mineralmittel. Man gibt ausführliche Bohrlöcherdaten.

The sand and gravel resources of the country around Terling, Essex

Description of 1 : 25 000 resource sheet TL 71

C. H. EATON,¹ BSc, DIC

Introduction

AIMS AND LIMITATIONS

National resources of many of the 'bulk' or 'industrial' minerals may seem so large that stocktaking is unnecessary, but the demand for land for all purposes and for minerals is intensifying. In contrast with other developments of land there may be little or no choice of area for the working of minerals and in the case of low-price materials such as sand and gravel transport costs will be an important factor. Whereas the economic benefit of using land for many other purposes can be assessed, hitherto little has been known of the potential value, on a regional scale, of any mineral resources which may be present. An important aim of the work is to improve the factual background against which planning policies can be decided (Archer, 1969; Thurrell, 1971).

Sand and gravel, considered together as naturally occurring aggregate, was selected as the bulk mineral demanding the most urgent attention, particularly in the south-east of England, where about half the national output is won and very few sources of alternative aggregates are available. Following a short feasibility project, initiated in 1966 by the Ministry of Land and Natural Resources, the Mineral Assessment Unit began systematic surveys on a regional scale in Essex, Suffolk and Norfolk in May 1968. This work is being supported by the Department of the Environment (which incorporates the former Ministries of Housing and Local Government, and Public Building and Works) and undertaken with the cooperation of the Sand and Gravel Association of Great Britain (SAGA). The detail is at the 'indicated' level, a term introduced in the United States in connection with the estimation of national mineral resources. The level is that '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' (Anon., 1948, p.15).

The survey is therefore concerned not with the estimation of reserves (which can only be assessed in the light of particular or existing economic considerations), but rather with resources, which include deposits which are not currently exploitable but have a foreseeable use. Clearly, the social and economic criteria used to decide whether a deposit may be workable at some time in the future cannot be rigorously defined. After discussion with the industry, the following arbitrary physical criteria were adopted for this survey:

- a. the deposit should average at least 3 ft (0.9 m) in thickness.
- b. the ratio of overburden to sand and gravel should be no more than 3:1.
- c. the proportion of fines (that is, particles passing 1/16 mm (approximately No.200 mesh B.S. sieve)) should not exceed 40 per cent.

Ground below 80 ft (24.4 m) from the surface is seldom explored, this being taken as the likely maximum working depth under most circumstances. It follows that boreholes are drilled no deeper than 60 ft (18.3 m) if they are still in overburden.

A deposit of sand and gravel that broadly fulfils the above criteria is considered to be 'potentially workable' and is assessed as 'mineral'. It is recognised that small parts of such a deposit may not satisfy all the requirements.

The volume and chief characteristics of sand and gravel within defined but relatively large areas, referred to as resource blocks, are assessed. Ideally, each resource block contains roughly 10 km² of sand and gravel.

The consequent limitation of the use to which the results can be put must be emphasised. The assessments of quantity and composition apply to the resource block as a whole.

¹Formerly at the Institute of Geological Sciences, 199 Knightsbridge, London SW7 1DZ

Valid conclusions cannot be drawn about the mineral in parts of a block, except in the immediate vicinity of the actual sample points.

It follows that reserves, which are accurately demarcated areas of economically workable mineral, must be proved by the customary detailed exploration undertaken by the industry. However, the information provided about the resource blocks in an area may assist in the selection of the best targets for such commercial exploration and evaluation.

Thus the work can be regarded as the statistically controlled application to large areas of methods similar to those applied by industry to establish the existence of workable reserves on a relatively small site, and also as an extension of conventional geological mapping techniques, which delineate (with varying degrees of accuracy, depending, for example, on the presence of cover) the areal extent of deposits.

PROCEDURE

Trial and error during preliminary studies showed that for the complex and variable glacial deposits of East Anglia and Essex, an absolute minimum of five sample-points evenly distributed across the area of mineral are needed to provide a worthwhile statistical assessment but that, ideally, there should be no fewer than ten. Sample-points are any points for which there exists adequate information about the nature and thickness of the deposit and, apart from the holes drilled during the survey, may include exposures and other boreholes. In particular, the cooperation of sand and gravel operators has ensured that boreholes were not drilled where reliable information was already available. Such data is held confidentially by the Institute and cannot be disclosed, although it may have been used in the calculations.

The mineral shown on each 1:25 000 sheet is divided into resource blocks. The arbitrary size selected, approximately 10 km² of mineral, is a compromise to meet the aims of the survey and to provide sufficient sample-points in each block. As far as possible the block boundaries are controlled by regional geological features; for example, wherever practicable, 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 establish whether there are 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. Ideally the distribution should be unbiased with respect

to the geology to ensure that the data obtained are representative of any broad trend in the variation in thickness or grading, as this will govern spot values.

However, because broad trends are independently overlaid by smaller scale variations, characteristically random in form, 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 have been taken into account in siting the holes; at the same time it has been 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. In the estimation of the resources on this sheet no account is taken of any factor, for example, roads, villages and areas of high agricultural and landscape value, which might stand in the way of sand and gravel being exploited. The estimate of the volume of mineral, therefore, bears no simple relationship to the amount that could be extracted in practice.

Ideally the drilling machine employed should be capable of providing a continuous sample representative of all unconsolidated deposits, from depths up to 100 ft (30 m), with particle diameters up to about 8 in (200 mm), and from 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) and it should be fast. Although uncased continuous flight power augers can meet these requirements in some ground, they fail below the water table, in some clay-free sand and gravel, when the mineral does not stay on the flights or when the borehole caves. On the area covered by this sheet, the German Wirth B1 drill (or B0 modified) was used extensively. With this machine, casing can be advanced at the same time as the hole is being drilled, thus minimising disturbance to the ground, and avoiding contamination and caving. In difficult ground a bailer can be substituted for the auger, although this method suffers from the disadvantage that there is a tendency for the sampled material to be washed and for the pumping action to draw unwanted material into the hole either from the sides or the bottom. Other machines, including conventional 'shell and augers', were also used.

A continuous series of bulk samples is taken throughout the thickness of sand and gravel. Ideally, samples are composed exclusively of the whole of the material previously occupying the space defined by the hole's dimensions, as determined by the diameter of the casing and the thickness penetrated. A new sample is commenced whenever there is an appreciable lithological change within the sand and gravel,

or for every 3 ft (0.9 m) depth. The samples are despatched in heavy-duty polythene bags to a laboratory for grading. Care is taken to discard, as far as possible, material which has caved or been pumped from the bottom of the hole. The samples sent for analysis each weigh 60-100 lb (27-45 kg). The grading procedure is based on BS 1377:1967. Random checks are made on the accuracy of the laboratory grading.

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 C. Detailed results are available for reference on application to the Institute.

The method used in estimating the volume of mineral and other statistics for each of the resource blocks is described in Appendix A and the results are quoted on page 9.

THE MAP

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

Geological Data

The geological boundary lines, symbols, etc. shown are taken from the geological map of the area, which was surveyed in 1966 and 1969 at the scale of 1:10 560. This information was obtained by detailed application of field mapping techniques by the field staff in the Institute's East Anglia and South-East England Unit. Borehole data, which include the stratigraphic relations and mean particle-size distribution of the sand and gravel samples collected during the survey, are also shown.

The geological boundaries are regarded as the best interpretation of the information available at the time of survey. However, it is inevitable, particularly with glacial deposits (such as those included in the area of Sheet TL 71) which change rapidly vertically and laterally, that local irregularities or discrepancies are revealed by some boreholes (for example, at boreholes NE 13 and SE 135). These are taken into account in the assessment of resources.

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 page 1).

The mineral on TL 71 is subdivided into areas where it crops out and areas where it

is present in continuous (or almost continuous) spreads beneath overburden. The whole area of exposed sand and gravel as mapped is considered as mineral, although there may be small patches where sand and gravel is absent or not potentially workable.

Beneath overburden mineral may be continuous (or almost continuous) or discontinuous. The recognition of these categories is subjective, depending on the importance attached to the proportion of boreholes which did not find potentially workable sand and gravel and the distribution of barren boreholes within a block. The mineral is described as almost continuous if it is present in 75 per cent or more of the boreholes in a resource block. The 'discontinuous' category is not recognised on the present sheet.

Areas where bedrock crops out, where boreholes indicate absence of sand and gravel beneath cover, where sand and gravel beneath cover is interpreted to be not potentially workable, and areas not assessed are uncoloured on the map, and where appropriate the relevant criterion is noted. In such areas it is assumed that mineral is absent except in infrequent and relatively minor patches which can neither be outlined nor assessed quantitatively in the context of this survey.

The area of exposed sand and gravel is measured from the mapped geological boundary lines. Inferred boundaries are inserted around areas where sand and gravel beneath cover is interpreted to be not potentially workable or absent. Such boundaries, for which a distinctive red symbol is used, are drawn primarily for the purpose of volume estimation. The symbol is intended to convey an approximate location within a likely zone of occurrence rather than to represent the breadth of the zone, its size being limited only by cartographic considerations. For the purpose of measuring areas the centre-line of the symbol is used.

Description of sheet TL 71

GENERAL

Sheet TL 71 shows 100 km² (about 39 square miles) of rural, predominantly farming country centred on Terling, about 10 km north-east of Chelmsford, Essex. The villages of Hatfield Peverel and Little Waltham, and parts of White Notley and Broomfield are also situated on the sheet; they are included in the assessment. The A12 trunk road and the main railway between London and East Anglia cross the south-eastern part of the area.

TOPOGRAPHY

Basically the area comprises a plateau which slopes down very gradually (at about 1 in 700) from north-west to south-east, and which is dissected by three small rivers flowing in

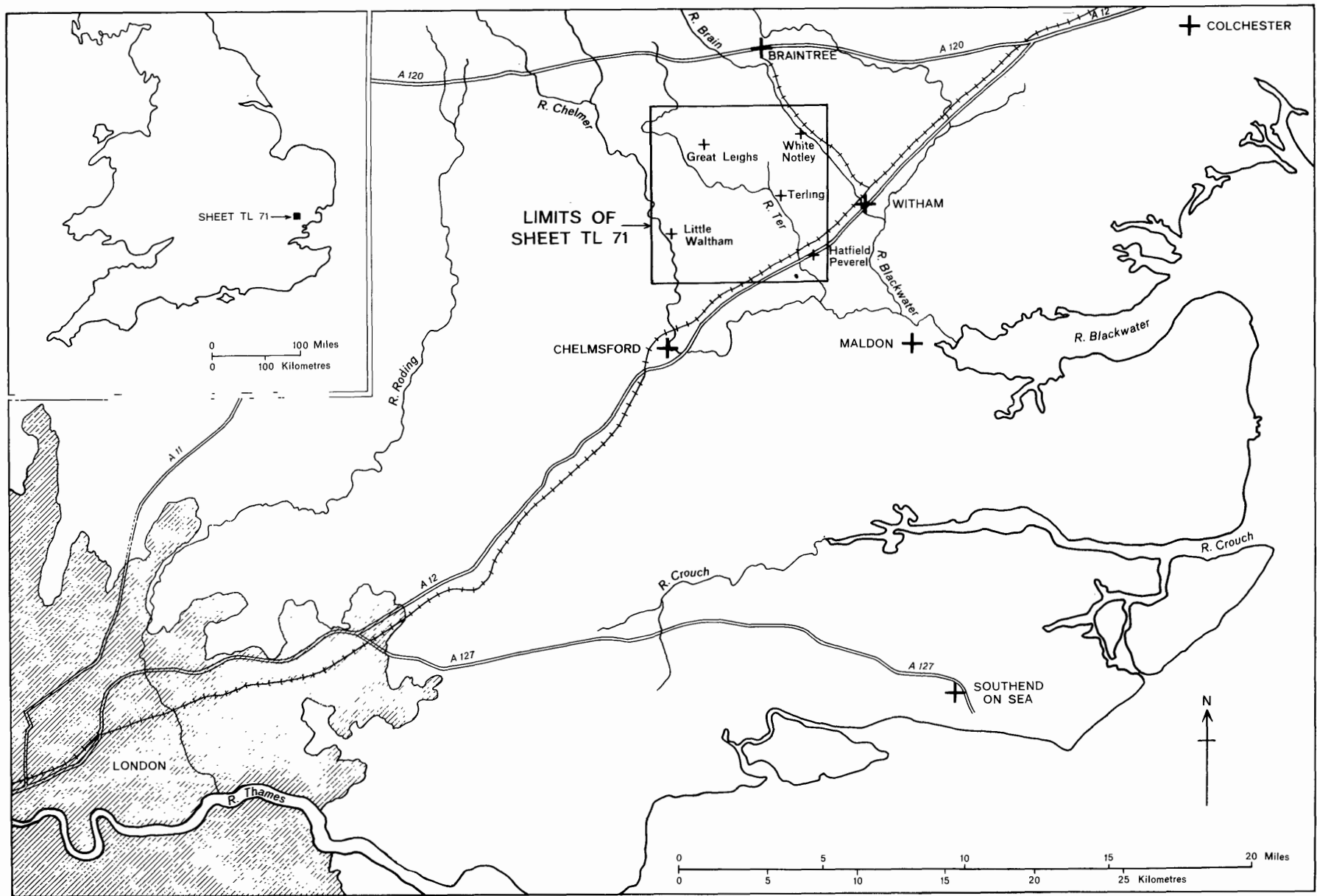


Fig.1. Sketch map showing the location of sheet TL 71

Table 1. Classification of deposits in the Terling area.

DRIFT (Recent and Pleistocene)

Superficial deposits of varied origin and age	- Calcareous tufa, peat, Head and Brickearth
River deposits	- Alluvium and first terrace of the River Chelmer
Boulder Clay	- Divisible into an upper, Springfield Till and lower, Maldon Till (separated by the Chelmsford Gravels)
Glacial Sand and Gravel	- Chelmsford Gravels

SOLID (Eocene)

London Clay

that direction. The River Ter divides the area diagonally and the rivers Brain and Chelmer cross the north-eastern and south-western corners respectively. The River Ter joins the River Chelmer, which flows eastward at Chelmsford, about 1 km south of the southern border of the sheet.

The average difference in elevation between valley floor and watershed is about 100 ft (30 m). The general relief is, therefore, gentle and the land surface is almost flat over considerable areas. The extremes of ground level on the sheet are about 250 ft (76 m) above O.D. on the northern border and about 50 ft (15 m) above O.D. in the valley of the River Ter at the south-eastern corner.

GEOLOGY

The area was mapped geologically on the scale of 1:10 560 in 1966 and 1969 by Dr. C. R. Bristow and Mr. R. D. Lake of the East Anglia and South-East England Field Unit of the Institute. The classification of the drift deposits and solid formation recognised is given in Table 1.

The relationship between these deposits is illustrated in the schematic cross-section, Fig. 2, which is drawn from north-north-west to south-south-east.

London Clay

London Clay constitutes bedrock to the drift deposits in the entire area. It is a stiff, bluish-grey, silty clay where fresh but is usually weathered to brown for a few feet beneath its surface. It contains some hard concretions and occasional pyrite nodules.

Chelmsford Gravels

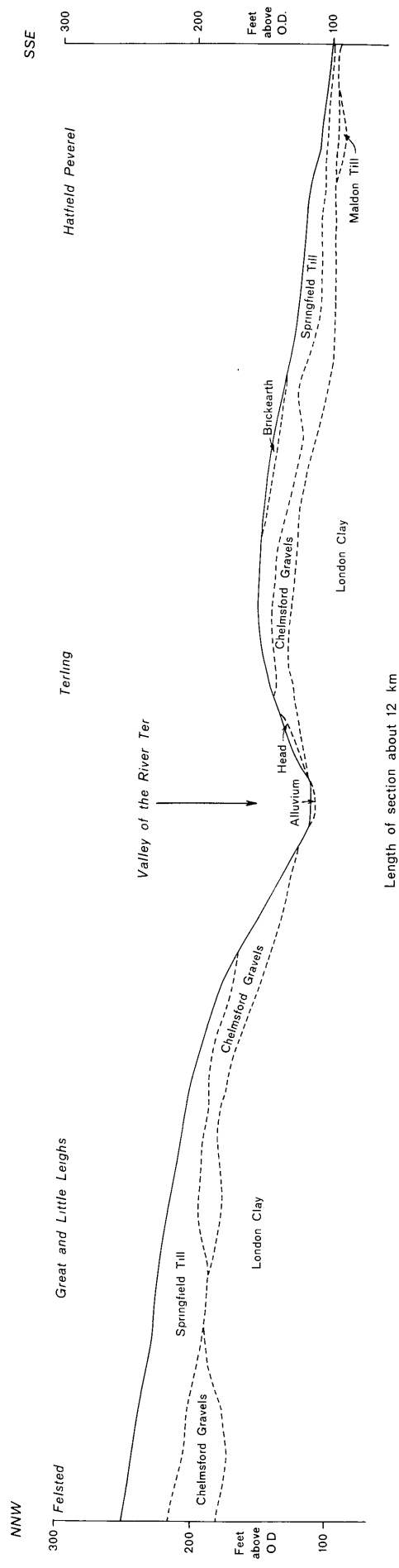
The Chelmsford Gravels (Clayton, 1957) constitute virtually the sole sand and gravel resource of the area and their important properties as such are detailed below. Usually they directly overlie London Clay but very

occasionally, as in borehole SE 136, chalky boulder clay, which may be assigned to the Maldon Till, intervenes. On Sheet TL 71 the term Chelmsford Gravels is synonymous with Glacial Sand and Gravel; it is generally considered as an outwash deposit derived from the ice-sheet that produced the boulder clay.

Boulder Clay

Maldon Till and Springfield Till are also terms introduced by Clayton (1957). These tills generally underlie and overlie the Chelmsford Gravels respectively. For the purposes of this report they are classified together as Boulder Clay. This comprises brown or grey (usually the former overlying the latter) sandy clay containing more or less frequent pellets and larger fragments of chalk together with a fairly wide variety of harder erratics. The most common of these are flints; less frequently they are of quartz and quartzite but only rarely of other rock types. The flints range in form from angular and irregular to rounded but the other rock types are more generally subrounded or rounded. The erratics are usually of pebble size and large boulders are notably absent. The average thickness of boulder clay in the area is about 20 ft (6 m).

The most common sequence in the area is, therefore, Boulder Clay overlying Chelmsford Gravels on London Clay. Locally this is complicated by a certain degree of interbedding of boulder clay or other clays with the Chelmsford Gravels and by an occasional occurrence of boulder clay (Maldon Till) beneath the Gravels. Locally, notably in the western and northern parts of the area, the Chelmsford Gravels are missing from the succession. At the time of writing, sections through the full drift succession are exposed in two gravel pits and in the river valleys, where Boulder Clay and Chelmsford Gravels, together with the uppermost few feet of London Clay,



Note : On Resource Sheet TL 71 i. Springfield Till and Maldon Till, constituting Boulder Clay, are not differentiated.
 ii. Chelmsford Gravels are equivalent to Glacial Sand and Gravel

Fig. 2. Sketch section across sheet TL 71 to show the general relations of the deposits

crop out.

Drilling results indicate that in most of block A and in smaller parts of blocks D and H the base of the Chelmsford Gravels is relatively flat, at levels predominantly between 170 ft (52 m) and 190 ft (58 m) above O.D. This must represent an erosion level but it is not known whether it has regional significance. Lower erosion levels at about 120 ft (37 m) to 140 ft (43 m) above O.D. and at about 90 ft (27 m) to 110 ft (34 m) above O.D. may also occur progressively to the south-east but the intensity of drilling was insufficient to prove this conclusively. It is notable that where the Chelmsford Gravels rest on the 170 ft to 190 ft erosion level, and to a lesser extent just south of it in the Ter valley, they generally contain more sand, at the expense of gravel, than elsewhere in the sheet (Fig. 3).

Drilling and mapping also reveal that the base of the Chelmsford Gravels is usually lower along the three main valleys which cross the area than on the watersheds. There is insufficient evidence to decide whether or not the Gravels were deposited in shallow pre-existing valleys and to what extent they may have been subjected to cambering or creep to lower levels during post-glacial times.

River Terrace Deposits

The first terrace of the River Chelmer contains sand and gravel but is represented on sheet TL 71 by only one small outcrop, near Broomfield, which is insufficient to be assessed separately in the context of this report.

Alluvium

This occurs along the present courses of streams and rivers and is generally silty without an appreciable content of sand and gravel.

Other deposits

Brickearth, a fine sandy or silty loam, and Head, a clayey deposit comprising locally derived materials, are generally present only as a thin veneer over the older drift deposits, particularly on valley sides. Calcareous tufa and peat are of only very local, superficial occurrence and occupy a negligible area.

Generally only the lower part of the Chelmsford Gravels is below the water table.

COMPOSITION OF THE SAND AND GRAVEL DEPOSITS

In Sheet TL 71, sand and gravel, as mineral, is contained almost solely in the Glacial Sand and Gravel, derived as outwash from an ice-front situated to the north-west. The constituent rock types are of northern origin, the degree of rounding of the particles being generally proportional to the distance and time during which they have been transported.

The gravel fraction (+4 mm) consists of tough pebbles and infrequent cobbles. Flints are the most common (over 80 per cent) with subordinate quartz and quartzite; other rock types are rare. The flints have been derived directly or indirectly from Chalk and the quartz and quartzite are generally accepted as having come from the Bunter Pebble Beds. All three rock types have resisted chemical weathering.

The majority of the flints occur as subangular to rounded, brown or black, sometimes white-coated pebbles; however, cobbles and large pebbles with very irregular form and evidently locally derived are not uncommon. Vein-quartz is found as well-rounded pebbles and occasionally as cobbles; it is particularly noticeable in the fine gravel (-16+4 mm) range. Quartzite is conspicuous as subrounded pebbles and cobbles, often broadly tabular in shape, grey or orange-brown in colour, and of coarse massive texture.

The sand ranges from coarse to fine but the medium fraction (-1+ $\frac{1}{4}$ mm) is almost always dominant (Fig. 3). The sand consists mainly of sub-angular quartz with subordinate well-rounded, probably wind-blown grains. Angular flint is relatively common in the coarse fraction (-4+1 mm) and commonly imparts a sharp texture to the sand.

Borehole samples indicate that the mineral is usually clean (less than 10 per cent of fines, that is, -1/16 mm particles, although in practice the No. 200 mesh sieve is used). Only occasionally is the cut-off at 40 per cent fines approached in minor, probably lenticular, parts of the deposit. On average the samples contained 6 per cent fines, with the sand and gravel fractions in roughly equal proportions. This 'average mineral' is typified on a smaller scale by the average in block C. On the plateau (roughly blocks A, C, F, and G) the proportion of gravel increases southwards, that is, from higher to lower levels. Similarly, in the Ter valley, the gravel proportion increases downstream from block D to block E. Corresponding conclusions cannot be reached about the Brain and Chelmer valleys, as insufficient stretches occur on the sheet.

Some iron staining is general but it is usually of minor significance. Locally, however, it may be so concentrated as to cement the sand and gravel into coherent masses. There is sometimes a tendency for the upper parts of the sand and gravel deposit to be more stained than the lower. Where the latter is particularly iron-free it is referred to as 'Essex white ballast'.

RESULTS

The results of the statistical assessment

of the mineral resources are summarised in Table 2. Fuller grading particulars are shown in Fig. 3.

Accuracy of Results

For the seven resource blocks A-G on sheet TL 71 which are assessed statistically, the accuracy of the results at the 95 per cent confidence level (that is, the probability that nineteen times out of twenty the true volumes present lie within the stated limits) varies between 29 per cent and 53 per cent of the mean. It should be remembered, however, that the true volumes are more likely to be nearer the figure estimated than at the limits of accuracy. Moreover, it is probable that roughly the same percentage limits would apply for the statistical estimate of volume of a very much smaller parcel of ground (say, 200 acres) containing similar sand and gravel deposits if the results from the same number of sample-points (as provided by, say, ten boreholes) were used in the calculation. Thus, if closer limits are needed for quotation of reserves, data from more than ten sample-points would be required, even if the area were quite small. This point can be illustrated by considering the whole of the potentially workable sand and gravel in blocks A to G of sheet TL 71. The total volume (421 million m³) can be estimated to limits of ± 13 per cent at the 95 per cent confidence level, by a calculation based on the data from the 100 sample-points spread across the seven resource blocks. (The inferred assessment of 10 million m³ in block H is not included in this total of volume.) However, it must again be emphasised that the quoted volume of sand and gravel has no simple relationship with the amount that could be extracted in practice, as no allowance has been made in the calculations for any restraints (such as existing buildings and roads) on the use of the land for mineral working.

