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INSTITUTE OF GEOLOGICAL SCIENCES

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ASSESSMENT OF BRITISH SAND AND GRAVEL RESOURCES No. 9

The sand and gravel resources of the country around Attlebridge, Norfolk

Description of 1 : 25 000 resource sheet TG 11

E. F. P . Nickless, BSc

with contributions by A. R. Clayton

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PREFACE

It has become increasingly clear in recent years that an assessment of resources of many minerals should be undertaken. This Report of the Mineral Assessment Unit which was set up in May 1968 to undertake such work describes and quantifies the resources of sand and gravel of 98 km^2 of country north and westward of Norwich, shown on the accompanying 1:25 000 resource sheet TG 11.

This survey 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 large areas 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.

The survey was conducted by Mr. E. F. P. Nickless assisted by Mr. A. R. Clayton as field officer who supervised the drilling and sampling programme and helped in the preparation of data for this publication. The work is based on a geological survey at 1:10 560 in 1968-70 by Dr. F. C. Cox (East Anglia and S. E. England Field Unit) and Mr. Nickless. Dr. Cox has also helped in the geological interpretation.

Mr. J. W. Gardner, C. B. E. (Land Agent) has been responsible for negotiating access to land for drilling. The ready cooperation of land owners and tenants in this work is gratefully acknowledged. 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 September 1973

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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The geological maps of the Institute of Geological Sciences, pre-existing borehole information, and 99 boreholes drilled for the Mineral Assessment Unit form the basis of the assessment of sand and gravel resources in the Attlebridge area, Norfolk.

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

The 1:25 000 map is divided into eight resource blocks containing from 9.4 to 15.9 km^2 of sand and gravel. For each block the mineral-bearing area, the mean thickness of overburden and mineral, and the mean grading are given and the geomorphology and geology of the deposits described.

The position of the boreholes and exposures, the geology and topography and the outlines of the blocks are shown on the accompanying map TG 11. Detailed borehole data are given.

Sommaire

Les cartes géologiques de l'Institute of Geological Sciences, les renseignements sur des trous de sonde qui existaient déjà, et 99 trous de sonde forés pour le Mineral Assessment Unit, constituent la base de l'évaluation des ressources en sable et en gravier dans la région de Attlebridge, Norfolk.

Tous les dépôts dans la région, qui présentent la possibilité d'exploitation pour le sable et le gravier (mineral), ont été étudiés de point de vue géologique, et on s'est servi d'une methode statistique simple pour en évaluer le volume (cubage). Les évaluations de volume sont tenues d'être à deux côtés et à 95 pour cent exactes.

La carte 1:25 000 est divisée en huit blocs de ressources, qui comprennent entre 9.4 a 15.9 km^2 de sable et de gravier. On donne pour chaque bloc l'étendue minéralisée, l'epaisseur moyenne de recouvrement et de minéral, et la gradation moyenne. On décrit la géomorphologie et la géologie des dépôts.

La situation des trous de sonde et des affleurements, la géologie et la topographie, et la configuration des blocs sont montrées sur la carte TG 11. Des données détaillées des trous de sonde se trouvent.

Zusammenfassung

Die geologischen Karten von der Institute of Geological Sciences die vorher existierende Information im Bezug auf Bohrlochern, auch 99 Bohrlöcher, die für das Mineral Assessment Unit gemacht waren, bilden den Grund für die Einschätzung der Sand- und Schottermittel im Attlebridge Gebiet, Norfolk.

Man hat im Gebiet alle Ablagerungen, die möglich bearbeitbare für Sand und Schotter (Mineral) sind, geologisch untersucht, und man hat auch eine einfache statistische Methode benutzt, um das Volumen zu schätzen. Man gibt die Zuverlässigkeit der Volumenschatzungen mit 95 Prozent zveiseitig Vertrauensgrenzwerten.

Man teilt die 1:25 000 Karte in acht Mittlesblocke, die ein Gebiet von 9.4 bis zum 15.9 km^2 von Sand und Schotter einschliesst. Für jeden Bloch gibt man das mineralhaltige Gebiet, die Durchschnittsdiche von Überlastung und Mineral, und die Durchschnittsklassifizierung, und beschreibt die Geomorphologie und Geologie der Ablagerungen.