NOTES ON THE RESOURCE BLOCKS

Block A

Except beneath a small but indefinite area, including borehole sites NW 1 and NW 7, the base of the Chelmsford Gravels in block A is extraordinarily flat, lying predominantly between 170 ft (52 m) and 190 ft (58 m) above O.D. The mineral occurs beneath boulder clay overburden, except along a short stretch of the Brain valley where the overburden has been removed by erosion. The junction between the Boulder Clay and the Chelmsford Gravels is probably fairly regular over considerable areas, although it may be disturbed close to its outcrop as a result of creep of material down the valley sides. A certain amount of interbedding of clays (sometimes boulder clay but otherwise unclassified) with the Gravels has been

recognised, for example, in boreholes NW 15 and NW 24.

The block area, sampled area of mineral, average thickness of overburden and of sampled mineral, and the assessed volume of mineral are shown in Table 2. The ranges in thickness of the mineral and overburden, where observed, are 0 to 53 ft (16.1 m) and about 1 ft (0.3 m) to 32 ft (9.8 m) respectively. Where the River Brain is incised into the London Clay bedrock, the mineral-bearing horizon is absent. At the western end, and in the east-central part of the block, there are sizeable tracts of land in which all the boreholes drilled prove the thickness of overburden to be more than three times that of the sand and gravel. In boreholes NW1, NW7, NW12, NE14 and NE16 sand and gravel is absent and boulder clay lies directly on London Clay. On the basis of these observations, and with supporting evidence from surface outcrops, areas are left uncoloured on the map which are excluded from the statistical assessment of the resources. Any mineral actually present within them is likely to be in relatively small deposits and beneath relatively thick overburden.

The mineral samples from block A were clean but, on the whole, were the most sandy and least gravel-rich in the sheet (Table 2 and Fig. 3).

Block B

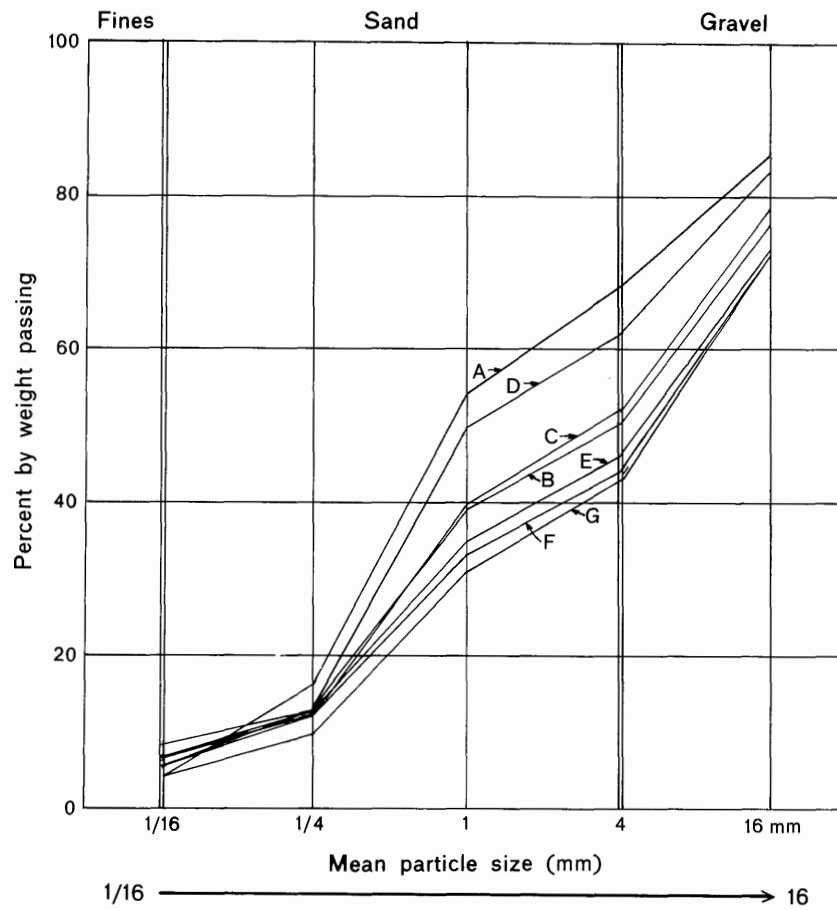
Most of this block comprises a part of the valley of the River Brain which exposes the London Clay bedrock along its floor. Data suggest that the base of the Chelmsford Gravels (that is, the mineral) rises generally to both north-east and south-west away from the river, from about 100 ft (30 m) to about 140 ft (43 m) above O.D. The contact between the Boulder Clay and Chelmsford Gravels appears to be fairly regular and distinct over wide areas. Only minor lenses of clay were observed within the mineral horizon, as in borehole NE 31, for example.

Boulder clay is mapped as directly overlying London Clay in places and consequential assumptions have been made about the limits of the sampled area of mineral as shown on the map. No mineral was found in borehole NE 32 but the site is included in the area of continuous or almost continuous mineral beneath overburden as there is no reason to suspect that this reflects any more than a local absence. This zero thickness of mineral was also included in the calculations. As there are nine sample-points in the block, in effect it is assumed as a first approximation, that eight-ninths of the sampled area of mineral is actually mineral-bearing. Any mineral which may be present in the areas left uncoloured on the map would tend to be thin and is regarded as unimportant in the

Table 2. The sand and gravel resources of sheet TL 71

Block	Area of		Average thickness, over sampled area of mineral, of				Volume of mineral				Mean proportion, in samples of			
	Block km ²	Sampled mineral km ²	Overburden (inc. soil)		Mineral		million m ³	million yd ³	Limits at 95% confidence level		Fines (-1/16 mm) %	Sand (+1/16-4 mm) %	Gravel (+4mm) %	
			m	ft	m	ft			± million m ³	± million yd ³				
A	16.0	10.1	6.6	22	6.8	22.5	69	90	40	28	4	64	32	
B	7.6	6.4	6.0	20	6.0	20	38	50	39	15	6	44	50	
C	12.0	11.5	8.8	29	6.0	20	69	92	43	30	5	47	48	
D	12.5	9.6	5.3	17.5	4.7	15.5	45	59	53	24	5	57	38	
E	15.3	12.5	2.1	7	4.9	16	61	80	29	18	8	38	54	
F	12.7	12.3	5.8	19	4.8	16	59	78	31	18	6	38	56	
G	12.9	11.9	7.2	23.5	6.7	22	80	104	42	34	4	39	57	
H	11.0	2.0	c.5	c.16	c.5	c.16	c.10	c.13	speculative		11	35	54	
A to G	89.0	74.3	5.9	19.5	5.6	18.5	421	553	13	55	6	46	48	
A to H	100.0	76.3	c.5.8	c.19	c.5.8	c.19	c.431	566	speculative		6	46	48	

Note: Minor patches of mineral may occur in the parts of each block which are shown uncoloured on the map. Any such mineral cannot be quantified and is not included in the assessment summarised above.



Block	Percent by weight passing				
	1/16 mm	1/4 mm	1 mm	4 mm	16 mm
A	4	16	54	68	86
B	6	13	39	50	77
C	5	12	40	52	79
D	5	13	50	62	84
E	8	13	35	46	74
F	6	12	33	44	73
G	4	10	31	43	73
H (one borehole)	11	21	38	46	74
A to H	6	13	40	52	78

Fig. 3. Mean particle size distribution of samples from the assessed thickness of sand and gravel in resource blocks A to H of sheet TL 71

context of this Report.

In addition to the resource assessment values given in Table 2 the data indicate thickness for overburden in the range of about 1 ft (0.3 m) to 41.5 ft (12.6 m) and for mineral of 0 to about 31 ft (9.5 m). The average sample grading is close to that for the whole Sheet.

Three boreholes were drilled on site NE 9 providing data which is shown in compounded form on the map.

Block C

Except for a minor cross-cutting stream this block forms a watershed or plateau area between the Rivers Ter and Brain. Mineral occurs as an almost continuous spread beneath overburden, its base falling south-eastwards from about 170 ft (52 m) to about 90 ft (27 m) above O.D. However, this fall may be stepped, possibly being relatively flat in two areas, one mainly at 120 ft (37 m) to 140 ft (43 m) above O.D. around and between boreholes NE 18, NE 20 and NE 25, and the other mainly at 90 ft (27 m) to 110 ft (34 m) above O.D. including boreholes NE 28 and SE 13. The top of the mineral horizon is typically distinct and fairly regular. Occasional clay lenses occur within the mineral horizon, such as were proved in boreholes NE 20 and SE 13.

Boreholes NE 7, 241/19 and 241/20 showed no mineral. However it is not inferred that this evidence points to a single barren area of significant size. The sites are included within the area of 'continuous or almost continuous' mineral and the zero thickness values are used in the resource calculation. There are eleven sample-points, after weighting, in the block and the effective assumption is that very approximately nine-elevenths of the sampled area of mineral is actually mineral-bearing. On the other hand, from outcrop and borehole data, a barren strip, including borehole NE 2, is deduced to be present along the course of the minor north-south stream crossing the northern part of the block. Any mineral within the strip is not included in the assessed resources and could only be present in insignificant quantities in the context of this Report.

Observed ranges of overburden and mineral thicknesses are about 1 ft (0.3 m) to 43 ft (13.1 m) and 0 to 39 ft (11.9 m) respectively. The average sample grading is virtually identical to that for the sheet as a whole. Additional detailed values are given in Table 2.

Boreholes SE 12 and SE 25 were drilled so close together that data from them is compounded on the map.

Block D

This block covers the upstream part of the Ter valley occurring on Sheet TL 71 and has several similarities with block B in the Brain valley and with block E discussed below. The River Ter is incised into the London Clay but elsewhere the base of the Chelmsford Gravels apparently rises away from the river up to roughly 180 ft (55 m) above O.D. adjacent to much of block A and the most northerly part of block H, and up to roughly 130 ft (40 m) above O.D. adjacent to blocks F and G and the remainder of block H. The junction between the Boulder Clay and the Chelmsford Gravels may be somewhat disturbed in the immediate vicinity of its outcrop in the valley sides but elsewhere there is no reason to suspect that it is not distinct. Borehole NW 15 provides an example of the minor occurrence of boulder clay lenses within the mineral horizon.

Boreholes NW 9, NE 11 and NE 13 contain no mineral but they are not excluded from the area of mineral because it is considered likely that they represent only relatively local barren patches which cannot be accounted for individually in a regional survey. There are twelve sample-points in the block and it is implicit, as a first approximation, that three quarters of the sampled area of mineral as shown on the map actually contains mineral, just sufficient for the mineral to be classified as 'almost continuous' (see p. 3). Quite commonly approximate limits to the area of mineral beneath Boulder Clay and other overburden have to be inferred. London Clay crops out almost continuously along the valley floor.

Resource assessment values are included in Table 2. Observed overburden thicknesses range from about 1 ft (0.3 m) to 34 ft (10.4 m), the range for mineral is from 0 to 37 ft (11.3 m). The samples collected are generally clean but sandier than the average for the sheet, with a correspondingly lower gravel content.

Block E

This forms the downstream stretch of the Ter valley on the sheet. As in blocks B and D, London Clay is frequently exposed along the centre of the valley and the base of the mineral (Chelmsford Gravels) generally rises away from the river, although mainly only to roughly 100 ft (30 m) above O.D. As in block D, the overburden/mineral boundary is likely to be disturbed only close to its outcrop in the valley sides where superficial movements may have taken place. Experience in the area suggests that the mineral horizon may contain minor clay lenses, although none were proved. It should be noted that although it was sited on outcropping sand and gravel, none was found in borehole SE 135. However, because this

barren patch is inferred to be small, the 'nil' thickness value is retained in the calculation of mineral volume. Of seventeen sample-points in the block, after weighting, about 7 per cent contain no mineral. For calculation purposes, it is frequently necessary to infer approximate limits to the area of mineral beneath various types of overburden. Although it is possible that quantities of mineral may be present in the areas left uncoloured on the map, they would be insignificant in the context of this Report.

In addition to values given in Table 2, observed overburden and mineral thicknesses range from about 1 ft (0.3 m) to 21 ft (6.4 m) and from 0 to 34 ft (10.4 m) respectively. The average gravel content of samples collected from the block is slightly higher than from the sheet as a whole. As in all blocks the mineral is generally clean (less than 10 per cent of fines).

Block F

This forms part of the plateau area between the Rivers Ter and Chelmer. It is gently dissected by a small stream which exposes mineral over a fairly large area in the centre of the block. Otherwise mineral occurs as a continuous or almost continuous spread beneath overburden.

The base of the mineral horizon slopes down eastwards towards the Ter valley between extremes of about 140 ft (43 m) and 90 ft (27 m) above O.D. From inspection of borehole data the surface appears to be relatively flat in two areas, one lying between 120 ft (37 m) and 140 ft (43 m) above O.D. in the west and the other between 90 ft (27 m) and 110 ft (34 m) above O.D. in the eastern part of the block. At the time of writing the overburden and mineral can be seen to be separated by a clear cut surface in a pit at Boreham and this may well be typical of the block.

Overburden, as observed, ranges in thickness from about 1 ft (0.3 m) to 39 ft (11.9 m) and mineral from 0 to 42 ft (12.8 m). The usual minor occurrence of clay lenses within the mineral horizon was observed in boreholes SE 14 and SE 131. Within the sampled area of mineral minor barren patches which cannot justifiably be outlined and accounted for separately on the scale of the regional survey were encountered in boreholes SW 1, SW 3, SE 30 and SE 130. After weighting, about 23 per cent of the sample-points in the sampled area of mineral showed no mineral.

Compared with most blocks on Sheet TL 71 the mineral samples were relatively gravel-rich on the whole, with a correspondingly low sand content (Table 2 and Fig. 3). Typically the samples were clean (less than 10 per cent of

fines).

Data from four boreholes drilled on site SE 128 are combined on the map.

Block G

Part of this block comprises a stretch of the eastern side of the Chelmer valley; otherwise it forms a continuation of the plateau occupying block F. The base of the mineral horizon is possibly fairly flat throughout the block, mainly at 120 ft (37 m) to 140 ft (43 m) above O.D.

The mineral is almost continuous beneath overburden in the plateau portion. It crops out in the side of the Chelmer valley and London Clay bedrock is exposed at intervals near the floor of the valley. Where observed the overburden, predominantly of boulder clay, ranges from about 1 ft (0.3 m) to the maximum of 60 ft (18.3 m) thick, and mineral from 0 to 50 ft (15.2 m).

No mineral was found in borehole SW 34 which represents one-twelfth of the sample-points within the sampled area of mineral. Occasionally overburden was observed lying directly on bedrock and certain barren areas are outlined approximately on this account. As well as the worked out part of a sand and gravel pit near Broomfield, barren areas include the mapped London Clay outcrop. On the latter patches of sand and gravel were recognised, (for example, in borehole SW 36) but they are too small to be included in the map and in the assessment.

The clear-cut nature of the contact between overburden and mineral, as exposed in the Broomfield pit, and the likelihood that clay lenses may locally divide the mineral (although not observed), can be assumed for the block. The mineral is, on average, the most gravel-rich in the sheet and is low in fines (Table 2 and Fig. 3).

The data illustrated on the map at site SW 1 is a combination of data from three boreholes drilled.

Block H

In this block the majority of boreholes did not prove mineral; boulder clay either overlies less than one-third of its own thickness of sand and gravel or directly overlies London Clay bedrock. This, together with similar evidence at the western end of block A, suggests the existence of a region to the west containing more scattered sand and gravel deposits. However, this has not yet been substantiated by drilling.

The majority of block H is assumed to be barren and is left uncoloured on the map. Small patches may well exist where the overburden/mineral thickness ratio falls within the criteria arbitrarily adopted, but none have been outlined

nor included in the assessment.

Of the sampled area of mineral shown, part has an ill-defined and largely assumed limit beneath overburden consisting mainly of Head.

The remainder contains terrace material which, although geologically distinct, is so restricted in its development as not to warrant separate assessment.

Because there are only two sample-points in the sampled area of mineral the stated quantity and quality of the resources are based on an inferred assessment (Table 1).

LIST OF QUARRIES

In 1971 only two quarries were in operation.

Table 3. List of quarries on sheet TL 71 and their locations

Quarry	Grid Reference
Mid-Essex Gravel Pits Ltd, near Broomfield	7211
Ready Mixed Concrete Ltd, Boreham	7511

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Appendix A: Assessment Procedure

1. Within a resource block, a statistical assessment is made for a sampled area of mineral greater than 2 km² and containing a minimum of five evenly-spaced boreholes.
2. If the sampled area of mineral is between 0.25 and 2 km² and contains one or two suitably sited boreholes an inferred assessment is made. An inferred assessment may also be attempted for any area where the deduced mineral content is small and which consequently has not been sampled by boreholes. No specific level of accuracy is claimed for such subjective assessments.
3. No assessment is attempted for an area of mineral less than 0.25 km².

Statistical Assessment

4. The simple methods used in the calculations are consistent with the amount of data provided by the survey. Conventional confidence limits (that is, the tolerance on the estimate or the range within which the result falls) are calculated at the two-sided 95 per cent confidence level, that is, there is a 2½ per cent or 1 in 40 chance that the result exceeds the stated upper limit and a corresponding 2½ per cent chance that it is less than the stated lower limit.
5. The volume estimate (V) for the sampled mineral in a given block is the product of the two variables, the sampled areas (A) and the mean thickness (\bar{l}) calculated from the individual thicknesses at the sample points. The standard deviations for these variables are related such that

$$S_V = \sqrt{S_A^2 + S_{\bar{l}}^2} \dots\dots\dots (1)$$

where S_V , S_A and $S_{\bar{l}}$ are the standard deviations for volume, area and mean thickness, expressed as proportions of V, A and \bar{l} , respectively.

6. The above relationship may be transposed such that

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

From this it can be seen that as $(\frac{S_A}{S_{\bar{l}}})$ tends to 0, S_V tends to $S_{\bar{l}}$. 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.

7. Given that the number of approximately

evenly spaced sample points in the sampled area is n, with mineral thickness measurements l_1, l_2, \dots, l_n , then the best estimate of mean thickness, $\bar{l} =$

$$\frac{\sum(l_1 + l_2 \dots l_n)}{n}$$

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

$$S_{\bar{l}} = \frac{1}{\bar{l}} \sqrt{\frac{\sum(l - \bar{l})^2}{n(n - 1)}} \text{ where } l \text{ is any}$$

value in the series l_1 to l_n .

8. The sampled area A 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 a deposit). Generally, therefore, the only error in determining the area is the negligible planimetry error and S_A is 0. Where the area is not defined by a mapped boundary, that is, where the boundary is inferred (and the distinctive symbol is used), experience suggests that S_A is small relative to $S_{\bar{l}}$.

The relationship

$$\frac{S_A}{S_{\bar{l}}} \leq \frac{1}{3} \text{ is assumed in all cases.}$$

It follows from equation (2) that

$$S_{\bar{l}} \leq S_V \leq 1.05 S_{\bar{l}} \dots\dots\dots (3)$$

9. The two-sided 95 per cent confidence limits, $L_{\bar{l}}$, for the estimate of mean thickness of mineral in the sampled area, for values of n between 5 and 20, may be expressed in absolute units

$$\bar{l} \pm (t \times S_{\bar{l}} \times \bar{l}),$$

or as a percentage

$$\bar{l} \pm (t \times S_{\bar{l}} \times 100) \text{ per cent}$$

where t is Student's t at the two-sided 95 per cent confidence level for (n - 1) degrees of freedom and is evaluated by reference to statistical tables. In applying Student's t it is assumed that the measurements are distributed normally.

10. Values of t at the two-sided 95 per cent confidence level for values of n up to 20 are set out below:

n	t	n	t
1	∞	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 Ed. Cambridge University Press, 1962).

The value of t, 1.96, when n is infinity is used when n is greater than 20.

11. In calculating the two-sided 95 per cent confidence limits for volume, L_V , the following inequality corresponding to (3) is applied:

$$L_{\bar{I}} \leq L_V \leq 1.05 L_{\bar{I}}$$

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

$$\frac{1.05 \times t}{\bar{I}} \times \sqrt{\frac{\sum(1 - \bar{I})^2}{n(n-1)}} \times 100 \text{ per cent}$$

and when n is greater than 20, as

$$\frac{1.05 \times 1.96}{\bar{I}} \times \sqrt{\frac{\sum(1 - \bar{I})^2}{n(n-1)}} \times 100 \text{ per cent}$$

13. An illustration of the procedures outlined above is given in Figs. 10 and 11, where a volume estimate with confidence limits at the 95 per cent level of confidence is derived from fictitious data.

Inferred Assessments

14. If the sampled area of mineral in a resource block is between 0.25 km² and 2 km² an assessment is inferred based on geological and topographical information usually supported by the data from one or two suitably sited boreholes. The volume of mineral is calculated as the product of the sampled area, chosen from interpretation of field data as in the statistical assessment, and the judged average mineral thickness. Confidence limits are not calculated.
15. In some cases in addition to the sampled area of mineral a resource block includes an area left uncoloured on the map, generally based on interpretation of mapping and sample data. On occasions some mineral

may be present in such areas and an assessment is made on the basis of the average mineral thickness deduced from exposures and any other evidence available.

Note on Weighting

16. The thickness of a deposit at any point in a sampled area may be governed solely by the position of the point in relation to a broad trend. However, most sand and gravel deposits in addition exhibit a random pattern of local, and sometimes considerable, variation in thickness.
17. Thus, in estimating mean thickness of sand and gravel from a number of data points in a sampled area only the use of simple weighting factors is justified, and the distribution of data points need be only approximately regular. In practice, equal weighting can often be applied to thicknesses at all data points within the sampled area. If, however, there is a distinctly unequal distribution of points, the thicknesses must be weighted to avoid the bias this creates. Weighting factors are determined by first dividing the sampled area into broad zones, to each of which a value roughly proportional to its area is assigned. This value is then shared between the data points within the zone.

Appendix B: Classification and Description of Sand and Gravel

The terminology commonly used by geologists when describing sedimentary rocks (Wentworth, 1922) is not entirely satisfactory for the purposes of this Report. For example, Wentworth proposed that a deposit should be described as a 'gravelly sand' when the proportion of sand is greater than that of gravel which must exceed 10 per cent, fines and oversize materials (that is, with diameter greater than 64 mm) being less than 10 per cent. Because deposits containing more than 10 per cent fines (material less than 1/16 mm) are not embraced by this system a modified binary classification based on Willman (1942) has been adopted.

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.

When the fines content exceeds 40 per cent the material is considered to be not 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 and 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

BLOCK CALCULATION

1:25 000 Sheet } Fictitious
Block }

Area	Volume
Block: 11.08 km ² Mineral: 8.32 km ²	Overburden: 21 million m ³ Mineral: 38 million m ³
Thickness	95 per cent confidence limits of the estimate of mineral volume
Overburden: 2.5 m Mineral: 4.5 m	Percentage: ± 53 per cent Units of volume: ± 20 million m ³

Thickness estimate (l = thickness) Measurements in metres							
Sample point	Weighting w	Overburden		Mineral		Remarks	
		l _o	wl _o	l _m	wl _m		
SE 14	1	1.5	1.5	5.2	5.2	MAU Boreholes	
SE 18	1	3.3	3.3	nil	-		
SE 20	1	nil	-	2.1	2.1		
SE 22	1	0.7	0.7	9.3	9.3		
SE 23	1	6.2	6.2	5.7	5.7		
SE 24	1	4.3	4.3	6.5	6.5		
SE 17	1/2	1.2	1.6	4.2	3.9	Hydrogeol. Dept. record Close group of four boreholes (commercial)	
123/45	1/2	2.0		3.6			
1	1/4	2.4	2.5(25)*	3.4	3.6(25)*		
2	1/4	4.5		0.8			
4	1/4	0.4		4.3			
5	1/4	2.8		6.0			
Totals	Σw = 8	Σwl _o = 20.1(25)*		Σwl _m = 36.3(25)*			
Averages		l _o = 2.5(16)*		l _m = 4.5(41)*			

Calculation of Confidence Limits

l	(l - l̄)	(l - l̄) ²
5.2	0.7	0.49
nil	4.5	20.25
2.1	2.4	5.76
9.3	4.8	23.04
5.7	1.2	1.44
6.5	2.0	4.00
3.9	0.6	0.36
3.6	0.9	0.81
Σl = 36.3 (25)	Σ(l - l̄) ² = 56.15	
n = 8		
l̄ = 4.5 (41)		
≈ 4.5		

n = 8
t = 2.365

$$L_V = 1.05 \frac{t}{\bar{l}} \sqrt{\frac{\sum(l - \bar{l})^2}{n(n-1)}} \times 100$$

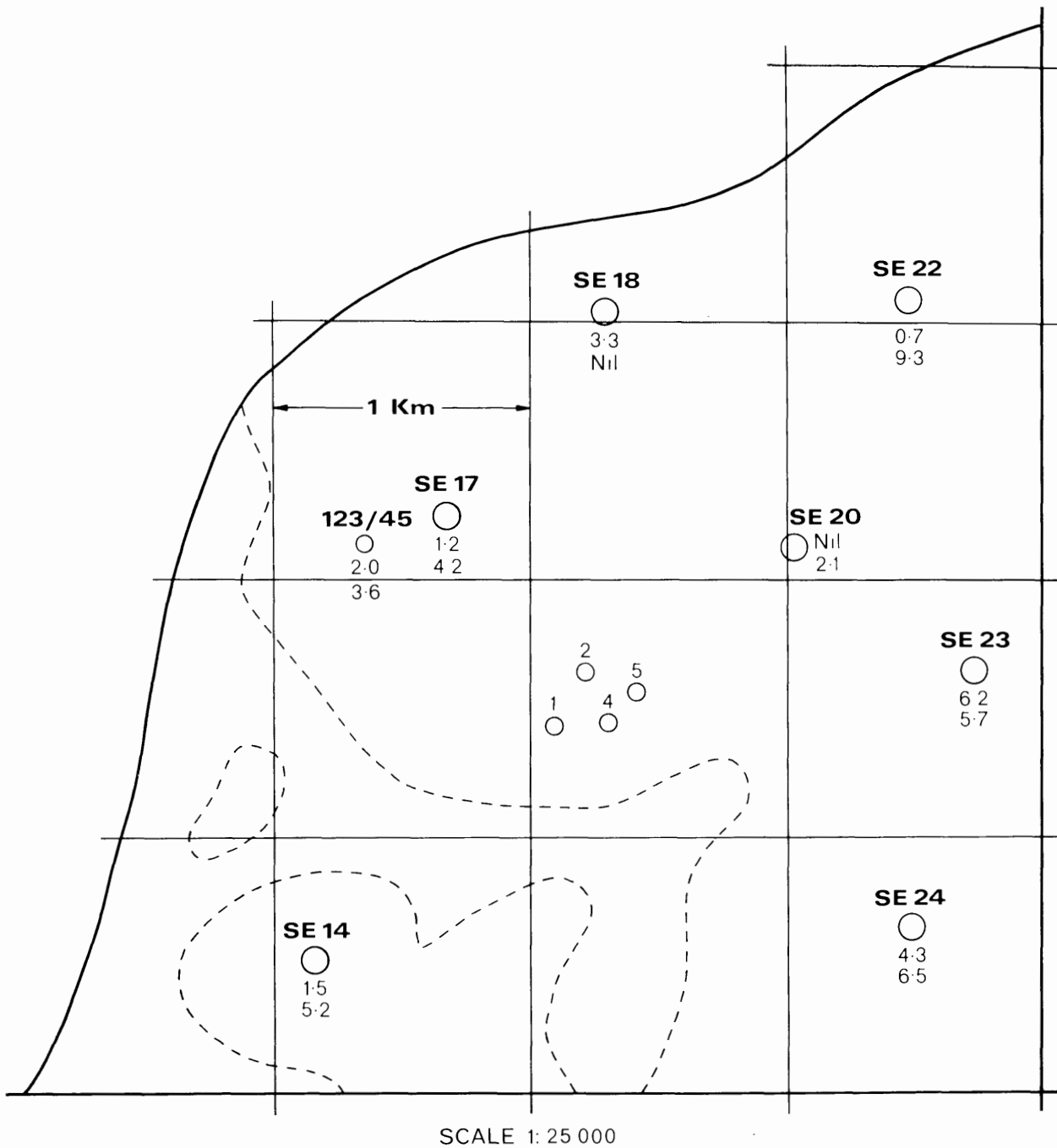
$$= 1.05 \times \frac{2.365}{4.541} \sqrt{\frac{56.15}{8 \times 7}} \times 100$$

$$= 54.77$$

≈ 55%

* The figures in brackets are additional decimal places used only in the calculation of confidence limits.

Fig. 4. Example of resource block assessment: statement and calculation



SE 17

○ M. A. U. borehole

○ Other boreholes

1.2 — Overburden } Thickness in metres
4.2 — Mineral }

—— Boundary of resource block - - - - Boundary of sand and gravel deposit

Fig. 5. Example of resource block assessment: map of fictitious block

1/16 mm. Thus it has no mineralogical significance and includes particles falling within the size limits of silt. Wherever the term clay does not appear in single quotation marks the normal meaning applies.

The ratio of sand to gravel defines the boundaries between Sand, Pebbly Sand, Sandy Gravel and Gravel (at 19:1, 3:1 and 1:1).

Thus it is possible to classify the mineral into one of twelve descriptive categories (see Fig 8). The procedure is as follows.

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

For example, a deposit grading: gravel, 11 per cent; sand, 70 per cent; fines, 19 per cent is classified as 'clayey' pebbly sand. This short description is included in the borehole log (see Note 10, p.23).

Many differing proposals exist for the classification of the grain size of sediments (Atterberg, 1905; Udden, 1914; Wentworth, 1922; Wentworth, 1935; Allen, 1936; Twenhofel, 1937; Lane and others, 1947). As Archer (1970a, b) has emphasised, there is a pressing need for a simple metric scale acceptable to both scientific and engineering interests, for which the class limit sizes correspond closely with certain marked changes in the natural properties of mineral particles. For example, there is an important change in the degree of cohesion between particles at about the 1/16 mm size, which approximates to the generally accepted boundary between silt and sand. In this and other respects the system shown in Table 4, used in this report, is satisfactory. It is based on Udden's geometric scale and a simplified form of Wentworth's terminology.

The fairly wide intervals in the scale are consistent with the general level of accuracy of the quantitative assessments of the resource blocks. Three sizes of sand are recognised, fine ($-\frac{1}{4} + 1/16$ mm), medium ($-1 + \frac{1}{4}$ mm) and coarse ($-4 + 1$ mm). The boundary at 16 mm distinguishes a range of finer gravel ($-16 + 4$ mm), often characterised by abundance of worn tough pebbles of vein quartz, from coarser ranges often of notably different average composition. 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, and is presented by the laboratory as logarithmic cumulative curves (see, for example, British Standard 1377:67). In this report the grading is tabulated on the borehole record sheets (Appendix C), the intercepts corresponding with the simple geometric scale 1/16 mm, $\frac{1}{4}$ mm, 1 mm, 4 mm, 16 mm, and so on as required. Original sample grading curves are available for reference at the appropriate office of the Institute.

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

The relative proportions of the rock types present in the gravel fraction are indicated by 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 accessory rock type, comprises 5 to 25 per cent of the whole. Where the accessory material accounts for less than 5 per cent of the whole, but is still readily apparent, the phrase 'with some' has been used. Rare constituents are referred to as 'trace'.

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

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

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

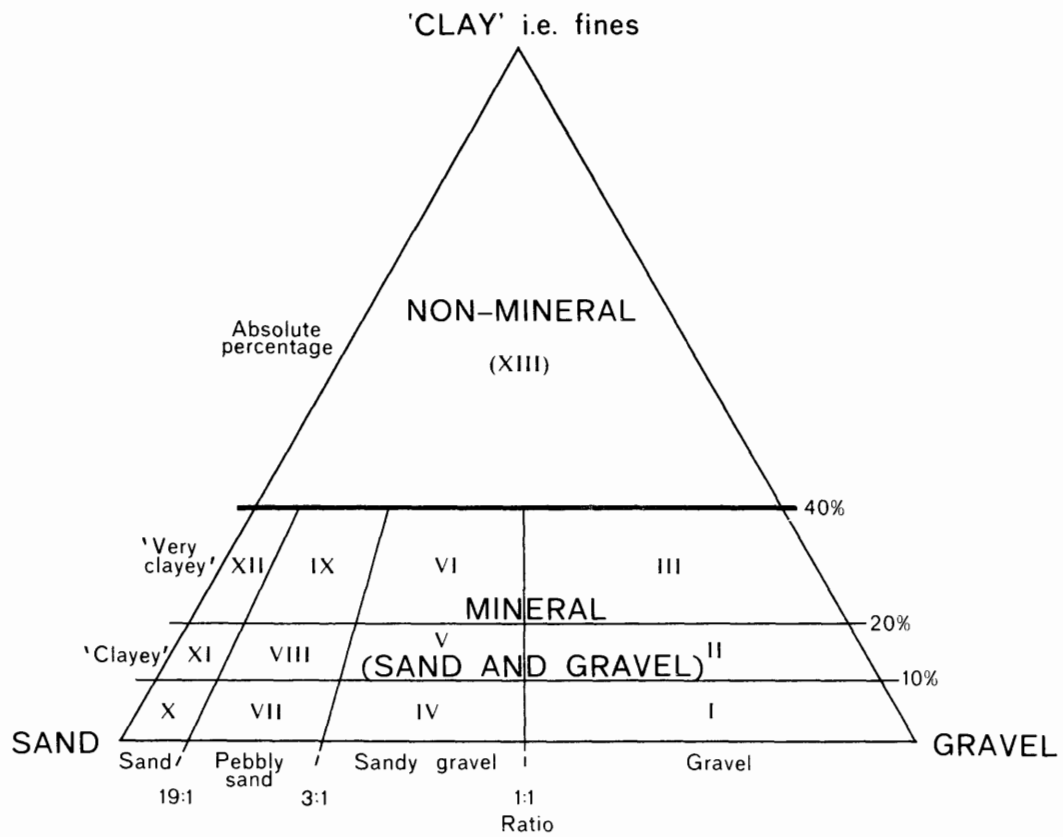
Subrounded: showing considerable wear. The edges and corners are rounded off to smooth curves. Original grain shape is still distinct.

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

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

Table 4. Classification of gravel, sand and fines

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



- | | | | |
|--------|----------------------------|---|---------|
| I | Gravel | } | MINERAL |
| 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 | | |
| (XIII) | NON-MINERAL | | |

Fig. 6. Diagram showing the descriptive categories used in the classification of sand and gravel

Appendix C: Borehole Records

EXPLANATION

Annotated Example of Borehole Records

TL 71 SE 13 ¹	7947 1396 ²	Near Dancing Dicks ³						
Surface level (+ 47.9 m) + 157 ft ⁴			Overburden ⁷ (8.8 m) 29 ft;					
Water not struck ⁵			Mineral (1.9 m) 6 ft;					
Wirth B 1, 8 inch diam.,			Waste (0.3 m) 1 ft;					
February 1967 ⁶			Mineral (4.2 m +) 14 ft + ⁸					
				Thickness		Depth ¹¹		
				(m)	ft	(m)	ft	
Soil ¹⁰				(0.5)	1.5	(0.5)	1.5	
Boulder Clay ⁹	Chalky			(8.3)	27.5	(8.8)	29	
Glacial Sand and Gravel	(a) 'Clayey' pebbly sand			(1.9)	6	(10.7)	35	
? Boulder Clay	Very sandy			(0.3)	1	(11.0)	36	
Glacial Sand and Gravel	(b) Gravel			(4.2 +)	14 +	(15.2 +)	50 +	
				Depth below ¹²		Percentage ¹³		
				surface (ft)		Fines	Sand	Gravel
(a) ¹⁴	Gravel	15	%	29 - 31		1	91	8
			mm	31 - 33		27	64	9
			+ 64	33 - 35		15	57	28
			- 64 + 16					
			- 16 + 4					
			%					
			0					
			8					
			7					
	Sand	71						
			- 4 + 1					
			- 1 + 1/4					
			- 1/4 + 1/16					
			%					
			3					
			26					
			42					
	Fines	14	- 1/16					
			%					
			14					
(b)	Gravel	64	+ 64	36 - 37		1	61	38
			- 64 + 16	37 - 39		14	53	33
			- 16 + 4	39 - 41		15	41	44
			%	41 - 43		3	46	51
			0	43 - 45		7	25	68
			31	45 - 47		grading not available		
			23	47 - 49		0	28	72
				49 - 50		0	23	77
	Sand	39	- 4 + 1					
			- 1 + 1/4					
			- 1/4 + 1/16					
			%					
			8					
			22					
			9					
	Fines	7	- 1/16					
			%					
			7					

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

1. Borehole Registration Number.

Each Mineral Assessment Unit and feasibility project borehole is identified by a registration number. This consists of two statements:

- 1) The number of the 1:25 000 sheet on which the borehole lies, for example, TL 71.
- 2) The quarter of the 1:25 000 sheet on which the borehole lies and its number in a series for that quarter, for example, SE 13.

Thus the full Registration Number is TL 71 SE 13. Usually this is abbreviated to SE 13 in the text.

2. The National Grid Reference.

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

3. Location.

The borehole location is generally referred to the nearest named locality on the 1:25 000 base map.

4. Surface Level.

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

5. Groundwater Conditions.

Three kinds of entry are made: either, the level at which groundwater was encountered is given in metres and feet above Ordnance Datum; or, where no groundwater was encountered, this is stated; or, where there is no record of the groundwater conditions, this is stated.

6. Type of Drill and Date of Drilling.

Three types of drilling machine were used in this survey; a Shell and Auger, a With B0 or B1 cased power auger, and a Gryphon auger. The type of machine, the external diameter of the casing used, and the month and year of the completion of the borehole are stated.

7. Overburden, Mineral, Waste and Bedrock.

Mineral is sand and gravel which, as part of a deposit, falls within the arbitrary definition of potentially workable material (see p.1).

Bedrock is the formation, rock type, country rock or rock-head, below which potentially workable sand and gravel will not be found. In the Terling area the bedrock is London Clay.

Waste is any material other than bedrock or mineral. Where waste occurs between the surface and a mineral horizon it is classified as overburden.

Thicknesses are given in metres and feet.

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

The borehole log

9. Geological Classification.

A geological classification of the strata encountered in drilling is given whenever possible. (For an explanation of the terms used see p. 5).

10. Lithological Description.

When sand and gravel is recorded, a general description based on the mean grading characteristics is followed by more detailed particulars. (For explanation of conventions see Appendix B). A description of other rock types is based on visual field examination.

11. Depth.

The figures relate to depths from surface to base of the strata recorded on the log.

Grading information

12. Sampling.

Generally a continuous series of bulk samples is taken throughout the thickness of sand and gravel. A new sample is commenced whenever there is an appreciable lithological change within the sand and gravel, or for every 3 ft of depth.

13. Grading Results.

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

14. Mean Grading.

The mean grading for the mineral thickness is the mean of the individual sample gradings, but where the thicknesses of mineral represented by the samples are not constant each grading result is first weighted by its relative thickness.

The results are given for the three main classes, gravel, sand and fines, and for the smaller ranges within these classes.

Since fully representative sampling of sand and gravel is difficult to achieve, particularly where groundwater levels are high, there may be differences between the gradings determined during the survey and the corresponding in-situ grading of the deposit. Comparison with exposures suggests that the proportion of sand in the samples collected from boreholes may be somewhat higher. Conversely the results suggest that the proportion of fines and of +16 mm material may be lower.

Note on metrication

- 1) All measurements were made in feet. Approximate metric conversions appear in brackets.
- 2) Metric conversions of measurements of the depth and thickness of beds have been rounded off to the nearest 0.1 m, because quotation to two places of decimals would imply a higher order of accuracy than could be justified by the original figures. To eliminate any discrepancy appearing after metrication between depth as recorded and depth as obtained by summing thicknesses, adjustment has been made where necessary to one or more of the thickness figures. However, the recorded mineral thickness is not adjusted.

LIST OF ASSESSMENT BOREHOLES

Data from the several boreholes drilled on each of the sites NE9, SW1 and SE128, and from boreholes SE12 and SE25, are compounded for the purpose of illustration on the map.

Borehole No. (by sheet quadrant)	Grid Reference (all fall in 10 km (square) TL 71)	Borehole No. (by sheet quadrant)	Grid Reference (all fall in 10 km (square) TL 71)	Borehole No. (by sheet quadrant)	Grid Reference (all fall in 10 km (square) TL 71)
NW 1	7022 1962	16	7585 1896	SE 6	7501 1493
2	7055 1955	17	7596 1995	7	7776 1495
3	7008 1820	18	7617 1646	8	7602 1399
4	7031 1764	19	7690 1889	9	7691 1402
5	7044 1652	20	7706 1819	10	7741 1380
6	7078 1506	21	7773 1734	11	7810 1398
7	7157 1945	22	7805 1864	12	7923 1457
8	7150 1876	23	7844 1787	13	7947 1396
9	7143 1771	24	7863 1972	14	7662 1330
10	7139 1687	25	7870 1627	15	7604 1289
11	7104 1577	26	7871 1697	16	7781 1298
12	7216 1939	27	7895 1874	17	7932 1310
13	7263 1840	28	7903 1519	18	7539 1252
14	7237 1775	29	7938 1957	19	7544 1207
15	7210 1628	30	7939 1742	20	7710 1230
16	7194 1540	31	7954 1615	21	7784 1212
17	7310 1961	32	7976 1878	22	7877 1232
18	7344 1859	33	7502 1999	23	7734 1132
19	7368 1786			24	7878 1462
20	7388 1693	SW 1(a)	7393 1400	25	7927 1457
21	7304 1640	1(b)	7393 1400	26	7784 1387
22	7398 1617	1(c)	7393 1400	27	7800 1398
23	7313 1533	*1(d)		28	7546 1134
24	7428 1965	2	7487 1363	29	7522 1096
25	7432 1841	3	7485 1312	30	7540 1091
		29	7030 1437	31	7559 1095
NE 1	7585 1783	30	7077 1343	32	7544 1066
2	7638 1804	31	7031 1270	33	7563 1070
3	7608 1718	32	7039 1159	128(a)	7536 1412
4	7668 1713	33	7146 1432	128(b)	7536 1412
5	7774 1700	34	7133 1247	128(c)	7536 1412
6	7710 1625	35	7129 1176	128(d)	7536 1412
7	7787 1600	36	7154 1031	*129	
8	7892 1543	37	7257 1454	130	7599 1267
9(a)	7992 1560	38	7202 1341	131	7594 1015
9(b)	7992 1560	39	7247 1274	132	7676 1318
9(c)	7992 1560	40	7250 1150	133	7752 1056
*9(d)		41	7235 1059	134	7858 1012
10	7694 1533	42	7345 1441	135	7901 1327
11	7572 1569	43	7338 1320	136	7999 1089
12	7506 1606	*44			
13	7598 1507	45	7362 1085		
14	7506 1884	46	7464 1445		
15	7500 1794				

* Data rejected from these boreholes

TL 71 NW 3 7008 1820 nr. Priory Farm

Surface level (+ 61.9 m) + 203 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 December 1968

Overburden (1.2 m) 4 ft;
 Mineral (4.0 m) 13 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(1.2)	4	(1.2)	4
Glacial Sand and Gravel	'Clayey' sandy gravel	(4.0)	13	(5.2)	17
London Clay		(0.9 +)	3 +	(6.1)	20

	%	mm	%	Depth below surface (ft)	Percentage		
					Fines	Sand	Gravel
Gravel	41	+ 64	0	4 - 7	20	58	22
		- 64 + 16	22	7 - 10	13	41	46
		- 16 + 4	19	10 - 12	17	36	47
				12 - 15	8	47	45
Sand	46	- 4 + 1	12	15 - 17	7	43	50
		- 1 + 1/4	27				
		- 1/4 + 1/16	7				
Fines	13	- 1/16	13				

TL 71 NW 4 7031 1764 nr. Mattock's Farm

Surface level (+ 69.5 m) + 228 ft.
 Water struck at (+ 59.1 m) + 194 ft
 Wirth B O, 8 inch diam.,
 December 1968

Overburden (5.8 m) 19 ft;
 Mineral (6.7 m) 22 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(2.1)	7	(2.1)	7
Boulder Clay	Brown with little chalk	(1.9)	6	(4.0)	13
? Glacial Sand and Gravel	Excessively 'clayey' sand and gravel	(1.8)	6	(5.8)	19
Glacial Sand and Gravel	'Clayey' sandy gravel	(6.7)	22	(12.5)	41
London Clay	Brown	(0.9 +)	3 +	(13.4)	44

			Depth below surface (ft)	Percentage			
%	mm	%		Fines	Sand	Gravel	
Gravel	26	+ 64	0	19 - 22	32	40	28
		- 64 + 16	14	22 - 25	21	43	36
		- 16 + 4	12	25 - 28	13	55	32
Sand	60	- 4 + 1	7	28 - 31	16	62	22
		- 1 + 1/4	38	31 - 34	12	63	25
		- 1/4 + 1/16	15	34 - 37	2	71	27
				37 - 40	2	80	18
Fines	14	- 1/16	14	40 - 41	2	91	7

TL 71 NW 5 7044 1652 nr. Old Shaw's Farm

Surface level (+ 63.1 m) + 207 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 December 1968

Waste (10.1 m) 33 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown with little chalk from 1 to 10 feet, otherwise grey and chalky	(9.8)	32	(10.1)	33
London Clay	Brown	(0.9 +)	3 +	(11.0)	36

TL 71 NW 6 7078 1506 nr. Hyde Hall

Surface level (+ 57.9 m) + 190 ft
 No record of groundwater
 Shell and auger, 7 inch diam;
 January 1969

Waste (18.3 m +) 60 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Made ground		(0.8)	2.5	(0.8)	2.5
Boulder Clay	Brown from 2.5 to 9.5 feet, otherwise blue/grey. Chalky	(17.5 +)	57.5 +	(18.3)	60

TL 71 NW 7 7157 1945 nr. Rutlands

Surface level (+64.6 m) + 212 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 December 1968

Waste (19.2 m) 63 ft;
 Bedrock (1.2 m +) 4 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown. Very chalky from 1 to 17 feet. Numerous flints from 1 to 28 feet. Only occasional pebbles below 28 feet.	(18.9)	62	(19.2)	63
London Clay	Blue/grey	(12+)	4+	(20.4)	67

TL 71 NW 8 7150 1876 nr. Hornells

Surface level (+55.2 m) + 181 ft
 Water struck at (+50.3 m) +165 ft
 Wirth B O, 8 inch diam.,
 December 1968

Overburden (4.9 m) 16 ft;
 Mineral (3.3 m) 11 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(1.2)	4	(1.2)	4
Boulder Clay	Brown with numerous cobbles	(2.5)	8	(3.7)	12
	Dark grey clay with traces of sand and organic matter	(1.2)	4	(4.9)	16
Glacial Sand and Gravel	Gravel	(3.3)	11	(8.2)	27
London Clay		(0.9+)	3+	(9.1)	30

	%	mm	%	Depth below surface (ft)	Fines	Sand	Gravel
Gravel	56	+ 64	0	16 - 19	1	54	45
		- 64 + 16	27	19 - 22	2	35	63
		- 16 + 4	29	22 - 25	1	39	60
				25 - 27	1	44	55
Sand	43	- 4 + 1	13				
		- 1 + 1/4	27				
		- 1/4 + 1/16	3				
Fines	1	- 1/16	1				

TL 71 NW 9 7143 1771 nr. Little Warricks

Surface level (+ 52.4 m) + 172 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 December 1968

Waste (8.5 m) 28 ft;
 Bedrock (0.6 m +) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown with little chalk	(1.5)	5	(1.8)	6
? Boulder Clay	Mainly brown with blue/grey flecks	(6.7)	22	(8.5)	28
London Clay	Brownish-grey	(0.6 +)	2 +	(9.1)	30