Man zeigt die Lage von den Bohrlöchern und Aufschlüssen, die Geologie und Topographie. auch die Skizzen von den Blöchen auf der Begleitkarte TG 11. Man gibt ausführliche Bohrlöcherdaten.

The sand and gravel resources of the country around Attlebridge, Norfolk

Description of 1:25 000 resource sheet TG 11

E. F. P. Nickless,[1] BSc

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 Ministry of Housing and Local Government and the Ministry of Public Building and Works) and is being 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 foreseable 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 km^2 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.

[1]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 sand and gravel 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 have not been drilled where reliable information was already available. Such data are held confidentially by the Institute and cannot be disclosed, although they 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, 10 km^2, 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 determined by geological boundaries; 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. The blocks are drawn provisionally before drilling begins.

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 unbiassed with respect to the geology, to ensure that the data obtained are representative of any broad trends 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. The built-up area of Norwich has been avoided, but otherwise in siting the boreholes and in the subsequent calculations, no account is taken of any factors, 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 total volume of sand and gravel 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, so that the in-situ grading can be determined, if necessary, to a depth of 100 ft (30 m) at a diameter of about 8 in (200 mm), and 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 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 ideal dimensions, as determined by the internal 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) of 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 a 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 records may be consulted at the appropriate offices of the Institute, upon application to the Director.

The methods used in estimating the volume of mineral and other statistics for each of the resource blocks are described in Appendix A and the results are quoted on p. 10.

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 this area, which was surveyed recently 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 assessment 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 TG 11) which change rapidly vertically and laterally, that local irregularities or discrepancies will be revealed by some boreholes (for example, at boreholes NW 17 and NE 61). 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 p. 1).

On TG 11 the mineral is subdivided into areas where it outcrops, and areas where it is present 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.

Areas where bedrock outcrops, 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. 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 have been inserted around areas where sand and gravel beneath cover is interpreted to be not potentially workable or absent. Such boundaries, for which a distinctive symbol is used, are drawn primarily for the purpose of volume estimation. The symbol 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 TG 11

GENERAL

The city of Norwich extends over 2 km^2 of the map and no assessment has been made for this area. The table of results (Table 1) shows that of the remaining 98 km^2, 91 km^2 are sand and gravel bearing.