TL 71 NW 10 7139 1687 nr. Leighs Hall

Surface level (+ 52.7 m) + 173 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 December 1968

Waste (3.7 m) 12 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Boulder Clay	Brown. Very chalky and numerous flints from 1.5 to 9 feet, otherwise with few pebbles	(3.2)	10.5	(3.7)	12
London Clay	Brown with concretions	(0.9 +)	3 +	(4.6)	15

TL 71 NW 11 7104 1577 nr. Hyde Hall

Surface level (+ 56.4 m) + 185 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 December 1968

Waste (16.2 m) 53 ft
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown with little chalk from 1 to 12 feet, otherwise grey and very chalky	(15.9)	52	(16.2)	53
London Clay	Brown at surface, otherwise blue/grey	(0.9 +)	3 +	(17.1)	56

TL 71 NW 12 7216 1939 nr. Peaches Farm

Surface level (+ 69.5 m) + 228 ft
 Water struck at (+ 54.9 m) + 180 ft
 Wirth B O, 8 inch diam.,
 October 1968

Waste (14.0 m) 46 ft;
 Bedrock (1.2 m +) 4 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown with numerous flints	(8.8)	29	(9.1)	30
? Boulder Clay	Brown and grey with numerous pebbles	(4.9)	16	(14.0)	46
London Clay	Brown from 46 to 48 feet, otherwise blue/grey. With concretions and iron pyrites	(1.2 +)	4 +	(15.2)	50

TL 71 NW 13

7263 1840

nr. Moulsham Hall

Surface level (+ 64.6 m) + 212 ft
 Water struck at (+ 60.0 m) + 197 ft
 Wirth B O, 8 inch diam.,
 October 1968

Overburden (1.2 m) 4 ft;
 Mineral (8.2 m) 27 ft;
 Bedrock (1.3 m +) 4 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.2)	0.5	(0.2)	0.5
Boulder Clay	Light brown with few pebbles	(1.0)	3.5	(1.2)	4
Glacial Sand and Gravel	Sandy gravel	(8.2)	27	(9.4)	31
London Clay	Brown	(1.3 +)	4 +	(10.7)	35

			Depth below surface (ft)	Percentage		
%	mm	%		Fines	Sand	Gravel
Gravel	37	+ 64	4 - 7	2	54	44
		- 64 + 16	7 - 10	3	89	8
		- 16 + 4	10 - 13	2	92	6
Sand	61	- 4 + 1	13 - 16	2	60	38
		- 1 + 1/4	16 - 19	0	44	56
		- 1/4 + 1/16	19 - 22	2	54	44
			22 - 25	0	42	58
Fines	2	- 1/16	25 - 28	0	47	53
			28 - 31	2	70	28

TL 71 NW 14 7237 1775 nr. Bream's Farm

Surface level (+ 64.0 m) + 210 ft
 Water struck at (+ 57.3 m) + 188 ft
 Wirth B O, 8 inch diam.,
 October 1968

Overburden (6.1 m) 20 ft ;
 Mineral (2.1 m) 7 ft;
 Bedrock (1.2 m +) 4 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Made ground		(1.2)	4	(1.2)	4
Boulder Clay	Brown, becoming sandy below 10 feet	(4.9)	16	(6.1)	20
Glacial Sand and Gravel	Gravel	(2.1)	7	(8.2)	27
London Clay	Brown from 27 to 28 feet, otherwise blue/grey	(1.2 +)	4 +	(9.4)	31

		mm		Depth below surface (ft)		Percentage		
%			%			Fines	Sand	Gravel
Gravel	52	+ 64	0	20 - 22	2	96	2	
		- 64 + 16	25	22 - 25	0	17	83	
		- 16 + 4	27	25 - 27	0	44	56	
Sand	47	- 4 + 1	10					
		- 1 + 1/4	22					
		- 1/4 + 1/16	15					
Fines	1	- 1/16	1					

TL 71 NW 15

7210 1628

nr. The Crescent

Surface level (+ 51.8 m) + 170 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 October 1968

Overburden (1.2 m) 4 ft;
 Mineral (2.8 m) 9 ft;
 Waste (1.5 m) 5 ft;
 Mineral (2.4 m) 8 ft;
 Waste (1.5 m) 5 ft;
 Bedrock (4.0 m +) 13 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown. With numerous pebbles below 2 feet	(0.9)	3	(1.2)	4
Glacial Sand and Gravel	(a) 'Clayey' mainly medium sand and medium gravel	(2.8)	9	(4.0)	13
Boulder Clay	Brown. Chalky	(1.5)	5	(5.5)	18
Glacial Sand and Gravel	(b) Pebbly Sand	(2.4)	8	(7.9)	26
? Boulder Clay	Brown and grey	(1.5)	5	(9.4)	31
London Clay	Brown from 31 to 40 feet, otherwise blue/grey. With concretions and iron pyrites below 40 feet	(4.0 +)	13 +	(13.4)	44

		Depth below surface (ft)		Percentage		
				Fines	Sand	Gravel
(a)	Mean grading not available, and hence not displayed on the map	4 - 10		grading not available		
		10 - 13		1	42	57
(b)	%	mm	%			
	Gravel	17	+ 64	0		
			- 64 + 16	7		
			- 16 + 4	10		
	Sand	82	- 4 + 1	8		
			- 1 + 1/4	47		
			- 1/4 + 1/16	27		
	Fines	1	- 1/16	1		

TL 71 NW 16 7194 1540 nr. Chatham Green

Surface level (+ 51.5 m) + 169 ft
 Water struck at (+ 39.9 m) + 131 ft
 Wirth B O, 8 inch diam.,
 October 1968

Waste (15.5 m) 51 ft;
 Bedrock (1.0 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Boulder Clay	Brown from 1.5 to 13 feet and from 28 to 31 feet, otherwise grey. Very chalky from 1.5 to 28 feet. Only occasional flints from 28 to 31 feet. No pebbles recorded below 31 feet	(11.1)	36.5	(11.6)	38
	Black silty clay	(0.6)	2	(12.2)	40
Glacial Sand and Gravel	Sandy gravel	(3.3)	11	(15.5)	51
London Clay	Brown from 51 to 52 feet, otherwise blue/grey	(1.0 +)	3 +	(16.5)	54

				Depth below surface (ft)	Percentage		
	%	mm	%		Fines	Sand	Gravel
Gravel	28	+ 64	0	40 - 42	grading not available		
		- 64 + 16	11	42 - 44	2	88	10
		- 16 + 4	17	44 - 46	3	89	8
Sand	70	- 4 + 1	15	46 - 48	0	63	37
		- 1 + 1/4	43	48 - 50	1	53	46
		- 1/4 + 1/16	12	50 - 51	1	47	52
Fines	2	- 1/16	2				

TL 71 NW 17

7310 1961

nr. Young's End

Surface level (+ 76.5 m) + 251 ft
 Water struck at (+ 71.9 m) + 236 ft
 Wirth B O, 8 inch diam.,
 October 1968

Overburden (4.6 m) 15 ft;
 Mineral (3.6 m) 12 ft;
 Waste (0.9 m) 3 ft;
 Mineral (12.5 m) 41 ft;
 Bedrock (0.7 m +) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Made ground		(0.6)	2	(0.6)	2
Boulder Clay	Brown. Very chalky from 2 to 4 feet. With thin sandy lenses from 4 to 10 feet	(4.0)	13	(4.6)	15
Glacial Sand and Gravel	(a) Gravel	(3.6)	12	(8.2)	27
	Brown sandy clay	(0.9)	3	(9.1)	30
	(b) Pebbly sand	(12.5)	41	(21.6)	71
London Clay	Brown	(0.7 +)	2 +	(22.3)	73

		%	mm	%	Depth below surface (ft)	Percentage		
						Fines	Sand	Gravel
(a)	Gravel	54	+ 64	0	15 - 18	0	20	80
			- 64 + 16	21	18 - 21	0	53	47
			- 16 + 4	33	21 - 24	0	47	53
	Sand	45	- 4 + 1	18	24 - 27	2	60	38
			- 1 + 1/4	23				
- 1/4 + 1/16			4					
Fines	1	- 1/16	1					
(b)	Gravel	13	+ 64 +	0	30 - 33	0	58	42
			- 64 + 16	4	33 - 36	0	67	33
			- 16 + 4	9	36 - 39	0	96	4
	Sand	85	- 4 + 1	12	39 - 42	1	69	30
			- 1 + 1/4	45	42 - 45	1	98	1
			- 1/4 + 1/16	28	45 - 48	0	97	3
					48 - 54	grading not available		
	Fines	2	- 1/16	2	54 - 57	15	84	1
					57 - 60	0	97	3
					60 - 63	1	95	4
					63 - 66	1	94	5
				66 - 69	grading not available			
				69 - 71	1	85	14	

TL 71 NW 18

7344 1859

nr. Moulsham Hall

Surface level (+69.2 m) + 227 ft
 Water struck at (+61.0 m) + 200 ft
 Wirth B O, 8 inch diam.,
 October 1968

Overburden (8.2 m) 27 ft;
 Mineral (6.4 m) 21 ft;
 Bedrock (1.9 m +) 6 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown, chalky	(4.0)	13	(4.3)	14
? Glacial Sand and Gravel	'Clayey' mainly medium sand and medium gravel	(0.3)	1	(4.6)	15
Boulder Clay	Brown	(3.6)	12	(8.2)	27
Glacial Sand and Gravel	Sandy gravel	(6.4)	21	(14.6)	48
London Clay	Brown from 48 to 52 feet, otherwise blue/grey	(1.9 +)	6 +	(16.5)	54

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	39	+ 64	27 - 30	grading not available		
		- 64 + 16	30 - 33	1	31	68
		- 16 + 4	33 - 36	1	98	1
Sand	60	- 4 + 1	36 - 39	1	58	41
		- 1 + 1/4	39 - 42	0	67	33
		- 1/4 + 1/16	42 - 45	1	73	26
			45 - 48	2	32	66
Fines	1	- 1/16				1

TL 71 NW 19

7368 1786

nr. Gubbion's Hall

Surface level (+ 71.6 m) + 235 ft
 Water struck at (+ 61.8 m) + 203 ft
 Wirth B O, 8 inch diam.,
 October 1968

Overburden (9.8 m) 32 ft;
 Mineral (5.1 m) 17 ft;
 Waste (0.9 m) 3 ft;
 Bedrock (0.4 m +) 1 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown from 1 to 23 feet, otherwise orange/brown. Chalky from 1 to 23 feet. With only occasional pebbles below 23 feet	(9.5)	31	(9.8)	32
Glacial Sand and Gravel	Sandy gravel	(5.1)	17	(14.9)	49
? Boulder Clay	Brown	(0.9)	3	(15.8)	52
London Clay		(0.4+)	1 +	(16.2)	53

			Depth below	Percentage		
%	mm	%	surface (ft)	Fines	Sand	Gravel
Gravel 38	+ 64	0	32 - 35	5	70	25
	- 64 + 16	14	35 - 38	2	32	66
	- 16 + 4	24	38 - 41	0	77	23
Sand 61	- 4 + 1	20	41 - 44	0	52	48
	- 1 + 1/4	36	44 - 47	0	67	33
	- 1/4 + 1/16	5	47 - 49	0	65	35
Fines 1	- 1/16	1				

TL 71 NW 20

7388 1693

nr. Bishop's Hall

Surface level (+ 63.1 m) + 207 ft
 Water Struck at (+ 58.8 m) + 193 ft
 Wirth B O, 8 inch diam.,
 October 1968

Overburden (4.3 m) 14 ft;
 Mineral (1.5 m) 5 ft;
 Bedrock (1.8 m +) 6 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.2)	0.5	(0.2)	0.5
Boulder Clay	Brown. Chalky	(4.1)	13.5	(4.3)	14
Glacial Sand and Gravel	Gravel	(1.5)	5	(5.8)	19
London Clay	Brown from 19 to 22 feet, otherwise blue/grey	(1.8 +)	6 +	(7.6)	25

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	55	+ 64	14 - 17	3	43	54
		- 64 + 16	17 - 19	1	41	58
		- 16 + 4				
Sand	43	- 4 + 1				11
		- 1 + 1/4				28
		- 1/4 + 1/16				4
Fines	2	- 1/16				2

TL 71 NW 21 7304 1640 nr. Little Leighs

Surface level (+ 52.1 m) + 171 ft
 Water struck at (+ 38.4 m) + 126 ft
 Wirth B O, 8 inch diam
 October 1968

Overburden (10.4 m) 34 ft;
 Mineral (6.4 m) 21 ft.
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.2)	0.5	(0.2)	0.5
Boulder Clay	Brown from 0.5 to 12 feet. Grey from 12 to 28 feet. Grey/brown from 28 to 34 feet.	(10.2)	33.5	(10.4)	34
Glacial Sand and Gravel	Sandy gravel	(6.4)	21	(16.8)	55
London Clay	Brown at surface, otherwise blue/grey	(0.9 +)	3 +	(17.7)	58

			Depth below surface (ft)	Percentage			
	%	mm		%	Fines	Sand	Gravel
Gravel	29	+ 64	0	34 - 37	0	100	0
		- 64 + 16	9	37 - 40	0	85	15
		- 16 + 4	20	40 - 43	0	70	30
Sand	71	- 4 + 1	14	43 - 46	0	41	59
		- 1 + 1/4	45	46 - 49	0	58	42
		- 1/4 + 1/16	12	49 - 55	grading not available		
Fines	0	- 1/16	0				

TL 71 NW 22

7398 1617

nr. Church End

Surface level (+47.2 m) + 155 ft
 Water not struck
 Wirth B O , 8 inch diam.,
 October 1968

Overburden (1.5 m) 5 ft;
 Mineral (2.8 m) 9 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Boulder Clay	Brown. Sandy	(1.0)	3.5	(1.5)	5
Glacial Sand and Gravel	Gravel	(2.8)	9	(4.3)	14
London Clay	Brown at surface, otherwise blue/grey	(0.9+)	3+	(5.2)	17

			Depth below surface (ft)	Percentage		
%	mm	%		Fines	Sand	Gravel
Gravel 58	+ 64	0	5 - 8	0	52	48
	- 64 + 16	25	8 - 11	0	40	60
	- 16 + 4	33	11 - 14	4	32	64
Sand 41	- 4 + 1	15				
	- 1 + 1/4	24				
	- 1/4 + 1/16	2				
Fines 1	- 1/16	1				

TL 71 NW 23

7313 1533

nr. Goodman's Farm

Surface level (+ 50.9 m) + 167 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 November 1968

Overburden (1.5 m) 5 ft
 Mineral (7.9 m) 26 ft;
 Bedrock (1.0 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.2)	0.5	(0.2)	0.5
Boulder Clay	Brown. With numerous flints from 0.5 to 2 feet. With sand lenses from 2 to 5 feet	(1.3)	4.5	(1.5)	5
Glacial Sand and Gravel	Gravel	(7.9)	26	(9.4)	31
London Clay	Greyish-brown	(1.0 +)	3 +	(10.4)	34

	%	mm	%	Depth below surface (ft)	Percentage		
					Fines	Sand	Gravel
Gravel	53	+ 64	0	5 - 8	13	49	38
		- 64 + 16	17	8 - 11	0	42	58
		- 16 + 4	36	11 - 14	0	64	36
				14 - 17	grading not available		
Sand	45	- 4 + 1	20	17 - 20	5	47	48
		- 1 + 1/4	22	20 - 23	0	39	61
		- 1/4 + 1/16	3	23 - 26	0	42	58
				26 - 29	0	40	60
Fines	2	- 1/16	2	29 - 31	0	26	74

TL 71 NW 24

7428 1965

nr. Friar's Farm

Surface level (+ 74.7 m) + 245 ft
 Water struck at (+ 62.8 m) + 206 ft
 Wirth B O, 8 inch diam.,
 October 1968

Overburden (4.6 m) 15 ft;
 Mineral (7.9 m) 26 ft;
 Waste (2.4 m) 8 ft;
 Mineral (4.3 m) 14 ft;
 Waste (4.6 m +) 15 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil	Muddy	(0.6)	2	(0.6)	2
Boulder Clay	Chalky	(4.0)	13	(4.6)	15
Glacial Sand and Gravel	(a) Sandy gravel	(7.9)	26	(12.5)	41
? Boulder Clay	Sandy clay and gravel	(2.4)	8	(14.9)	49
Glacial Sand and Gravel	(b) Sandy gravel	(4.3)	14	(19.2)	63
	Sandy clay with gravel and occasional large flint	(4.6 +)	15 +	(23.8)	78

				Depth below surface (ft)	Percentage		
		%	mm		Fines	Sand	Gravel
(a)	Gravel	31	+ 64	15 - 18	18	53	29
			- 64 + 16	18 - 21	0	90	10
			- 16 + 4	21 - 24	2	98	0
	Sand	64	- 4 + 1	24 - 27	12	45	43
			- 1 + 1/4	27 - 30	0	90	10
			- 1/4 + 1/16	30 - 33	5	55	40
Fines	5	- 1/16	33 - 36	2	53	45	
			36 - 39	2	42	56	
(b)	Gravel	42	+ 64	49 - 52	19	35	46
			- 64 + 16	52 - 58	grading not available		
			- 16 + 4	58 - 61	0	57	43
	Sand	51	- 4 + 1	61 - 63	0	64	36
			- 1 + 1/4				
			- 1/4 + 1/16				
Fines	7	- 1/16					

TL 71 NW 25

7432 1841

nr. Smugglers Hole

Surface level (+ 72.2 m) + 237 ft
 Water struck at (+ 67.0 m) + 220 ft
 Wirth B O, 8 inch diam.,
 October 1968

Overburden (5.2 m) 17 ft;
 Mineral (5.5 m) 18 ft;
 Bedrock (1.5 m +) 5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown. Chalky	(4.9)	16	(5.2)	17
Glacial Sand and Gravel	Pebbly sand	(5.5)	18	(10.7)	35
London Clay	Brown at surface, otherwise blue/grey	(1.5 +)	5 +	(12.2)	40

			Depth below Surface (ft)	Percentage		
%	mm	%		Fines	Sand	Gravel
Gravel	18	+ 64	17 - 20	17	80	3
		- 64 + 16	20 - 23	12	79	9
		- 16 + 4	23 - 26	2	61	37
			26 - 29	1	93	6
Sand	76	- 4 + 1	29 - 32	3	93	4
		- 1 + 1/4	32 - 35	0	50	50
		- 1/4 + 1/16				
Fines	6	- 1/16				

TL 71 NE 1 7585 1783 nr. Dines Hall

Surface level (+ 65.8 m) + 216 ft
 Water struck at (+ 55.1 m) + 181 ft
 Wirth B 1, 8 inch diam.,
 March 1967

Overburden (7.0 m) 23 ft;
 Mineral (6.1 m) 20 ft;
 Bedrock (0.6 m +) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Light brown. Slightly chalky	(6.7)	22	(7.0)	23
Glacial Sand and Gravel	Pebbly sand	(6.1)	20	(13.1)	43
London Clay	Brown	(0.6 +)	2 +	(13.7)	45

			Depth below	Percentage		
			surface (ft)	Fines	Sand	Gravel
Gravel	10	+ 64	23 - 25	10	61	29
		- 64 + 16	25 - 27	12	61	27
		- 16 + 4	27 - 32.5	5	92	3
Sand	81	- 4 + 1	32.5 - 35	7	85	8
		- 1 + 1/4	35 - 37	17	69	14
		- 1/4 + 1/16	37 - 40	10	88	2
			40 - 43	11	84	5
Fines	9	- 1/16				9

TL 71 NE 2 7638 1804 nr. Westock's Farm

Surface level (+ 52.1 m) + 171 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 March 1967

Waste (6.4 m) 21 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.8)	2.5	(0.8)	2.5
Head	Light brown clay	(5.6)	18.5	(6.4)	21
London Clay		(0.9+)	3 +	(7.3)	24

TL 71 NE 3

7608 1718

Galleycable Wood

Surface level (+ 56.7 m) + 186 ft
 Water struck at (+ 48.8 m) + 160 ft
 Wirth B 1, 8 inch diam.,
 March 1967

Overburden (6.2 m) 20.5 ft;
 Mineral (8.4 m) 27.5 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown. Slightly chalky	(5.9)	19.5	(6.2)	20.5
Glacial Sand and Gravel	'Clayey' sandy gravel	(8.4)	27.5	(14.6)	48
London Clay	Brown	(0.9 +)	3 +	(15.5)	51

			Depth below	Percentage		
			surface (ft)	Fines	Sand	Gravel
Gravel	41	+ 64	20.5 - 24.5	22	32	46
		- 64 + 16	24.5 - 26.5	9	45	46
		- 16 + 4	26.5 - 30.5	5	45	50
			30.5 - 32.5	9	69	22
Sand	48	- 4 + 1	32.5 - 34	10	69	21
		- 1 + 1/4	34 - 35.5	7	78	15
		- 1/4 + 1/16	35.5 - 37.5	18	77	5
Fines	11		37.5 - 40.5	5	58	37
			40.5 - 42.5	5	45	50
			42.5 - 45	0	33	67
			45 - 48	27	17	56

TL 71 NE 4 7668 1713 nr Fairstead

Surface level (+ 46.9 m) + 154 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 April 1967

Overburden (0.3 m) 1 ft;
 Mineral (7.6 m) 25 ft;
 Bedrock (2.8 m +) 9 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil	Gravelly	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Gravel	(7.6)	25	(7.9)	26
London Clay	Brown	(2.8 +)	9 +	(10.7)	35

			Depth below surface (ft)	Percentage			
%	mm	%		Fines	Sand	Gravel	
Gravel	60	+ 64	0	1 - 3	6	52	42
		- 64 + 16	28	3 - 6	4	36	60
		- 16 + 4	32	6 - 8	4	46	50
Sand	36	- 4 + 1	10	8 - 10	4	42	54
		- 1 + 1/4	21	10 - 13	grading not available		
		- 1/4 + 1/16	5	13 - 15	2	38	60
				15 - 18	2	34	64
Fines	4	- 1/16	4	18 - 20	2	35	65
				20 - 22	4	27	69
				22 - 24	1	29	70
				24 - 26	12	26	62

TL 71 NE 5 (not displayed on the map) 7774 1700 nr. Troys Farm

Surface level (+ 58.8 m) + 193 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 March 1967

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Boulder Clay	Brown from 1.5 to 27.5 feet, otherwise blue/grey. With some chalk below 24.5 feet.	(11.7 +)	38.5 +	(12.2)	40

TL 71 NE 6 7710 1625 nr. Fairstead

Surface level (+ 51.8 m) + 170 ft
 Water struck at (+ 39.6 m) + 130 ft
 Wirth B 1, 8 inch diam.,
 March 1967

Overburden (9.4 m) 31 ft;
 Mineral (5.4 m) 17.5 ft;
 Bedrock (2.0 m +) 6.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown	(7.0)	23	(7.3)	24
? Glacial Sand and Gravel	Excessively 'clayey' sand and gravel	(2.1)	7	(9.4)	31
Glacial Sand and Gravel	Gravel	(5.4)	17.5	(14.8)	48.5
London Clay	Brown	(2.0 +)	6.5 +	(16.8)	55

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	51	+ 64	31 - 33	30	43	27
		- 64 + 16	33 - 36	7	53	40
		- 16 + 4	36 - 39	5	38	57
Sand	40	- 4 + 1	39 - 42	1	26	73
		- 1 + 1/4	42 - 48.5	grading not available		
		- 1/4 + 1/16				
Fines	9	- 1/16				9

TL 71 NE 7 7787 1600 Ivy Wood

Surface level (+ 55.2 m) + 181 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 March 1967

Waste (11.3 m) 37 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown from 1 to 32 feet otherwise blue/grey	(11.0)	36	(11.3)	37
London Clay	Brown	(0.9 +)	3 +	(12.2)	40

TL 71 NE 8 (not displayed on the map) 7892 1543 nr. Ardley Wood

Surface level (+ 53.6 m) + 176 ft
 Water struck at (+ 49.3 m) + 162 ft
 Wirth B 1, 8 inch diam.,
 February 1967

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil and Head	Topsoil and brickearth	(1.1)	3.5	(1.1)	3.5
Boulder Clay	Chalky	(11.1 +)	36.5 +	(12.2)	40

TL 71 NE 9 (a) 7992 1560 nr. Home Farm

Surface level (+ 45.7 m) + 150 ft
 Water struck at (+ 35.9 m) + 118 ft
 Wirth B 1, 8 inch diam.,
 March 1967

Overburden (4.3 m) 14 ft;
 Mineral (7.6 m) 25 ft;
 Bedrock (3.3 m +) 11 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown	(4.0)	13	(4.3)	14
Glacial Sand and Gravel	'Clayey' gravel	(7.6)	25	(11.9)	39
London Clay	Brown	(3.3 +)	11 +	(15.2)	50

	%	mm	%	Depth below surface (ft)	Percentage		
					Fines	Sand	Gravel
Gravel	61	+ 64	0	14 - 16	20	34	46
		- 64 + 16	31	16 - 19	9	34	57
		- 16 + 4	30	19 - 22	3	34	63
				22 - 25	34	18	48
Sand	29	- 4 + 1	9	25 - 28	3	31	66
		- 1 + 1/4	16	28 - 31	1	25	74
		- 1/4 + 1/16	4	31 - 34	11	25	64
				34 - 37	1	36	63
Fines	10	- 1/16	10	37 - 39	8	31	61

TL 71 NE 9 (b)

7992 1560

nr. Home Farm

Surface level (+ 45.7 m) + 150 ft
 No record of groundwater
 Wirth B 1, 8 inch diam.,
 June 1967

Overburden (3.4 m) 11 ft;
 Mineral (7.3 m) 24 ft;
 Bedrock (0.3 m +) 1 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay		(3.1)	10	(3.4)	11
Glacial Sand and Gravel	Gravel	(7.3)	24	(10.7)	35
London Clay	Brown	(0.3 +)	1 +	(11.0)	36

			Depth below	Percentage		
			surface (ft)	Fines	Sand	Gravel
Gravel	%	mm	11 - 15	10	53	37
	57	+ 64	15 - 20	8	51	41
		- 64 + 16	20 - 25	8	41	51
Sand		- 16 + 4	25 - 30	2	23	75
	37	- 4 + 1	30 - 35	1	20	79
		- 1 + 1/4				
		- 1/4 + 1/16				
Fines	6	- 1/16				6

TL 71 NE 9 (c)

7992 1560

nr Home Farm

Surface level (+ 45.7 m) + 150 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 February 1967

Overburden (3.7 m) 12 ft;
 Mineral (7.6 m) 25 ft;
 Bedrock (1.5 m +) 5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Chalky	(3.4)	11	(3.7)	12
Glacial Sand and Gravel	Gravel	(7.6)	25	(11.3)	37
London Clay	Brown from 37 to 39 feet, otherwise blue/grey	(1.5 +)	5 +	(12.8)	42

			Depth below	Percentage		
			surface (ft)	Fines	Sand	Gravel
Gravel	68	+ 64	12 - 14	2	50	48
		- 64 + 16	14 - 17	0	41	59
		- 16 + 4	17 - 19	0	32	68
Sand	32	- 4 + 1	19 - 21	0	25	75
		- 1 + 1/4	21 - 24	1	27	72
		- 1/4 + 1/16	24 - 27	0	23	77
		- 1/16	27 - 28	1	34	65
Fines	0		28 - 31	0	33	67
			31 - 33	0	42	58
			33 - 35	0	28	72
			35 - 37	0	26	74

TL 71 NE 10

7694 1533

nr. Sandypit Farm

Surface level (+ 41.5 m) + 136 ft
 Water struck at (+ 35.7 m) + 117 ft
 Wirth B 1, 8 inch diam.,
 Date not recorded

Overburden (0.3 m) 1 ft;
 Mineral (10.1 m) 33 ft;
 Bedrock (4.8 m +) 16 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Gravel	(10.1)	33	(10.4)	34
London Clay	Brown	(4.8 +)	16 +	(15.2)	50

			Depth below	Percentage			
			surface (ft)	Fines	Sand	Gravel	
Gravel	%	mm	%	1 - 4	16	45	39
	61	+ 64	0	4 - 7	3	37	60
		- 64 + 16	29	7 - 10	3	33	64
		- 16 + 4	32	10 - 13	2	30	68
Sand	33	- 4 + 1	12	13 - 17	2	21	77
		- 1 + 1/4	16	17 - 20	8	40	52
		- 1/4 + 1/16	5	20 - 23	3	22	75
Fines	6	- 1/16	6	23 - 26	11	37	52
				26 - 29	2	28	70
				29 - 31	3	32	65
				31 - 33	2	43	55
				33 - 34	17	43	40

TL 71 NE 11

7572 1569

nr. Ridley Hall

Surface level (+ 46.6 m) + 153 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 March 1967

Waste (8.5 m) 28 ft;
 Bedrock (2.3 m +) 7.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
? Boulder Clay	Light brown	(6.9)	22.5	(7.2)	23.5
Glacial Sand and Gravel	'Clayey' sandy gravel	(1.3)	4.5	(8.5)	28
London Clay	Brown	(2.3 +)	7.5 +	(10.8)	35.5

	%	mm	%	Depth below surface (ft)	Percentage		
					Fines	Sand	Gravel
Gravel	26	+ 64	0	23.5 - 25	32	44	24
		- 64 + 16	16	25 - 28	3	70	27
		- 16 + 4	10				
Sand	61	- 4 + 1	9				
		- 1 + 1/4	41				
		- 1/4 + 1/16	11				
Fines	13	- 1/16	13				

TL 71 NE 12

7506 1606

nr. Fuller Street

Surface level (+ 51.2 m) + 168 ft.
 Water struck at (+ 40.7 m) + 133 ft.
 Wirth B 1, 8 inch diam.,
 March 1967

Overburden (4.4 m) 14.5 ft;
 Mineral (11.3 m) 37 ft;
 Bedrock (1.1 m +) 3.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.2)	0.5	(0.2)	0.5
? Boulder Clay	Light brown	(4.2)	14	(4.4)	14.5
Glacial Sand and Gravel	Pebbly sand	(11.3)	37	(15.7)	51.5
London Clay	Brown	(1.1 +)	3.5 +	(16.8)	55

	%	mm	%	Depth below surface (ft)	Percentage		
					Fines	Sand	Gravel
Gravel	23	+ 64	0	14.5 - 18	16	36	48
		- 64 + 16	8	18 - 22.5	1	65	34
		- 16 + 4	15	22.5 - 28	12	85	3
Sand	70	- 4 + 1	9	28 - 34.5	8	91	1
		- 1 + 1/4	55	34.5 - 38	5	61	34
		- 1/4 + 1/16	6	38 - 43	3	74	23
		- 1/16	7	43 - 45	1	75	24
Fines	7	- 1/16	7	45 - 47.5	17	34	49
				47.5 - 49.5	0	88	12
				49.5 - 51.5	6	62	32

TL 71 NE 13

7598 1507

nr. Whathobb's Farm

Surface level (+ 42.1 m) + 138 ft.
 Water not struck
 Wirth B 1, 8 inch diam.,
 March 1967

Waste (7.6 m) 25 ft;
 Bedrock (3.2 m +) 10.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.2)	0.5	(0.2)	0.5
? Glacial Sand and Gravel	Clay with some gravel	(1.2)	4	(1.4)	4.5
	Light brown lay	(6.2)	20.5	(7.6)	25
London Clay	Brown	(3.2 +)	10.5	(10.8)	35.5

TL 71 NE 14 7506 1884 nr. Hazelton Wood

Surface level (+ 73.8 m) + 242 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 May 1968

Waste (12.8 m) 42 ft;
 Bedrock (4.9 m +) 16 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Boulder Clay	Light brown. Chalky with flints	(8.0)	26.5	(8.5)	28
? Glacial Sand and Gravel	'Clayey' fine sand	(4.3)	14	(12.8)	42
London Clay		(4.9 +)	16 +	(17.7)	58

TL 71 NE 15 7500 1794 nr. Rank's Green

Surface level (+ 71.9 m) + 236 ft.
 Water not struck
 Wirth B 1, 8 inch diam.,
 May 1968

Overburden (9.8 m) 32 ft;
 Mineral (5.9 m) 19.5 ft;
 Bedrock (1.7 m +) 5.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Made ground		(0.6)	2	(0.6)	2
Boulder Clay	Chalky with flints	(9.2)	30	(9.8)	32
Glacial Sand and Gravel	Sandy gravel	(5.9)	19.5	(15.7)	51.5
London Clay		(1.7 +)	5.5 +	(17.4)	57

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	31	+ 64	32 - 35	19	57	24
		- 64 + 16	35 - 36.5	8	62	30
		- 16 + 4	36.5 - 39.5	4	60	36
Sand	62	- 4 + 1	39.5 - 42.5	2	43	55
		- 1 + 1/4	42.5 - 44	3	55	42
		- 1/4 + 1/16	44 - 47	5	65	30
			47 - 50	4	84	12
Fines	7	- 1/16	50 - 51.5	8	71	21

TL 71 NE 16 7585 1896 nr. Hazelton Wood

Surface level (+ 68.0 m) + 223 ft.
 Water not struck
 Wirth B 1, 8 inch diam.,
 May 1968

Waste (17.1 m) 56 ft;
 Bedrock (7.6 m +) 25 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Made ground		(0.6)	2	(0.6)	2
Boulder Clay	Chalky with flints	(16.5)	54	(17.1)	56
London Clay		(7.6 +)	25 +	(24.7)	81

TL 71 NE 17 7596 1995 nr. Black Notley Hospital

Surface level (+ 67.7 m) + 222 ft.
 Water struck at (+ 55.5 m) + 182 ft.
 Wirth B O, 8 inch diam.,
 September 1968

Overburden (9.4 m) 31 ft;
 Mineral (4.3 m) 14 ft;
 Bedrock (3.1 m +) 10 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown from 1 to 16 feet, otherwise grey. Chalky	(8.5)	28	(8.8)	29
	Brown sandy clay	(0.6)	2	(9.4)	31
Glacial Sand and Gravel	Gravel	(4.3)	14	(13.7)	45
London Clay	Brown from 45 to 49 feet, otherwise blue/grey	(3.1 +)	10 +	(16.8)	55

				Depth below surface (ft)	Percentage		
	%	mm	%		Fines	Sand	Gravel
Gravel	56	+ 64	0	31 - 34	4	51	45
		- 64 + 16	26	34 - 37	0	38	62
		- 16 + 4	30	37 - 40	22	20	58
Sand	38	- 4 + 1	12	40 - 43	1	40	59
		- 1 + 1/4	22	43 - 45	1	41	58
		- 1/4 + 1/16	4				
Fines	6	- 1/16	6				

TL 71 NE 18

7617 1646

nr. Phoenix Cottages

Surface level (+ 53.9 m) + 177 ft.
 Water struck at (+ 44.8 m) + 147 ft
 Wirth B O, 8 inch diam.,
 October 1968

Overburden (5.8 m) 19 ft;
 Mineral (11.0 m) 36 ft;
 Bedrock (1.5 m +) 5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown	(5.5)	18	(5.8)	19
Glacial Sand and Gravel	Sandy gravel	(11.0)	36	(16.8)	55
London Clay	Brown at the surface, otherwise blue/grey	(1.5 +)	5 +	(18.3)	60

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	39	+ 64	19 - 22	15	29	56
		- 64 + 16	22 - 25	7	36	57
		- 16 + 4	25 - 28	3	43	54
Sand	58	- 4 + 1	28 - 31	2	66	32
		- 1 + 1/4	31 - 34	1	64	35
		- 1/4 + 1/16	34 - 37	0	86	14
			37 - 40	0	84	16
Fines	3	- 1/16	40 - 43	0	86	14
			43 - 46	2	46	52
			46 - 49	0	55	45
			49 - 52	1	55	44
			52 - 55	1	42	47

TL 71 NE 19 7690 1889 nr. Webbs Farm

Surface level (+ 65.5 m) + 215 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 May 1968

Waste (15.4 m) 50.5 ft;
 Bedrock (2.3 m +) 7.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Boulder Clay	Chalky with flints	(6.2)	20.5	(6.7)	22
	Clay with isolated patches of sand and gravel	(5.8)	19	(12.5)	41
Glacial Sand and Gravel	'Clayey' sandy gravel	(2.0)	6.5	(14.5)	47.5
	Sand with clay	(0.9)	3	(15.4)	50.5
London Clay		(2.3 +)	7.5 +	(17.7)	58

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	42	+ 64	41 - 44	22	41	37
		- 64 + 16	44 - 46.5	7	45	48
		- 16 + 4	46.5 - 47.5	8	49	43
Sand	44	- 4 + 1				
		- 1 + 1/4				
		- 1/4 + 1/16				
Fines	14	- 1/16				

Surface level (+ 63.7 m) + 209 ft
 Water struck at (+ 53.0 m) + 174 ft
 Wirth B O, 8 inch diam.,
 October 1968

Overburden (10.7 m) 35 ft;
 Mineral (1.2 m) 4 ft;
 Waste (0.3 m) 1 ft;
 Mineral (2.1 m) 7 ft;
 Waste (0.6 m) 2 ft;
 Mineral (8.6 m) 28 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Boulder Clay	Brown from 1.5 to 18 feet, otherwise grey. Very chalky below 18 feet	(10.2)	33.5	(10.7)	35
Glacial Sand (a) and Gravel	Sandy gravel	(1.2)	4	(11.9)	39
	Brown sandy clay	(0.3)	1	(12.2)	40
	(b) Gravel	(2.1)	7	(14.3)	47
	Brown sandy clay	(0.6)	2	(14.9)	49
	(c) Sandy gravel	(8.6)	28	(23.5)	77
London Clay		(0.9+)	3+	(24.4)	80

		%	mm	%	Depth below surface (ft)	Percentage			
						Fines	Sand	Gravel	
(a)	Gravel	43	+ 64	0	35 - 38	0	48	52	
			- 64 + 16	22	38 - 39	1	83	16	
			- 16 + 4	21					
	Sand	57	- 4 + 1	16					
			- 1 + 1/4	37					
			- 1/4 + 1/16	4					
	Fines	0	- 1/16	0					
(b)	Gravel	59	+ 64	0	40 - 43	3	37	60	
			- 64 + 16	25	43 - 46	0	45	55	
			- 16 + 4	34	46 - 47	3	25	72	
	Sand	39	- 4 + 1	15					
			- 1 + 1/4	20					
			- 1/4 + 1/16	4					
	Fines	2	- 1/16	2					
(c)	Gravel	37	+ 64	0	49 - 51	0	98	2	
			- 64 + 16	12	51 - 53	0	100	0	
			- 16 + 4	25	53 - 56	1	74	25	
		Sand	62	- 4 + 1	16	56 - 59	0	55	45
				- 1 + 1/4	34	59 - 62	2	85	13
				- 1/4 + 1/16	12	62 - 65	0	69	31
						65 - 68	1	52	47
		Fines	1	- 1/16	1	68 - 71	0	49	51
						71 - 74	2	47	51
						74 - 77	0	24	76

TL 71 NE 21 7773 1734 nr. Troys Farm

Surface level (+ 57.6 m) + 189 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 August 1968

Overburden (12.8 m) 42 ft;
 Mineral (4.6 m +) 15 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.8)	2.5	(0.8)	2.5
Boulder Clay	Brown from 2.5 to 14 feet, otherwise greyish-brown. Chalky with flints	(12.0)	39.5	(12.8)	42
Glacial Sand and Gravel	Gravel	(4.6 +)	15 +	(17.4)	57

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	47	+ 64	42 - 45	0	38	62
		- 64 + 16	45 - 48	21	56	23
		- 16 + 4	48 - 51	1	51	48
Sand	47	- 4 + 1	51 - 54	7	49	44
		- 1 + 1/4	54 - 57	0	44	56
		- 1/4 + 1/16				
Fines	6	- 1/16				

TL 71 NE 22

7805 1864

nr. White Notley

Surface level (+ 47.9 m) + 157 ft

Water not struck

Wirth B O, 8 inch diam.,

September 1968

Overburden (4.0 m) 13 ft

Mineral (7.9 m) 26 ft;

Bedrock (1.8 m +) 6 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Made ground		(0.2)	0.5	(0.2)	0.5
? Boulder Clay	Brown stony clay	(3.8)	12.5	(4.0)	13
Glacial Sand and Gravel	Sandy gravel	(7.9)	26	(11.9)	39
London Clay	Brown from 39 to 44 feet, otherwise blue/grey	(1.8 +)	6 +	(13.7)	45

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	37	+ 64	13 - 15	14	63	23
		- 64 + 16	15 - 18	8	90	2
		- 16 + 4	18 - 21	13	87	0
Sand	58	- 4 + 1	21 - 24	13	84	3
		- 1 + 1/4	24 - 27	0	53	47
		- 1/4 + 1/16	27 - 30	0	40	60
			30 - 33	0	36	64
Fines	5		33 - 36	0	32	68
		- 1/16	36 - 39	2	37	61

TL 71 NE 23

7844 1787

nr. White Notley

Surface level (+ 51.8 m) + 170 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 September 1968

Overburden (7.9 m) 26 ft;
 Mineral (9.5 m) 31 ft;
 Bedrock (0.6 m +) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown. Chalky	(7.6)	25	(7.9)	26
Glacial Sand and Gravel	Gravel	(9.5)	31	(17.4)	57
London Clay	Brown	(0.6 +)	2 +	(18.0)	59

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	51	+ 64	26 - 29	0	15	85
		- 64 + 16	29 - 32	0	94	6
		- 16 + 4	32 - 35	8	76	16
Sand	47	- 4 + 1	35 - 36	5	47	48
		- 1 + 1/4	36 - 39	0	35	65
		- 1/4 + 1/16	39 - 42	0	17	83
			42 - 45	0	64	36
			45 - 48	0	66	34
Fines	2	- 1/16	48 - 51	0	37	63
			51 - 54	12	41	47
			54 - 57	1	22	77

TL 71 NE 24

7863 1972

nr. Newbarns Farm

Surface level (+ 60.0 m) + 197 ft
 Water struck at (+ 55.4 m) + 182 ft
 Wirth B 1, 8 inch diam.,
 May 1968

Overburden (4.0 m) 13 ft;
 Mineral (6.8 m) 22.5 ft;
 Bedrock (3.8 m +) 12.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Chalky with flints	(3.7)	12	(4.0)	13
Glacial Sand and Gravel	'Clayey' sandy gravel	(6.8)	22.5	(10.8)	35.5
London Clay		(3.8 +)	12.5 +	(14.6)	48

	%	mm	%	Depth below surface (ft)	Percentage		
					Fines	Sand	Gravel
Gravel	24	+ 64	0	13 - 14.5	grading not available		
		- 64 + 16	7	14.5 - 17.5	13	44	43
		- 16 + 4	17	17.5 - 20.5	(13	67	20
Sand	64	- 4 + 1	11	20.5 - 23.5	(12	73	15
		- 1 + 1/4	33	23.5 - 26.5	26	38	36
		- 1/4 + 1/16	20	26.5 - 29.5	0	60	40
		- 1/16	12	29.5 - 32.5	11	86	3
Fines	12	- 1/16	12	32.5 - 35.5	7	88	5
					grading not available		

TL 71 NE 25 7870 1627 nr. Little Troys

Surface level (+ 51.5 m) + 169 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 September 1968

Overburden (5.8 m) 19 ft;
 Mineral (7.3 m) 24 ft;
 Bedrock (0.6 m +) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.2)	0.5	(0.2)	0.5
Boulder Clay	Brown from 0.5 to 12 feet, otherwise grey. Chalky	(5.6)	18.5	(5.8)	19
Glacial Sand and Gravel	Gravel	(7.3)	24	(13.1)	43
London Clay	Brown	(0.6 +)	2 +	(13.7)	45

			Depth below	Percentage				
			surface (ft)	Fines	Sand	Gravel		
Gravel	62	mm + 64 - 64 + 16 - 16 + 4	%	0 26 36	19 - 22	7	53	40
					22 - 25	0	46	54
					25 - 28	0	43	57
					28 - 31	0	42	58
Sand	37	- 4 + 1 - 1 + 1/4 - 1/4 + 1/16	%	14 20 3	31 - 34	2	30	68
					34 - 37	0	25	75
					37 - 40	0	30	70
					40 - 43	1	27	72
Fines	1	- 1/16		1				

TL 71 NE 26 (not displayed on the map) 7871 1697 nr. Troys Wood

Surface level (+ 55.2 m) + 181 ft
 Water not struck
 Shell and auger, 7 inch diam.,
 November 1968

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Grey. Chalky	(11.9 +)	39 +	(12.2)	40

TL 71 NE 27 7895 1874 nr. White Notley Station

Surface level (+ 46.0 m) + 151 ft
 Water struck at (+ 32.6 m) + 107 ft
 Wirth B 1, 8 inch diam.,
 May 1968

Overburden (9.8 m) 32 ft;
 Mineral (5.4 m) 18 ft;
 Bedrock (2.0 m +) 6.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Boulder Clay	Chalky with flints	(6.7)	22	(7.2)	23.5
? Glacial Sand and Gravel	Excessively 'clayey' sand and gravel	(2.6)	8.5	(9.8)	32
Glacial Sand and Gravel	Gravel	(5.4)	18	(15.2)	50
London Clay		(2.0 +)	6.5 +	(17.2)	56.5

			Depth below surface (ft)	Percentage		
%	mm	%		Fines	Sand	Gravel
Gravel 61	+ 64	0	32 - 35	12	25	63
	- 64 + 16	34	35 - 37	7	60	33
	- 16 + 4	27	37 - 39	31	35	34
Sand 31	- 4 + 1	14	39 - 41.5	1	32	67
	- 1 + 1/4	11	41.5 - 44	2	26	72
	- 1/4 + 1/16	6	44 - 47	4	29	67
Fines 8	- 1/16	8	47 - 50	4	18	78

TL 71 NE 28

7903 1519

nr. Farding's Farm

Surface level (+ 53.0 m) + 174 ft
 Water struck at (+ 47.5 m) + 156 ft
 Wirth B O, 8 inch diam.,
 September/October 1968

Overburden (13.1 m) 43 ft;
 Mineral (10.1 m) 33 ft;
 Bedrock (0.6 m +) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown from 1 to 30 feet, otherwise grey. Chalky	(12.8)	42	(13.1)	43
Glacial Sand and Gravel	Gravel	(10.1)	33	(23.2)	76
London Clay		(0.6 +)	2 +	(23.8)	78

			Depth below	Percentage		
			surface (ft)	Fines	Sand	Gravel
Gravel	%	mm				
	49	+ 64	43 - 46	5	42	53
		- 64 + 16	46 - 49	5	34	61
		- 16 + 4	49 - 52	0	40	60
Sand	46	-	52 - 55	4	63	33
			55 - 58	0	56	44
			58 - 61	0	54	46
			61 - 64	0	54	46
Fines	5	-	64 - 67	0	53	47
			67 - 70	0	22	78
			70 - 73	8	38	54
			73 - 76	29	59	12

TL 71 NE 29

7938 1957

nr. Sheepcote Wood

Surface level (+ 56.1 m) + 184 ft
 Water struck at (+ 52.1 m) + 171 ft
 Wirth B 1, 8 inch diam.,
 June 1968

Overburden (12.6 m) 41.5 ft;
 Mineral (4.3 m) 14 ft;
 Bedrock (0.8 m +) 2.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Made ground		(0.5)	1.5	(0.5)	1.5
Boulder Clay	Brown. Chalky with flints	(3.5)	11.5	(4.0)	13
? Glacial Sand and Gravel	Gravel	(0.7)	2.5	(4.7)	15.5
Boulder Clay	Chalky	(7.9)	26	(12.6)	41.5
Glacial Sand and Gravel	'Clayey' gravel	(4.3)	14	(16.9)	55.5
London Clay		(0.8 +)	2.5 +	(17.7)	58

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	53	+ 64	41.5 - 44	11	36	53
		- 64 + 16	44 - 46.5	12	30	58
		- 16 + 4	46.5 - 49.5	12	47	41
Sand	33	- 4 + 1	49.5 - 52.5	21	26	53
		- 1 + 1/4	52.5 - 55.5	12	29	59
		- 1/4 + 1/16				
Fines	14	- 1/16				

TL 71 NE 30

7939 1742

nr. Oak Farm

Surface level (+ 38.1 m) + 125 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 August 1968

Overburden (2.7 m) 9 ft;
 Mineral (4.1 m) 13.5 ft;
 Bedrock (3.3 m +) 10.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown	(2.4)	8	(2.7)	9
Glacial Sand and Gravel	Gravel	(4.1)	13.5	(6.8)	22.5
London Clay	Brown from 22.5 to 28 feet, otherwise blue/grey	(3.3 +)	10.5 +	(10.1)	33

			Depth below surface (ft)	Percentage			
	%	mm		Fines	Sand	Gravel	
Gravel	52	+ 64	0	9 - 12	7	60	33
		- 64 + 16	19	12 - 15	5	47	48
		- 16 + 4	33	15 - 18	2	40	58
Sand	44	- 4 + 1	12	18 - 21	0	42	58
		- 1 + 1/4	28	21 - 22.5	7	25	68
		- 1/4 + 1/16	4				
Fines	4	- 1/16	4				

Surface level (+ 45.4 m) + 149 ft

Water not struck

Wirth B O, 8 inch diam.,

September 1968

Overburden (3.7 m) 12 ft;

Mineral (2.1 m) 7 ft;

Waste (0.3 m) 1 ft;

Mineral (6.4 m) 21 ft;

Bedrock (0.6 m+) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.2)	0.5	(0.2)	0.5
Boulder Clay	Brown. Chalky	(3.5)	11.5	(3.7)	12
Glacial Sand and Gravel	(a) Gravel	(2.1)	7	(5.8)	19
	Grey slightly sandy clay	(0.3)	1	(6.1)	20
	(b) Gravel	(6.4)	21	(12.5)	41
London Clay	Brown	(0.6 +)	2 +	(13.1)	43

				Depth below surface (ft)	Percentage			
	%	mm	%		Fines	Sand	Gravel	
(a)	Gravel	65	+ 64	0	12 - 15	0	28	72
			- 64 + 16	29	15 - 18	0	40	60
			- 16 + 4	36	18 - 19	10	33	57
	Sand	34	- 4 + 1	12				
			- 1 + 1/4	18				
			- 1/4 + 1/16	4				
	Fines	1	- 1/16	1				
(b)	Gravel	57	+ 64	0	20 - 23	0	46	54
			- 64 + 16	25	23 - 26	0	49	51
			- 16 + 4	32	26 - 27	11	43	46
	Sand	42	- 4 + 1	15	27 - 29	0	66	34
			- 1 + 1/4	24	29 - 32	0	28	72
			- 1/4 + 1/16	3	32 - 35	grading not available		
					35 - 38	0	34	66
	Fines	1	- 1/16	1				
				38 - 41	0	36	64	

TL 71 NE 32 7976 1878 nr. Cressing Temple

Surface level (+ 47.2 m) + 155 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 May 1968

Waste (5.2 m) 17 ft;
 Bedrock (6.7 m +) 22 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Boulder Clay	Chalky with flints from 1.5 to 12 feet. No pebbles recorded below 12 feet	(4.7)	15.5	(5.2)	17
London Clay	Brown at surface, otherwise blue/grey	(6.7 +)	22 +	(11.9)	39

TL 71 NE 33 7502 1999 nr. Dagnett's Farm

Surface level (+ 70.1 m) + 230 ft
 Water struck at (+ 60.3 m) + 198 ft
 Wirth B O, 8 inch diam.,
 September 1968

Waste (12.5 m) 41 ft;
 Bedrock (3.3 m +) 11 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown from 1 to 3 feet, otherwise grey. Chalky	(9.5)	31	(9.8)	32
Glacial Sand and Gravel	Sandy gravel	(2.7)	9	(12.5)	41
London Clay	Brown from 41 to 47 feet, otherwise blue/grey	(3.3 +)	11 +	(15.8)	52

	%	mm	%	Depth below surface (ft)	Percentage			
					Fines	Sand	Gravel	
Gravel	48	+ 64	0	32 - 35	{	0	77	23
		- 64 + 16	24			0	57	43
		- 16 + 4	24			2	53	45
Sand	51	- 4 + 1	17	38 - 41	{	0	43	57
		- 1 + 1/4	32			2	38	60
		- 1/4 + 1/16	2			0	40	60
Fines	1	- 1/16	1					

TL 71 SW 1(a)

7393 1400

nr. Lawn's Farm

Surface level (+ 57.0 m) + 187 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 February 1967

Overburden (7.3 m) 24 ft;
 Mineral (8.2 m) 27 ft;
 Bedrock (1.6 m +) 5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.2)	0.5	(0.2)	0.5
Boulder Clay	Brown	(7.1)	23.5	(7.3)	24
Glacial Sand and Gravel	'Clayey' gravel	(8.2)	27	(15.5)	51
London Clay	Brown	(1.6 +)	5 +	(17.1)	56

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	59	+ 64	24 - 26	29	22	49
		- 64 + 16	26 - 30	13	24	63
		- 16 + 4	30 - 34	5	27	68
Sand	31	- 4 + 1	34 - 36.5	9	26	65
		- 1 + 1/4	36.5 - 38.5	21	49	30
		- 1/4 + 1/16	38.5 - 41	8	35	57
			41 - 43	12	38	50
Fines	10		43 - 46	2	34	64
			46 - 49	3	35	62
			49 - 51	5	28	67

TL 71 SW 1(b)

7393 1400

nr. Lawn's Farm

Surface level (+ 57.0 m) + 187 ft
 Water not struck
 Shell and auger, diameter not recorded
 June 1967

Overburden (8.2 m) 27 ft;
 Mineral (11.3 m) 37 ft;
 Bedrock (0.3 m +) 1 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.2)	0.5	(0.2)	0.5
Boulder Clay	Brown	(8.0)	26.5	(8.2)	27
Glacial Sand and Gravel	Gravel	(11.3)	37	(19.5)	64
London Clay	Brown	(0.3 +)	1 +	(19.8)	65

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	57	+ 64	27 - 30	2	29	69
		- 64 + 16	30 - 35	2	58	40
		- 16 + 4	35 - 40	32	40	28
Sand	37	- 4 + 1	40 - 45	5	35	60
		- 1 + 1/4	45 - 50	5	35	60
		- 1/4 + 1/16	50 - 55	1	32	67
			55 - 60	1	25	74
Fines	6	- 1/16	60 - 64	1	30	69

TL 71 SW 1(c)

7393 1400

nr. Lawn's Farm

Surface level (+ 57.0 m) + 187 ft
 Water struck at (+ 39.6 m) + 130 ft
 Wirth B 1, 8 inch diam.,
 March 1967

Overburden (7.6 m) 25 ft;
 Mineral (11.0 m +) 37 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Made ground		(2.6)	8.5	(2.6)	8.5
Boulder Clay	Chalky	(5.0)	16.5	(7.6)	25
Glacial Sand and Gravel	Gravel	(11.0 +)	37 +	(18.6)	61

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	51	+ 64	25 - 27	1	41	58
		- 64 + 16	27 - 29	5	55	40
		- 16 + 4	29 - 31	1	36	63
Sand	43	- 4 + 1	31 - 33	2	50	48
		- 1 + 1/4	33 - 35	1	58	41
		- 1/4 + 1/16	35 - 37	8	68	24
			37 - 39	24	51	25
			39 - 41	25	53	22
Fines	6	- 1/16	41 - 43	15	41	44
			43 - 45	10	43	47
			45 - 47	2	53	45
			47 - 49	7	47	46
			49 - 51	0	35	65
			51 - 53	0	30	70
			53 - 55	1	29	70
			55 - 57	0	33	67
			57 - 59	0	28	72
	59 - 61	2	34	64		

TL 71 SW 2 7487 1363 nr. Bird's Farm

Surface level (+ 56.4 m) + 185 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 February 1967

Waste (12.2 m) 40 ft;
 Bedrock (1.5 m +) 5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Boulder Clay	Brown. Chalky in parts	(11.7)	38.5	(12.2)	40
London Clay		(1.5 +)	5 +	(13.7)	45

TL 71 SW 3 7485 1312 nr. Russell Green Farm

Surface level (+ 54.9 m) + 180 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 February 1967

Waste (11.6 m) 38 ft;
 Bedrock (0.6 m +) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown	(11.3)	37	(11.6)	38
London Clay		(0.6 +)	2 +	(12.2)	40

TL 71 SW 29 7030 1437 nr. Hill's Farm

Surface level (+ 45.7 m) + 150 ft
 Water not struck
 Shell and auger, 6 inch diam.,
 January 1969

Waste (9.0 m) 29.5 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Made ground		(0.9)	3	(0.9)	3
Boulder Clay	Brown. Chalky	(8.1)	26.5	(9.0)	29.5
London Clay	Brown	(0.9+)	3+	(9.9)	32.5

TL 71 SW 30

7077 1343

nr. Chatham Hall

Surface level (+ 46.6 m) + 153 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 December 1968

Overburden (0.9 m) 3 ft;
 Mineral (8.9 m) 29 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.9)	3	(0.9)	3
Glacial Sand and Gravel	'Clayey' gravel	(8.9)	29	(9.8)	32
London Clay	Brown	(0.9 +)	3 +	(10.7)	35

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	48	+ 64	3 - 6	15	33	52
		- 64 + 16	6 - 9	29	33	38
		- 16 + 4	9 - 12	32	31	37
Sand	34	- 4 + 1	12 - 15	18	34	48
		- 1 + 1/4	15 - 18	21	34	45
		- 1/4 + 1/16	18 - 21	31	38	31
			21 - 24	12	43	45
Fines	18	- 1/16	24 - 27	1	32	67
			27 - 30	13	37	50
			30 - 32	7	25	68

TL 71 SW 31 7031 1270 nr. Little Waltham

Surface level (+ 37.8 m) + 124 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 December 1968

Waste (6.7 m) 22 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(1.8)	6	(1.8)	6
Head	Dark grey silty clay	(1.2)	4	(3.0)	10
Boulder Clay	Brown. With many flints	(3.7)	12	(6.7)	22
London Clay	Brown at surface, otherwise blue/grey	(0.9 +)	3 +	(7.6)	25

TL 71 SW 32

7039 1159

nr. Wood House

Surface level (+ 50.3 m) + 165 ft
 Water struck at (+ 39.9 m) + 131 ft
 Wirth B O, 8 inch diam.,
 December 1968

Overburden (3.0 m) 10 ft;
 Mineral (2.8 m) 9 ft;
 Waste (0.9 m) 3 ft;
 Mineral (7.3 m) 24 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown. With few pebbles	(2.7)	9	(3.0)	10
Glacial Sand and Gravel	(a) 'Very clayey' sandy gravel	(2.8)	9	(5.8)	19
	Excessively 'clayey' sand and gravel	(0.9)	3	(6.7)	22
	(b) Gravel	(7.3)	24	(14.0)	46
London Clay	Brown	(0.9 +)	3 +	(14.9)	49

		%		mm		%		Depth below surface (ft)		Percentage		
										Fines	Sand	Gravel
(a)	Gravel	33		+ 64		0		10 - 13		30	42	28
				- 64 + 16		14		13 - 16		21	39	40
				- 16 + 4		19		16 - 19		26	42	32
	Sand	41		- 4 + 1		5						
				- 1 + 1/4		24						
				- 1/4 + 1/16		12						
	Fines	26		- 1/16		26						
(b)	Gravel	62		+ 64		0		22 - 25		25	43	32
				- 64 + 16		31		25 - 28		12	40	48
				- 16 + 4		31		28 - 31		2	41	57
								31 - 34		2	13	85
	Sand	32		- 4 + 1		9		34 - 37		2	22	76
				- 1 + 1/4		14		37 - 40		2	21	77
				- 1/4 + 1/16		9		40 - 43		3	22	75
	Fines	6		- 1/16		6		43 - 46		1	55	44

TL 71 SW 33 7146 1432 nr. Stonage Farm

Surface level (+ 53.9 m) + 177 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 December 1968

Waste (13.7 m) 45 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Boulder Clay	Grey. Very chalky from 1.5 to 38 feet. Only occasional pebbles recorded below 38 feet	(13.2)	43.5	(13.7)	45
London Clay		(0.9 +)	3 +	(14.6)	48

TL 71 SW 34 7133 1247 nr. Little Waltham Hall

Surface level (+ 40.5 m) + 133 ft
 Water not struck
 Wirth 8 inch diam.,
 December 1968

Waste (4.0 m) 13 ft;
 Bedrock (0.6 m +) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown, with grey lenses below 5 feet. Very stony from 1 to 5 feet	(3.7)	12	(4.0)	13
London Clay	Brown	(0.6 +)	2 +	(4.6)	15

TL 71 SW 35 7129 1176

nr. Little Belstead's Farm

Surface level (+ 33.8 m) + 111 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 December 1968

Overburden (0.6 m) 2 ft;
 Mineral (1.5 m) 5 ft;
 Bedrock (1.9 m +) 6 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Gravel	(1.5)	5	(2.1)	7
London Clay	Mainly brown with blue/grey lenses	(1.9 +)	6 +	(4.0)	13

			Depth below surface (ft)	Percentage		
%	mm	%		Fines	Sand	Gravel
Gravel	68	+ 64	2 - 5	8	25	67
		- 64 + 16	5 - 7	10	21	69
		- 16 + 4				
Sand	23	- 4 + 1				15
		- 1 + 1/4				5
		- 1/4 + 1/16				3
Fines	9	- 1/16				9

TL 71 SW 36 7154 1031 nr. Hill Farm

Surface level (+ 28.0 m) + 92 ft
 Water struck at (+ 24.3 m) + 80 ft
 Wirth B O, 8 inch diam.,
 November 1968

Overburden (1.8 m) 6 ft;
 Mineral (1.9 m) 6 ft;
 Bedrock (2.4 m +) 8 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Head	Brown sandy clay with occasional traces of organic matter	(1.5)	5	(1.8)	6
? Glacial Sand and Gravel	'Clayey' gravel	(1.9)	6	(3.7)	12
London Clay		(2.4 +)	8 +	(6.1)	20

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	45	+ 64	6 - 9	12	41	47
		- 64 + 16	9 - 12	19	38	43
		- 16 + 4				
Sand	39	- 4 + 1				
		- 1 + 1/4				
		- 1/4 + 1/16				
Fines	16	- 1/16				

TL 71 SW 37 7257 1454 nr. Long's Farm

Surface level (+ 62.5 m) + 205 ft
 Water struck at (+ 45.4 m) + 149 ft
 Wirth B O, 8 inch diam.,
 November 1968

Waste (18.3 m +) 60 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown from 1 to 28 feet, otherwise grey. Chalky with flints	(18.0 +)	59 +	(18.3)	60

TL 71 SW 38

7202 1341

nr. Sheepcotes Farm

Surface level (+ 53.0 m) + 174 ft
 Water struck at (+ 38.7 m) + 127 ft
 Wirth B O, 8 inch diam.,
 November 1968

Overburden (6.1 m) 20 ft;
 Mineral (9.7 m) 32 ft;
 Bedrock (1.0 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown. Chalky	(5.8)	19	(6.1)	20
Glacial Sand and Gravel	Gravel	(9.7)	32	(15.8)	52
London Clay	Sandy brown, otherwise blue/grey	(1.0+)	3+	(16.8)	55

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	55	+ 64	20 - 23	0	45	53
		- 64 + 16	23 - 26	0	56	44
		- 16 + 4	26 - 29	0	22	78
Sand	45	- 4 + 1	29 - 32	0	31	69
		- 1 + 1/4	32 - 35	0	33	67
		- 1/4 + 1/16	35 - 38	0	43	57
		- 1/4 + 1/16	38 - 41	1	46	53
Fines	0	- 1/16	41 - 44	2	60	38
			44 - 47	0	63	37
			47 - 50	0	40	60
			50 - 52	2	52	46

TL 71 SW 39

7247 1274

nr. Power's Farm

Surface level (+ 62.2 m) + 204 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 November 1968

Overburden (12.8 m) 42 ft;
 Mineral (7.6 m) 25 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown from 1 to 18 feet, otherwise grey. Very chalky	(12.5)	41	(12.8)	42
Glacial Sand and Gravel	Gravel	(7.6)	25	(20.4)	67
London Clay	Brown from 67 to 68 feet, otherwise blue/grey	(0.9+)	3+	(21.3)	70

			Depth below	Percentage		
	%	mm	surface (ft)	Fines	Sand	Gravel
Gravel	49	+ 64	42 - 46	1	47	52
		- 64 + 16	46 - 49	13	42	45
		- 16 + 4	49 - 52	1	81	18
Sand	49	- 4 + 1	52 - 55	grading not available		
		- 1 + 1/4	55 - 58	1	49	50
		- 1/4 + 1/16	58 - 61	0	53	47
			61 - 64	0	43	57
Fines	2	- 1/16	64 - 67	0	29	71

TL 71 SW 40 7250 1150 nr. Belsteads

Surface level (+ 55.5 m) + 182 ft
 Water not struck
 Shell and auger, 6 inch diam.,
 January/February 1969

Overburden (6.8 m) 22.5 ft;
 Mineral (7.8 m) 25.5 ft;
 Bedrock (0.8 m +) 2.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.2)	0.5	(0.2)	0.5
Boulder Clay	Brown. Chalky from 0.5 to 15.5 feet. No pebbles recorded below 15.5 feet	(6.6)	22	(6.8)	22.5
Glacial Sand and Gravel	Gravel	(7.8)	25.5	(14.6)	48
London Clay	Brown	(0.8 +)	2.5 +	(15.4)	50.5

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	54	+ 64	22.5 - 25	2	48	50
		- 64 + 16	25 - 28	2	39	59
		- 16 + 4	28 - 31	2	48	50
Sand	45	- 4 + 1	31 - 34	2	41	57
		- 1 + 1/4	34 - 37	1	47	52
		- 1/4 + 1/16	37 - 40	1	43	56
			40 - 43	grading not available		
Fines	1	- 1/16	43 - 46	0	53	47
			46 - 48	1	36	63

TL 71 SW 41

7235 1059

nr. Belstead Hall

Surface level (+ 51.5 m) + 169 ft
 Water not struck
 Wirth B O, 8 inch diam.,
 Date not recorded

Overburden (5.5 m) 18 ft;
 Mineral (6.1 m) 20 ft;
 Bedrock (0.6 m +) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil	With flints	(0.5)	1.5	(0.5)	1.5
Boulder Clay	Brown. Chalky	(5.0)	16.5	(5.5)	18
Glacial Sand and Gravel	Gravel	(6.1)	20	(11.6)	38
London Clay	Brown at surface, otherwise blue/grey	(0.6 +)	2 +	(12.2)	40

	%	mm	%	Depth below surface (ft)	Percentage		
					Fines	Sand	Gravel
Gravel	51	+ 64	0	18 - 21	0	35	65
		- 64 + 16	23	21 - 24	1	44	55
		- 16 + 4	28	24 - 27	0	75	25
				27 - 30	0	60	40
Sand	49	- 4 + 1	13	30 - 33	1	41	58
		- 1 + 1/4	30	33 - 36	0	40	60
		- 1/4 + 1/16	6	36 - 38	0	42	58
Fines	0	- 1/16	0				

TL 71 SW 42

7345 1441

nr. Wakering's Farm

Surface level (+ 58.5 m) + 192 ft
 Water struck at (+ 50.9 m) + 167 ft
 Shell and auger, 8 inch diam.,
 December 1968/January 1969

Overburden (5.8 m) 19 ft;
 Mineral (15.2 m) 50 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown	(5.5)	18	(5.8)	19
Glacial Sand and Gravel	Gravel	(15.2)	50	(21.0)	69
London Clay	Brown from 69 to 70 feet, otherwise blue/grey	(0.9 +)	3 +	(21.9)	72

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	67	+ 64	19 - 22	0	6	94
		- 64 + 16	22 - 25	1	29	70
		- 16 + 4	25 - 28	1	43	58
Sand	32	- 4 + 1	28 - 37	grading not available		
		- 1 + 1/4	37 - 40	2	48	50
		- 1/4 + 1/16	40 - 43	grading not available		
			43 - 46	2	57	41
Fines	1	- 1/16	46 - 50	grading not available		
			50 - 53	1	38	61
			53 - 56	1	31	68
			56 - 59	2	40	58
			59 - 62	2	10	88
			62 - 65.	grading not available		
			65 - 67	2	22	76
		67 - 69	0	25	75	

TL 71 SW 43

7338 1320

nr. Drake's Farm

Surface level (+ 60.0 m) + 197 ft
 Water struck at (+ 55.7 m) + 183 ft
 Shell and auger, 8 inch diam.,
 December 1968

Overburden (15.2 m) 50 ft;
 Mineral (5.5 m) 18 ft;
 Bedrock (1.2 m +) 4 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown from 1 to 16 feet, otherwise grey. Chalky. Also very stony from 1 to 16 feet	(14.9)	49	(15.2)	50
Glacial Sand and Gravel	Gravel	(5.5)	18	(20.7)	68
London Clay		(1.2 +)	4 +	(21.9)	72

			Depth below surface (ft)	Percentage		
%	mm	%		Fines	Sand	Gravel
Gravel	72	+ 64	50 - 53	1	17	82
		- 64 + 16	53 - 56	0	34	66
		- 16 + 4	56 - 59	2	50	48
Sand	27	- 4 + 1	59 - 62	0	12	88
		- 1 + 1/4	62 - 65	grading not available		
		- 1/4 + 1/16	65 - 68	2	21	77
Fines	1	- 1/16				

TL 71 SW 45 7362 1085 nr. Water Hall

Surface level (+ 45.7 m) + 150 ft
 Water struck at (+ 43.6 m) + 143 ft
 Wirth B O, 8 inch diam.,
 November 1968

Overburden (2.1 m) 7 ft;
 Mineral (1.9 m) 6 ft;
 Bedrock (1.5 m +) 5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Made ground		(0.8)	2.5	(0.8)	2.5
Boulder Clay	Brown. Slightly chalky	(1.3)	4.5	(2.1)	7
Glacial Sand and Gravel	'Clayey' sandy gravel	(1.9)	6	(4.0)	13
London Clay	Brown. With concretions below 16 feet	(1.5 +)	5 +	(5.5)	18

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	32	+ 64	7 - 10	20	38	42
		- 64 + 16	10 - 13	6	72	22
		- 16 + 4				
Sand	54	- 4 + 1				
		- 1 + 1/4				
		- 1/4 + 1/16				
Fines	14	- 1/16				

TL 71 SW 46 7464 1445 nr. Scarlett's Farm

Surface level (+ 57.9 m) + 190 ft
 No record of groundwater
 Gryphon, 12 inch diam.,
 December 1968

Overburden (11.9 m) 39 ft;
 Mineral (6.4 m) 21 ft;
 Bedrock (0.6 m +) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown from 1 to 20 feet, otherwise grey. No pebbles recorded from 1 to 12.5 feet. Chalky below 12.5 feet	(11.6)	38	(11.9)	39
Glacial Sand and Gravel	Mainly fine to medium sand and fine gravel	(6.4)	21	(18.3)	60
London Clay		(0.6 +)	2 +	(18.9)	62

			Depth below surface (ft)	Percentage		
				Fines	Sand	Gravel
Average grading not available			39 - 42	1	64	35
			42 - 60	grading not available		

TL 71 SE 6

7501 1493

nr. Leyland's Farm

Surface level (+ 50.3 m) + 165 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 February 1967

Overburden (7.0 m) 23 ft;
 Mineral (8.8 m +) 29 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown	(6.7)	22	(7.0)	23
Glacial Sand and Gravel	Gravel	(8.8 +)	29 +	(15.8)	52

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	49	+ 64	23 - 25	15	13	72
		- 64 + 16	25 - 29	4	40	56
		- 16 + 4	29 - 32	2	28	70
Sand	47	- 4 + 1	32 - 35.5	4	33	63
		- 1 + 1/4	35.5 - 40	2	38	60
		- 1/4 + 1/16	40 - 45	1	65	34
			45 - 52	2	71	27
Fines	4	- 1/16				

TL 71 SE 7

7776 1495

nr. Terling Place

Surface level (+ 46.6 m) + 153 ft
 Water struck at (+ 36.8 m) + 121 ft
 Wirth B 1, 8 inch diam.,
 February 1967

Overburden (5.5 m) 18 ft;
 Mineral (4.9 m) 16 ft;
 Bedrock (1.2 m +) 4 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay		(5.2)	17	(5.5)	18
Glacial Sand and Gravel	Gravel	(4.9)	16	(10.4)	34
London Clay	Brown from 34 to 37 feet, otherwise blue/grey	(1.2 +)	4 +	(11.6)	38

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	64	+ 64	18 - 19	2	38	60
		- 64 + 16	19 - 25	1	39	60
		- 16 + 4	25 - 30	1	28	71
Sand	35	- 4 + 1	30 - 33	1	31	68
		- 1 + 1/4	33 - 34	1	48	51
		- 1/4 + 1/16				
Fines	1	- 1/16				

TL 71 SE 8

7602 1399

nr. Roll's Farm

Surface level (+ 44.2 m) + 145 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 March 1967

Overburden (0.5 m) 1.5 ft;
 Mineral (4.0 m) 13 ft;
 Bedrock (1.9 m +) 6.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Glacial Sand and Gravel	'Clayey' gravel	(4.0)	13	(4.5)	14.5
London Clay	Brown	(1.9 +)	6.5 +	(6.4)	21

	%	mm	%	Depth below surface (ft)	Percentage		
					Fines	Sand	Gravel
Gravel	51	+ 64	0	1.5 - 4	14	28	58
		- 64 + 16	22	4 - 7	7	33	60
		- 16 + 4	29	7 - 9	5	43	52
Sand	38	- 4 + 1	15	9 - 12	13	39	48
		- 1 + 1/4	14	12 - 14	13	43	44
		- 1/4 + 1/16	9	14 - 14.5	17	74	9
Fines	11	- 1/16	11				

TL 71 SE 9

7691 1402

nr. Brocksparck Wood

Surface level (+ 45.4 m) + 149 ft
 Water struck at (+ 36.3 m) + 119 ft
 Wirth B 1, 8 inch diam.,
 March 1967

Overburden (5.5 m) 18 ft;
 Mineral (4.3 m) 14 ft;
 Bedrock (2.4 m +) 8 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Brown	(5.2)	17	(5.5)	18
Glacial Sand and Gravel	Gravel	(4.3)	14	(9.8)	32
London Clay	Brown	(2.4 +)	8 +	(12.2)	40

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	64	+ 64	18 - 20	grading not available		
		- 64 + 16	20 - 22	12	57	31
		- 16 + 4	22 - 25	4	37	59
Sand	31	- 4 + 1	25 - 28	6	28	66
		- 1 + 1/4	28 - 31	1	7	92
		- 1/4 + 1/16	31 - 32	2	44	54
Fines	5	- 1/16				5

TL 71 SE 10

7741 1380

nr. Brockspark Wood

Surface level (+ 36.3 m) + 119 ft
 Water struck at (+ 32.9 m) + 108 ft
 Wirth B 1, 8 inch diam.,
 February 1967

Overburden (0.8 m) 2.5 ft;
 Mineral (2.9 m) 9.5 ft;
 Bedrock (1.2 m +) 4 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.8)	2.5	(0.8)	2.5
Glacial Sand and Gravel	'Clayey' gravel	(2.9)	9.5	(3.7)	12
London Clay		(1.2 +)	4 +	(4.9)	16

			Depth below surface (ft)	Percentage		
%	mm	%		Fines	Sand	Gravel
Gravel	50	+ 64	2.5 - 4.5	8	31	61
		- 64 + 16	4.5 - 6	11	36	53
		- 16 + 4	6 - 9	10	27	63
Sand	34	- 4 + 1	9 - 12	30	40	30
		- 1 + 1/4				
		- 1/4 + 1/16				
Fines	16	- 1/16				

TL 71 SE 11

7810 1398

nr. Warner's Farm

Surface level (+ 37.2 m) + 122 ft
 Water struck at (+ 34.5 m) + 113 ft
 Wirth B 1, 8 inch diam.,
 February 1967

Overburden (2.3 m) 7.5 ft;
 Mineral (2.6 m) 8.5 ft;
 Bedrock (2.1 m +) 7 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Chalky	(2.0)	6.5	(2.3)	7.5
Glacial Sand and Gravel	Gravel	(2.6)	8.5	(4.9)	16
London Clay	Brown from 16 to 19 feet, otherwise blue/grey	(2.1 +)	7 +	(7.0)	23

	%	mm	%	Depth below surface (ft)	Percentage		
					Fines	Sand	Gravel
Gravel	60	+ 64	0	7.5 - 9	7	63	30
		- 64 + 16	32	9 - 11	6	46	48
		- 16 + 4	28	11 - 13	1	20	79
Sand	37	- 4 + 1	10	13 - 15	1	42	57
		- 1 + 1/4	17	15 - 16	0	0	100
		- 1/4 + 1/16	10				
Fines	3	- 1/16	3				

TL 71 SE 12

7923 1457

nr. Farding's Farm

Surface level (+ 45.7 m) + 150 ft
 Water struck at (+ 35.3 m) + 116 ft
 Wirth B 1, 8 inch diam.,
 February 1967

Overburden (5.8 m) 19 ft;
 Mineral (4.9 m) 16 ft;
 Bedrock (1.5 m +) 5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Boulder Clay	Chalky	(4.9)	16	(5.2)	17
	Pebbly Sand	(0.3)	1	(5.5)	18
? Boulder Clay	Sandy	(0.3)	1	(5.8)	19
Glacial Sand and Gravel	Gravel. With chalk fragments from 20 to 23 feet	(4.9)	16	(10.7)	35
London Clay	Brown from 35 to 37 feet, otherwise blue/grey	(1.5 +)	5 +	(12.2)	40

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	61	+ 64	19 - 23	2	53	45
		- 64 + 16	23 - 25	0	34	66
		- 16 + 4	25 - 27	0	37	63
			27 - 30	1	26	73
Sand	38	- 4 + 1	30 - 33	0	36	64
		- 1 + 1/4	33 - 35	2	31	67
		- 1/4 + 1/16				
Fines	1	- 1/16				

TL 71 SE 13

7947 1396

nr. Dancing Dicks

Surface level (+ 47.9 m) + 157 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 February 1967

Overburden (8.8 m) 29 ft;
 Mineral (1.9 m) 6 ft;
 Waste (0.3 m) 1 ft;
 Mineral (4.2 m +) 14 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Boulder Clay	Chalky	(8.3)	27.5	(8.8)	29
Glacial Sand and Gravel	(a) 'Clayey' pebbly sand	(1.9)	6	(10.7)	35
? Boulder Clay	Very sandy	(0.3)	1	(11.0)	36
Glacial Sand and Gravel	(b) Gravel	(4.2+)	14+	(15.2)	50

		%	mm	%	Depth below surface (ft)	Percentage		
						Fines	Sand	Gravel
(a)	Gravel	15	+ 64	0	29 - 31	1	91	8
			- 64 + 16	8	31 - 33	27	64	9
			- 16 + 4	7	33 - 35	15	57	28
Sand	71	- 4 + 1	3					
		- 1 + 1/4	26					
		- 1/4 + 1/16	42					
Fines	14	- 1/16	14					
(b)	Gravel	54	+ 64	0	36 - 37	1	61	38
			- 64 + 16	31	37 - 39	14	53	33
			- 16 + 4	23	39 - 41	15	41	44
					41 - 43	3	46	51
Sand	39	- 4 + 1	8	43 - 45	7	25	68	
		- 1 + 1/4	22	45 - 47	grading not available			
		- 1/4 + 1/16	9	47 - 49	0	28	72	
				49 - 50	0	23	77	
Fines	7	- 1/16	7					

TL 71 SE 14

7662 1330

nr. Ringer's Farm

Surface level (+ 47.9 m) + 157 ft

Water not struck

Wirth B 1, 8 inch diam.,

February 1967

Overburden (6.7 m) 22 ft

Mineral (0.9 m) 3 ft;

Waste (0.6 m) 2 ft;

Mineral (7.0 m +) 23 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.8)	2.5	(0.8)	2.5
Boulder Clay	Brown. Chalky from 2.5 to 15 feet. No pebbles recorded from 15 to 18 feet. With flints below 18 feet	(5.9)	19.5	(6.7)	22
Glacial Sand and Gravel	(a) 'Very clayey' gravel	(0.9)	3	(7.6)	25
	Excessively 'clayey' gravel	(0.6)	2	(8.2)	27
	(b) Gravel	(7.0+)	23+	(15.2)	50

		%	mm	%	Depth below surface (ft)	Percentage		
						Fines	Sand	Gravel
(a)	Gravel	56	+ 64	0	22 - 25	27	17	56
			- 64 + 16	47				
			- 16 + 4	9				
	Sand	17	- 4 + 1	8				
			- 1 + 1/4	6				
			- 1/4 + 1/16	3				
	Fines	27	- 1/16	27				
(b)	Gravel	60	+ 64	0	27 - 30.5	10	29	61
			- 64 + 16	26	30.5 - 33.5	7	19	74
			- 16 + 4	34	33.5 - 35.5	4	43	53
				35.5 - 40	4	31	65	
	Sand	35	- 4 + 1	11	40 - 42	0	35	65
			- 1 + 1/4	18	42 - 46	3	37	60
			- 1/4 + 1/16	6	46 - 50	3	50	47
		Fines	5	- 1/16	5			

TL 71 SE 15

7604 1289

nr. Ringer's Farm

Surface level (+ 52.4 m) + 172 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 February 1967

Overburden (11.3 m) 37 ft;
 Mineral (4.7 m +) 15.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
? Brickearth	Light brown. Sandy in parts	(3.9)	13	(4.4)	14.5
Boulder Clay	Brown. Chalky	(6.9)	22.5	(11.3)	37
Glacial Sand and Gravel	'Clayey' gravel	(4.7 +)	15.5 +	(16.0)	52.5

	%	mm	%	Depth below surface (ft)	Percentage		
					Fines	Sand	Gravel
Gravel	57	+ 64	0	37 - 40	grading not available		
		- 64 + 16	30	40 - 43	6	31	63
		- 16 + 4	27	43 - 46	17	32	51
Sand	32	- 4 + 1	9	46 - 49	13	27	60
		- 1 + 1/4	16	49 - 50.5	3	32	65
		- 1/4 + 1/16	7	50.5 - 52	12	40	48
				52 - 52.5	grading not available		
Fines	11	- 1/16	11				

TL 71 SE 16 7781 1298 nr. Terling Hall

Surface level (+ 33.2 m) + 109 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 January 1967

Overburden (2.0 m) 6.5 ft;
 Mineral (4.1 m) 13.5 ft;
 Bedrock (3.0 m +) 10 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Head	Brown clay with occasional pebbles below 4.5 feet	(1.5)	5	(2.0)	6.5
? Glacial Sand and Gravel	'Clayey' gravel	(4.1)	13.5	(6.1)	20
London Clay	Brown from 20 to 25 feet, otherwise blue/grey	(3.0 +)	10 +	(9.1)	30

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	50	+ 64	6.5 - 10	25	34	41
		- 64 + 16	10 - 12	8	32	60
		- 16 + 4	12 - 14.5	5	35	60
Sand	36	- 4 + 1	14.5 - 17.5	10	23	67
		- 1 + 1/4	17.5 - 20	14	57	29
		- 1/4 + 1/16				
Fines	14	- 1/16				

TL 71 SE 17 (not displayed on the map) 7932 1310 nr. Termitt's Farm

Surface level (+ 43.3 m) + 142 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 February 1967

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.9)	3	(0.9)	3
Boulder Clay	Chalky	(5.2 +)	17 +	(6.1)	20

TL 71 SE 18 7539 1252 nr. Stock's Farm

Surface level (+ 50.9 m) + 167 ft
 Water struck at (+ 36.9 m) + 121 ft
 Wirth B 1, 8 inch diam.,
 February 1967

Overburden (8.5 m) 28 ft;
 Mineral (5.5 m) 18 ft;
 Waste (0.6 m) 2 ft;
 Bedrock (0.6 m +) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Boulder Clay	Brown. Chalky from 4.5 to 7.5 feet, otherwise no pebbles recorded	(8.0)	26.5	(8.5)	28
Glacial Sand and Gravel	Gravel	(5.5)	18	(14.0)	46
	Excessively clayey pebbly sand	(0.6)	2	(14.6)	48
London Clay		(0.6 +)	2 +	(15.2)	50

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	71	+ 64	28 - 30	30	25	45
		- 64 + 16	30 - 33	8	30	62
		- 16 + 4	33 - 35	5	25	70
Sand	23	- 4 + 1	35 - 38.5	2	25	73
		- 1 + 1/4	38.5 - 42	2	23	75
		- 1/4 + 1/16	42 - 46	2	11	87
Fines	6	- 1/16				

TL 71 SE 19

7544 1207

nr. Great Holts

Surface level (+ 42.4 m) + 139 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 February 1967

Overburden (0.5 m) 1.5 ft;
 Mineral (2.2 m) 7.5 ft;
 Bedrock (1.6 m +) 5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Glacial Sand and Gravel	Gravel	(2.2)	7.5	(2.7)	9
London Clay	Brown	(1.6 +)	5 +	(4.3)	14

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	71	+ 64	1.5 - 3	5	13	82
		- 64 + 16	3 - 5.5	10	40	50
		- 16 + 4	5.5 - 9	3	15	82
Sand	23	- 4 + 1				
		- 1 + 1/4				
		- 1/4 + 1/16				
Fines	6	- 1/16				6

TL 71 SE 20

7710 1230

nr. Lost Wood

Surface level (+ 41.8 m) + 137 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 February 1967

Overburden (5.2 m) 17 ft;
 Mineral (9.4 m) 31 ft;
 ? Bedrock (0.6 m +) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Boulder Clay	Brown. No pebbles recorded from 2 to 10 feet. With occasional pebbles and slightly chalky below 10 feet	(4.6)	15	(5.2)	17
Glacial Sand and Gravel	Gravel	(9.4)	31	(14.6)	48
? London Clay	Brown	(0.6 +)	2 +	(15.2)	50

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	49	+ 64	17 - 18	12	56	32
		- 64 + 16	18 - 19.5	23	49	28
		- 16 + 4	19.5 - 25	9	50	41
Sand	45	- 4 + 1	25 - 26	1	52	47
		- 1 + 1/4	26 - 27	3	45	52
		- 1/4 + 1/16	27 - 28.5	3	61	36
			28.5 - 33	3	36	61
Fines	6		33 - 34.5	4	36	60
			34.5 - 36.5	11	42	44
			36.5 - 40.5	1	37	62
			40.5 - 42.5	1	59	39
			42.5 - 45	1	46	53
		45 - 48	5	38	57	

TL 71 SE 21 7784 1212 nr. Hatfield Wick

Surface level (+ 24.4 m) + 80 ft
 Water struck at (+ 20.7 m) + 68 ft
 Wirth B 1, 8 inch diam.,
 January 1967

Overburden (3.7 m) 12 feet;
 Mineral (10.3 m) 34 ft;
 ? Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.5)	1.5	(0.5)	1.5
Head	Brickearth	(1.0)	3.5	(1.5)	5
	Clay with gravel	(2.2)	7	(3.7)	12
? Glacial Sand and Gravel	'Clayey' gravel	(10.3)	34	(14.0)	46
? London Clay		(0.9 +)	3 +	(14.9)	49

				Depth below	Percentage			
				surface (ft)	Fines	Sand	Gravel	
Gravel	47	mm	%	12 - 16	5	84	11	
				+ 64	0			
				- 64 + 16	24	1	25	74
Sand	41	mm	%	16 - 18	18	24	58	
				- 16 + 4	23	19	38	43
				22 - 25	19	38	43	
				25 - 30	25	59	16	
				30 - 33	13	46	41	
Fines	12	mm	%	33 - 36	2	26	72	
				36 - 40	6	21	73	
				40 - 43	3	40	57	
				43 - 46	15	34	51	

TL 71 SE 22 7877 1232 nr. Hatfield Peverel

Surface level (+ 38.1 m) + 125 ft
 Water struck at (+ 32.3 m) + 106 ft
 Wirth B 1, 8 inch diam.,
 February 1967

Waste (6.1 m) 20 ft;
 Bedrock (1.5 m +) 5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Made ground		(0.9)	3	(0.9)	3
Boulder Clay	Chalky	(4.9)	16	(5.8)	19
Glacial Sand and Gravel	Sand and Gravel	(0.3)	1	(6.1)	20
London Clay	Blue/grey	(1.5 +)	5 +	(7.6)	25

TL 71 SE 23 7734 1132 nr. Toppinghoe Hall

Surface level (+ 38.7 m) + 127 ft
 Water struck at (+ 36.9 m) + 121 ft
 Wirth B 1, 8 inch diam.,
 January 1967

Overburden (1.7 m) 5.5 ft;
 Mineral (3.5 m) 11.5 ft;
 Bedrock (2.4 m +) 8 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.8)	2.5	(0.8)	2.5
Head	Mainly brickearth with a little gravel	(0.9)	3	(1.7)	5.5
Glacial Sand and Gravel	Gravel	(3.5)	11.5	(5.2)	17
London Clay		(2.4 +)	8 +	(7.6)	25

				Depth below	Percentage		
				surface (ft)	Fines	Sand	Gravel
Gravel	50	+ 64	0	5.5 - 8.5	10	85	5
		- 64 + 16	23	8.5 - 10.5	5	44	51
		- 16 + 4	27	10.5 - 12	3	49	48
Sand	45	- 4 + 1	10	12 - 15	1	14	85
		- 1 + 1/4	30	15 - 17	3	34	63
		- 1/4 + 1/16	5				
Fines	5	- 1/16	5				

TL 71 SE 24 (not displayed on the map) 7878 1462 nr. Farding's Farm

Surface level (+ 49.7 m) + 163 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 October 1967

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Boulder Clay	Brown	(8.5 +)	28 +	(9.1)	30

TL 71 SE 25 7927 1457 nr. Farding's Farm

Surface level (+ 45.4 m) 149 ft;
 Water not struck
 Wirth B 1, 8 inch diam.,
 October 1967

Overburden (6.1 m) 20 ft;
 Mineral (5.5 m) 18 ft;
 Bedrock (1.5 m +) 5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Boulder Clay	Brown	(5.5)	18	(6.1)	20
Glacial Sand and Gravel	Gravel	(5.5)	18	(11.6)	38
London Clay	Brown	(1.5 +)	5 +	(13.1)	43

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	58	+ 64	20 - 23	9	34	57
		- 64 + 16	23 - 26	12	34	54
		- 16 + 4	26 - 29	12	35	53
Sand	33	- 4 + 1	29 - 32	9	27	64
		- 1 + 1/4	32 - 35	9	27	64
		- 1/4 + 1/16	35 - 38	5	39	56
Fines	9	- 1/16				

TL 71 SE 26 7784 1387 nr. Warner's Farm

Surface level (+ 28.7 m) + 94 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 October 1967

Waste (3.0 m) 10 ft;
 Bedrock (1.6 m +) 5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Head	Brown, sandy clay	(2.4)	8	(3.0)	10
London Clay	Brown	(1.6 +)	5 +	(4.6)	15

TL 71 SE 27

7800 1398

nr. Warner's Farm

Surface level (+ 35.1 m) + 115 ft
 No record of groundwater
 Wirth B 1, 8 inch diam.,
 October 1967

Overburden (1.5 m) 5 ft;
 Mineral (6.4 m) 21 ft;
 Bedrock (1.2 m +) 4 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Head	Brown clay	(0.9)	3	(1.5)	5
Glacial Sand and Gravel	'Clayey' sandy gravel	(6.4)	21	(7.9)	26
London Clay	Brown	(1.2 +)	4 +	(9.1)	30

			Depth below surface (ft)	Percentage		
%	mm	%		Fines	Sand	Gravel
Gravel	30	+ 64	5 - 8	17	60	23
		- 64 + 16	8 - 11	27	50	23
		- 16 + 4	11 - 14	24	40	36
Sand	52	- 4 + 1	14 - 17	20	58	22
		- 1 + 1/4	17 - 20	14	48	38
		- 1/4 + 1/16	20 - 23	10	48	42
			23 - 26	13	64	23
Fines	18	- 1/16				18

TL 71 SE 28

7546 1134

nr. Wallace's Farm

Surface level (+ 41.1 m) + 135 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 October 1967

Overburden (0.6 m) 2 ft;
 Mineral (9.8 m) 32 ft;
 Bedrock (1.8 m +) 6 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Gravel	(9.8)	32	(10.4)	34
London Clay	Brown	(1.8 +)	6 +	(12.2)	40

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	58	+ 64	2 - 5	20	37	43
		- 64 + 16	5 - 8	19	50	31
		- 16 + 4	8 - 11	8	47	45
Sand	34	- 4 + 1	11 - 14	14	39	47
		- 1 + 1/4	14 - 17	6	35	59
		- 1/4 + 1/16	17 - 20	5	21	74
			20 - 23	3	20	77
Fines	8		23 - 26	4	28	68
			26 - 29	1	30	69
		- 1/16	29 - 34	5	31	64

TL 71 SE 29

7522 1096

nr. Brick House Farm

Surface level (+ 39.0 m) + 128 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 October 1967

Overburden (3.0 m) 10 ft;
 Mineral (5.5 m) 18 ft;
 Bedrock (0.6 m +) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Boulder Clay	Brown	(2.4)	8	(3.0)	10
Glacial Sand and Gravel	'Clayey' gravel	(5.5)	18	(8.5)	28
London Clay	Brown	(0.6 +)	2 +	(9.1)	30

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	46	+ 64	10 - 13	2	62	36
		- 64 + 16	13 - 16	5	55	40
		- 16 + 4	16 - 19	10	33	57
Sand	39	- 4 + 1	19 - 22	33	35	32
		- 1 + 1/4	22 - 25	7	29	64
		- 1/4 + 1/16	25 - 28	29	24	47
		- 1/16				
Fines	15	- 1/16				15

TL 71 SE 30 7540 1091 nr. Brick House Farm

Surface level (+ 39.0 m) + 128 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 October 1967

Waste (7.9 m) 26 ft;
 Bedrock (1.2 m +) 4 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Boulder Clay	Brown	(5.5)	18	(6.1)	20
Glacial Sand and Gravel	'Very clayey' gravel	(1.8)	6	(7.9)	26
London Clay	Brown	(1.2 +)	4 +	(9.1)	30

		%		mm		%		Depth below surface (ft)		Percentage		
										Fines	Sand	Gravel
Gravel	48		+ 64		0			20 - 23		25	28	47
			- 64 + 16		23			23 - 26		37	15	48
			- 16 + 4		25							
Sand	21		- 4 + 1		5							
			- 1 + ¼		12							
			- ¼ + ⅙		4							
Fines	31		- ⅙		31							

TL 71 SE 31

7559 1095

nr. Brick House Farm

Surface level (+ 37.8 m) + 124 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 October 1967

Overburden (6.1 m) 20 ft;
 Mineral (4.6 m) 15 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Boulder Clay	Brown	(5.5)	18	(6.1)	20
Glacial Sand and Gravel	Gravel	(4.6)	15	(10.7)	35
London Clay	Brown	(0.9 +)	3 +	(11.6)	38

	%	mm	%	Depth below surface (ft)	Percentage		
					Fines	Sand	Gravel
Gravel	49	+ 64	0	20 - 23	9	37	54
		- 64 + 16	19	23 - 26	7	32	61
		- 16 + 4	30	26 - 29	8	42	50
Sand	43	- 4 + 1	8	29 - 32	8	56	36
		- 1 + 1/4	28	32 - 35	8	51	41
		- 1/4 + 1/16	7				
Fines	8	- 1/16	8				

TL 71 SE 32

7544 1066

nr. Brick House Farm

Surface level (+ 35.4 m) + 116 ft
 Water struck at (+ 27.8 m) + 91 ft
 Wirth B 1, 8 inch diam.,
 October 1967

Overburden (6.1 m) 20 ft;
 Mineral (7.3 m) 24 ft;
 Bedrock (1.8 m +) 6 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Boulder Clay	Brown	(5.5)	18	(6.1)	20
Glacial Sand and Gravel	'Clayey' sandy gravel	(7.3)	24	(13.4)	44
London Clay	Brown	(1.8+)	6+	(15.2)	50

			Depth below	Percentage		
	%	mm	surface (ft)	Fines	Sand	Gravel
Gravel	42	+ 64	20 - 23	16	58	26
		- 64 + 16	23 - 26	23	48	29
		- 16 + 4	26 - 29	14	44	42
Sand	46	- 4 + 1	29 - 32	11	42	47
		- 1 + 1/4	32 - 35	5	39	56
		- 1/4 + 1/16	35 - 38	7	61	32
			38 - 41	3	23	74
Fines	12	- 1/16	41 - 44	13	54	33

TL 71 SE 33 7563 1070 nr. Brick House Farm

Surface level (+ 35.4 m) + 116 ft
 Water not struck
 Wirth B 1, 8 inch diam.,
 October 1967

Overburden (2.7 m) 9 ft;
 Mineral (3.4 m) 11 ft;
 Bedrock (1.5 m +) 5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Boulder Clay	Sandy. No pebbles recorded below 5 feet	(2.1)	7	(2.7)	9
Glacial Sand and Gravel	'Clayey' pebbly sand	(3.4)	11	(6.1)	20
London Clay	Brown	(1.5 +)	5 +	(7.6)	25

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	17	+ 64	9 - 15	7	89	4
		- 64 + 16	15 - 20	21	45	34
		- 16 + 4				
Sand	69	- 4 + 1				
		- 1 + 1/4				
		- 1/4 + 1/16				
Fines	14	- 1/16				14

TL 71 SE 128 (a)

7536 1412

nr. Sparrow's Farm

Surface level (+ 53.3 m) + 175 ft
 Water struck at (+ 36.5 m) + 120 ft
 Wirth B O,8 inch diam.,
 November 1968

Overburden (8.5 m) 28 ft;
 Mineral (11.3 m) 37 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Boulder Clay	Brown. With sandy lenses	(1.8)	6	(2.4)	8
Glacial Sand and Gravel	Gravel	(0.6)	2	(3.0)	10
Boulder Clay	Brown. Very chalky	(5.5)	18	(8.5)	28
Glacial Sand and Gravel	Sandy gravel	(11.3)	37	(19.8)	65
London Clay	Brown at surface, otherwise blue/grey	(0.9 +)	3 +	(20.7)	68

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	41	+ 64	28 - 31	2	51	47
		- 64 + 16	31 - 34	0	47	53
		- 16 + 4	34 - 35	10	54	36
Sand	56	- 4 + 1	35 - 37	28	54	18
		- 1 + 1/4	37 - 40	0	38	62
		- 1/4 + 1/16	40 - 43	1	69	30
			43 - 46	2	71	27
Fines	3	- 1/16	46 - 49	1	52	47
			49 - 52	2	50	48
			52 - 55	2	87	11
			55 - 58	1	68	31
			58 - 61	1	49	50
			61 - 64	1	39	60
			64 - 65	17	35	48

TL 71 SE 128 (b)

7536 1412

nr. Sparrow's Farm

Surface level (+ 53.3 m) + 175 ft
 No record of groundwater
 Gryphon, 12 inch diam.,
 November 1968

Overburden (9.4 m) 31 ft;
 Mineral (11.0 m) 36 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Boulder Clay	Chalky	(8.8)	29	(9.4)	31
Glacial Sand and Gravel	Gravel	(11.0)	36	(20.4)	67
London Clay		(0.9 +)	3 +	(21.3)	70

				Depth below surface (ft)	Percentage		
	%	mm	%		Fines	Sand	Gravel
Gravel	49	+ 64	0	31 - 37.5	6	34	60
		- 64 + 16	22	37.5 - 42.5	6	24	70
		- 16 + 4	27	42.5 - 50	2	62	36
Sand	48	- 4 + 1	10	50 - 55	0	55	45
		- 1 + 1/4	28	55 - 60	0	62	38
		- 1/4 + 1/16	10	60 - 65	1	46	53
				65 - 67	0	54	46
Fines	3	- 1/16	3				

TL 71 SE 128 (c)

7536 1412

nr. Sparrow's Farm

Surface level (+ 53.3 m) + 175 ft
 Water struck at (+ 35.8 m) + 118 ft
 Shell and auger, 6 inch diam.,
 November/December 1968

Overburden (8.7 m) 28.5 ft;
 Mineral (11.0 m) 36 ft;
 Bedrock (1.0 m+) 3.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Boulder Clay	Brown from 2 to 22 feet, otherwise grey. No pebbles recorded from 2 to 12 feet. "Chalky below 12 feet	(8.1)	26.5	(8.7)	28.5
Glacial Sand and Gravel	Sandy gravel	(11.0)	36	(19.7)	64.5
London Clay	Brown	(1.0 +)	3.5 +	(20.7)	68

			Depth below surface (ft)	Percentage		
%	mm	%		Fines	Sand	Gravel
Gravel	44	+ 64	28.5 - 31.5	12	53	35
		- 64 + 16	31.5 - 34.5	0	50	50
		- 16 + 4	34.5 - 37.5	0	45	55
Sand	54	- 4 + 1	37.5 - 40.5	1	42	57
		- 1 + 1/4	40.5 - 43.5	1	76	23
		- 1/4 + 1/16	43.5 - 46.5	2	88	10
			46.5 - 49.5	0	44	56
Fines	2		49.5 - 52.5	0	46	54
			52.5 - 55.5	1	52	47
			55.5 - 58.5	0	45	55
			58.5 - 61.5	0	55	45
			61.5 - 64.5	grading not available		

TL 71 SE 128 (d)

7536 1412

nr. Sparrow's Farm

Surface level (+ 53.3 m) + 175 ft
 Water struck at (+ 37.1 m) + 122 ft
 Shell and auger, 8 inch diam.,
 December 1968

Overburden (8.8 m) 29 ft;
 Mineral (1.9 m) 6 ft;
 Waste (0.3 m) 1 ft;
 Mineral (8.5 m) 28 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Boulder Clay	Brown from 2 to 27 feet, otherwise grey	(8.2)	27	(8.8)	29
Glacial Sand and Gravel	(a) Gravel	(1.9)	6	(10.7)	35
	Grey silty clay	(0.3)	1	(11.0)	36
	(b) Gravel	(8.5)	28	(19.5)	64
London Clay	Brown at surface, otherwise blue/grey	(0.9+)	3+	(20.4)	67

				Depth below surface (ft)		Percentage			
		%	mm	%	Fines	Sand	Gravel		
(a)	Gravel	61	+ 64	0	29 - 32	0	42	58	
			- 64 + 16	27	32 - 35	2	33	65	
			- 16 + 4	34					
	Sand	38	- 4 + 1	14					
			- 1 + 1/4	23					
			- 1/4 + 1/16	1					
	Fines	1	- 1/16	1					
(b)	Gravel	72	+ 64	0	36 - 39	2	36	62	
			- 64 + 16	43	39 - 42	2	13	85	
			- 16 + 4	29	42 - 45	2	35	63	
					45 - 48	1	59	40	
	Sand	26	- 4 + 1	6	48 - 51	2	22	76	
			- 1 + 1/4	18	51 - 54	0	11	89	
			- 1/4 + 1/16	2	54 - 57	grading not available			
	Fines	2		- 1/16	2	57 - 60	3	14	83
						60 - 64	1	20	79

TL 71 SE 130 7599 1267 nr. Porridgepot Hall

Surface level (+ 51.2 m) + 168 ft
 No record of groundwater
 Gryphon, 12 inch diam.,
 December 1968

Waste (17.4 m) 57 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.4)	1.5	(0.4)	1.5
Boulder Clay	Brown from 1.5 to 30 feet, otherwise grey	(17.0)	55.5	(17.4)	57
London Clay	Brown from 57 to 59 feet, otherwise blue/grey	(0.9+)	3 +	(18.3)	60

TL 71 SE 131 7594 1015 Boreham

Surface level (+ 38.1 m) 125 ft
 Water struck at (+ 29.6 m) + 97 ft
 Shell and auger, 6 inch diam.,
 December 1968

Overburden (0.3 m) 1 ft;
 Mineral (2.1 m) 7 ft;
 Waste (0.3 m) 1 ft;
 Mineral (10.7 m) 35 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a) 'Clayey' sandy gravel	(2.1)	7	(2.4)	8
	Grey/brown clay	(0.3)	1	(2.7)	9
	(b) Gravel	(10.7)	35	(13.4)	44
London Clay	Brown from 44 to 45 feet, otherwise blue/grey	(0.9+)	3+	(14.3)	47

				Depth below surface (ft)		Percentage		
		%	mm	%	Fines	Sand	Gravel	
(a)	Gravel	33	+ 64	0	1 - 4	16	47	37
			- 64 + 16	12	4 - 8	17	52	31
			- 16 + 4	21				
Sand	50	- 4 + 1	11					
		- 1 + 1/4	32					
		- 1/4 + 1/16	7					
Fines	17	- 1/16	17					
(b)	Gravel	61	+ 64	0	9 - 12	0	50	50
			- 64 + 16	28	12 - 15	2	12	86
			- 16 + 4	33	15 - 18	3	56	41
Sand	37	- 4 + 1	13	18 - 21	0	48	52	
		- 1 + 1/4	21	21 - 24	2	43	55	
		- 1/4 + 1/16	3	24 - 27	2	37	61	
Fines	2	- 1/16	2	27 - 30	1	34	65	
				30 - 33	2	31	67	
				33 - 36	2	27	71	
				36 - 39	2	40	58	
				39 - 44	2	36	62	

TL 71 SE 132

7676 1318

nr. Terling Hall

Surface level (+ 47.5 m) + 156 ft
 No record of groundwater
 Gryphon, 12 inch diam.,
 November 1968

Overburden (7.0 m) 23 ft;
 Mineral (8.0 m) 26.5 ft;
 Bedrock (0.5 m +) 1.5 ft +

	Thickness		Depth		
	(m)	ft	(m)	ft	
Soil	(0.3)	1	(0.3)	1	
Boulder Clay	Brown. Chalky	(6.7)	22	(7.0)	23
Glacial Sand and Gravel	Sandy gravel	(8.0)	26.5	(15.0)	49.5
London Clay		(0.5 +)	1.5 +	(15.5)	51

	%	mm	%	Depth below surface (ft)	Percentage		
					Fines	Sand	Gravel
Gravel	48	+ 64	0	23 - 27.5	3	79	18
		- 64 + 16	22	27.5 - 32	1	62	37
		- 16 + 4	26	32 - 38	0	32	68
Sand	51	- 4 + 1	14	38 - 45	1	39	60
		- 1 + 1/4	30	45 - 49.5	0	54	46
		- 1/4 + 1/16	7				
Fines	1	- 1/16	1				

TL 71 SE 133 7752 1056 nr. Brakeys

Surface level (+ 39.6 m) + 130 ft
 Water struck at (+ 36.2 m) + 119 ft
 Wirth B O, 8 inch diam.,
 November 1968

Overburden (2.4 m) 8 ft;
 Mineral (3.4 m) 11 ft;
 Bedrock (0.6 m +) 2 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Head	Brown clay with a few pebbles	(2.1)	7	(2.4)	8
Glacial Sand and Gravel	Gravel	(3.4)	11	(5.8)	19
London Clay	Brown	(0.6 +)	2 +	(6.4)	21

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	61	+ 64	8 - 11	16	28	56
		- 64 + 16	11 - 14	0	33	67
		- 16 + 4	14 - 17	0	32	68
Sand	34	- 4 + 1	17 - 19	2	53	45
		- 1 + 1/4				
		- 1/4 + 1/16				
Fines	5	- 1/16				5

TL 71 SE 134 7858 1012 nr. Fairfields

Surface level (+ 32.3 m) + 106 ft
 Water struck at (+ 28.9 m) + 95 ft
 Wirth B O, 8 inch diam.,
 November 1968

Overburden (0.6 m) 2 ft;
 Mineral (5.2 m) 17 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Gravel	(5.2)	17	(5.8)	19
London Clay		(0.9 +)	3 +	(6.7)	22

			Depth below surface (ft)	Percentage		
	%	mm		Fines	Sand	Gravel
Gravel	66	+ 64	2 - 5	11	59	30
		- 64 + 16	5 - 8	0	35	65
		- 16 + 4	8 - 11	0	20	80
Sand	31	- 4 + 1	11 - 14	6	29	65
		- 1 + 1/4	14 - 17	0	12	88
		- 1/4 + 1/16	17 - 19	0	27	73
Fines	3	- 1/16				

TL 71 SE 135 7901 1327 nr. Termitt's Farm

Surface level (+ 39.0 m) + 128 ft
 No record of groundwater
 Gryphon, 12 inch diam.,
 November 1968

Waste (2.0 m) 6.5 ft;
 Bedrock (5.6 m +) 18.5 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.4)	1.5	(0.4)	1.5
Head	Clay with gravel	(1.6)	5	(2.0)	6.5
London Clay	Brown from 6.5 to 17 feet, otherwise blue/grey	(5.6 +)	18.5 +	(7.6)	25

Surface level (+ 37.2 m) + 122 ft
 Water struck at (+ 33.8 m) + 111 ft
 Wirth B O, 8 inch diam.,
 November 1968

Overburden (0.9 m) 3 ft;
 Mineral (2.5 m) 8 ft;
 Waste (3.9 m) 13 ft;
 Bedrock (0.9 m +) 3 ft +

		Thickness		Depth	
		(m)	ft	(m)	ft
Made ground		(0.9)	3	(0.9)	3
Glacial Sand and Gravel	Sandy gravel	(2.5)	8	(3.4)	11
	Grey/brown silty clay	(0.6)	2	(4.0)	13
	Sandy silt with a few pebbles	(0.6)	2	(4.6)	15
	'Very clayey' pebbly sand	(0.6)	2	(5.2)	17
? Boulder Clay	Brown from 17 to 20 feet, otherwise grey. No pebbles recorded from 17 to 20 feet. Very chalky below 20 feet	(2.1)	7	(7.3)	24
London Clay	Brown at surface, otherwise blue/grey	(0.9 +)	3 +	(8.2)	27

		%		mm		Percentage			
				Depth below surface (ft)			Fines	Sand	Gravel
Gravel	41	+ 64	0	3 - 6	2	53	45		
		- 64 + 16	19	6 - 9	10	58	32		
		- 16 + 4	22	9 - 11	2	50	48		
Sand	54	- 4 + 1	10						
		- 1 + 1/4	40						
		- 1/4 + 1/16	4						
Fines	5	- 1/16	5						

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Printed in England for Her Majesty's Stationery Office
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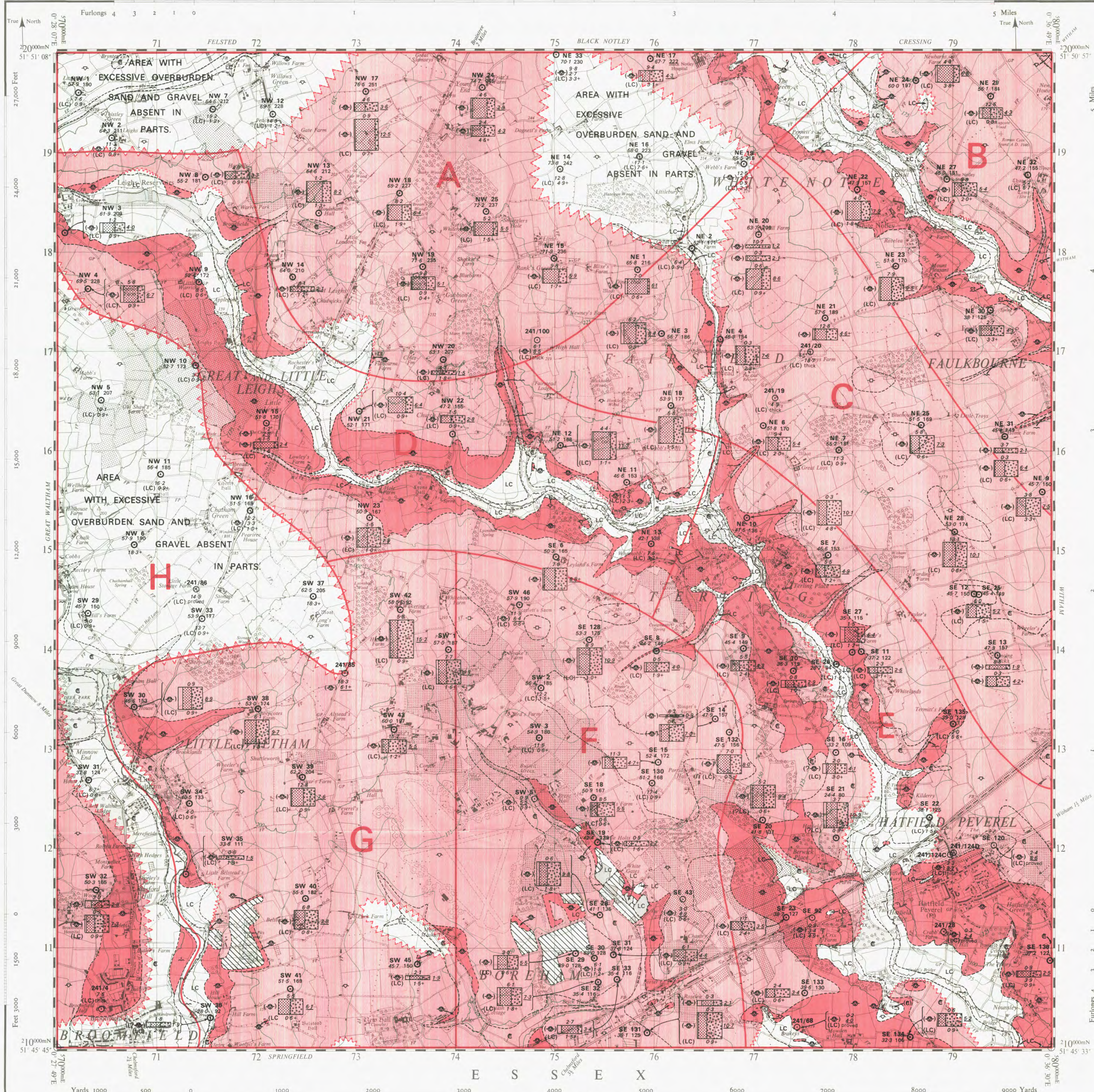
THE SAND & GRAVEL RESOURCES OF SHEET TL 71 (TERLING, ESSEX)

Scale 1:25 000 or about 2 1/2 Inches to 1 Mile

ORDNANCE SURVEY SHEET TL 71 PROVISIONAL EDITION

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

6

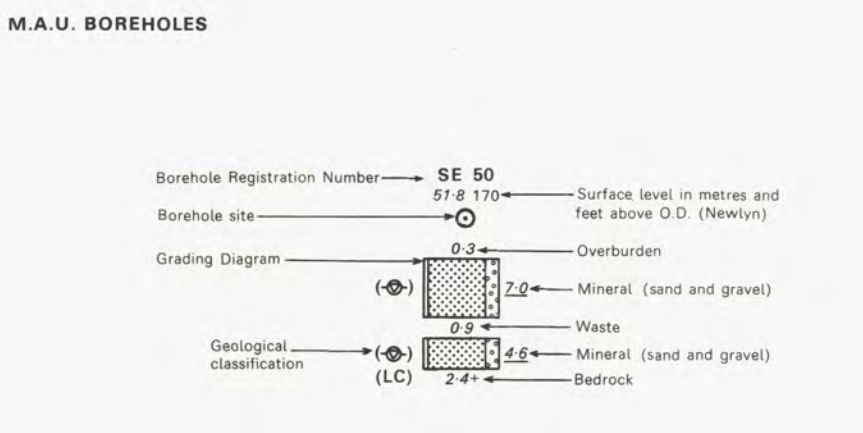


EXPLANATION OF SYMBOLS AND ABBREVIATIONS

- DRIFT**
- Calcareous Tufa. CT-2
 - Peat. P-1
 - Alluvium-silt, clay and fine sand without significant sand and gravel.
 - 1st Terrace of R. Chelmer-clayey pebbly sand and thin flint gravels.
 - Head-clayey, sandy and silty pebbly soilfluxion deposits.
 - Brickearth-fine sandy or silty loam with few stones.
 - Boulder Clay-stiff bluish grey silty and sandy clay, weathering brownish yellow, with chalk, flint and other erratic pebbles.
 - Glacial Sand and Gravel-mineral-bearing deposit: medium flint gravels and pebbly sands (Chelmsford Gravels).
- SOLID**
- London Clay-stiff grey silty clay, weathering to brown, with occasional cementstone nodules.
 - Made Ground.

- BOUNDARY LINES**
- Geological boundary, Drift.
 - Inferred or assumed boundary between recognized categories of deposits. (Size of symbol is governed only by cartographic considerations).
 - Resource Block boundary.

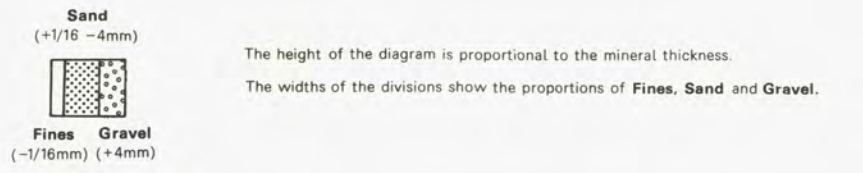
- BOREHOLE DATA**
- SITE LOCATIONS**
- Mineral Assessment Unit (M.A.U.) Boreholes.
 - Other Boreholes.



- Notes**
- Figures underlined denote thicknesses used in the assessment of resources.
 - The + sign indicates that the base of the deposit was not reached.
 - Figures in *italics* are conversions to metres of measurements recorded in feet.
 - The geological classification is given only for sand and gravel and bedrock.

Borehole Registration Number
Each M.A.U. borehole is identified by a Registration Number, eg SE 10. The letters refer to the quarter sheet and the figures to the I.G.S. serial number for the quarter. The unique designation for borehole SE 10 is TL 71 SE 10.

Grading Diagrams
Each grading diagram shows the mean particle size distribution of the samples collected from a single mineral horizon.



OTHER BOREHOLES
The layout of information is the same as for M.A.U. boreholes, although data available may not be as comprehensive. They are registered in the same series, except for records in the Hydrogeological Department: for example, 241/100 signifies Hydrogeological Department record 100 on New Series One-Inch Geological Sheet 241.

- CATEGORIES OF DEPOSITS**
- Sand and gravel outcrop, as mapped. Accepted for assessment purposes to equal mineral outcrop. CAT-EE
 - Continuous or almost continuous spreads of mineral beneath overburden. CAT-CI
 - Sand and gravel either not potentially workable (see Report) or absent. CAT-AZ

RESOURCE BLOCKS
For assessment purposes the map is divided into Resource Blocks (see Report). Each is designated by a letter.

Detailed records may be consulted on application to the Director at the appropriate offices of the Institute of Geological Sciences.

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 six-inch survey in 1966 and 1969 by C. R. Bristol and R. D. Lake. S. C. A. Holmes, District Geologist. Included in One-Inch Geological Sheets 223 and 241.

Sand and Gravel Survey by H. J. E. Haggard, E. F. P. Nickless, J. D. Ambrose, A. R. Clayton and J. A. Gray between 1967 and 1969. A. A. Archer and R. G. Thurwell, Heads, Mineral Assessment Unit.

1:25 000 Sand and Gravel Resource Sheet published 1972. Sir Kingsley Durham, D.Sc., F.R.S., Director, Institute of Geological Sciences incorporating the Geological Survey of Great Britain, the Museum of Practical Geology and Overseas Geological Surveys. 2050/172

The GRID lines on this sheet are at 1 kilometre interval. Heights are in feet above Mean Sea Level at Newlyn.
1 square inch on this map represents 99.639 acres on the ground.

Compiled from 6" sheets last fully revised 1915-20. Other partial systematic revision 1938-54 has been incorporated.

Made and published by the Director General of the Ordnance Survey, Southampton, with the addition of new major roads and reservoirs 1969.

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

		223
TL 61	TL 71	TL 81
		241
TL 60	TL 70	TL 80

Diagram showing the relation of the National Grid 1:25 000 sheets with the One-Inch Geological Sheets 223 and 241