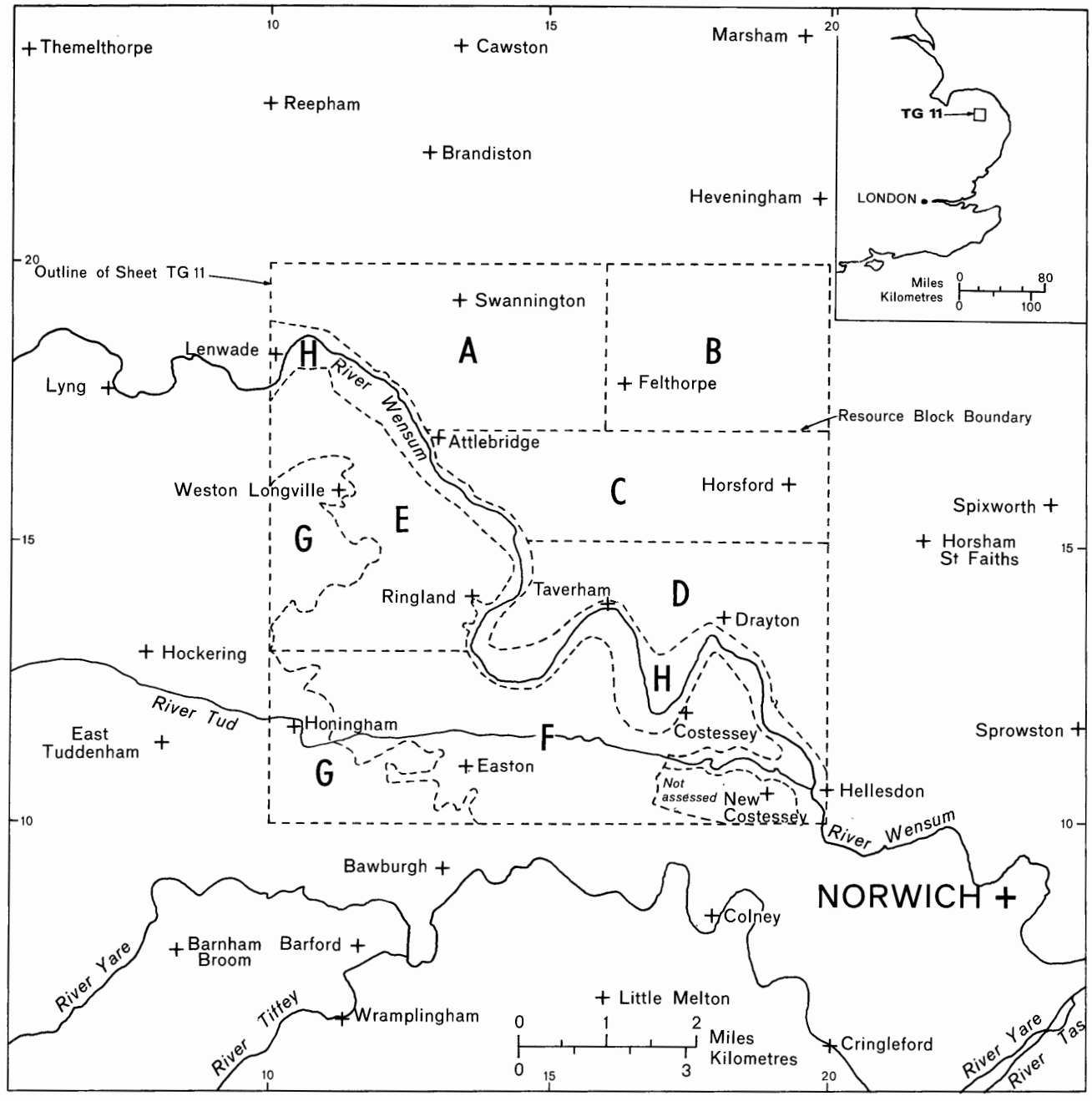


Fig. 1. Sketch map showing the location of sheet TG 11

TOPOGRAPHY

In the south-western part of the sheet, boulder clay forms a plateau at about 150 ft. Much of the remainder of the area is composed of sand and gravel, which being less resistant to erosion, forms lower ground. The chief physiographic feature of the area is the broad valley of the River Wensum. The river, which flows in a south-easterly direction, has a relatively straight course above Attlebridge Hall [138 156][1], whereas below it has developed large incised meanders.

GEOLOGY

The relationship of one bed to another is in many cases complex, but an appreciation of these complexities is essential to an understanding of the distribution of sand and gravel in this area.

The Chalk which outcrops along the sides of the valley of the River Wensum forms the bedrock to the overlying mainly unconsolidated, younger deposits, many of which are gravel bearing.

The fairly flat pre-Pleistocene surface of the Chalk, upon which the Norwich Crag lies in some places, has elsewhere been strongly and somewhat irregularly dissected by glacial and fluvial erosion, so that glacially deepened channels filled with drift deposits, including sand and gravel, are commonly overlain by more recent river deposits.

During early Pleistocene times the sea advanced across this part of Norfolk depositing a basal residual cobble bed (The Stone Bed of older authors) and the Norwich Crag. The cobble bed, up to 1 ft (0.3 m) thick consists mostly of brown coated, cobble-size flints, whose mean size varies from 4 to 12 in (100 to 300 mm). Occasionally bones and shells can be found within it. The Norwich Crag itself comprises alternations of sands, gravelly and shelly sands and thin clay seams. The clay seams are usually no more than 1 in (2.5 cm) thick.

In the area of neighbouring sheet TG 20 (Nickless, 1971) the Norwich Crag can be shown to vary in composition, both vertically and laterally. For example, at Whitlingham Pit [268 077] the Crag becomes increasingly gravelly towards its top; these gravels have been called the Bure Valley Beds or Westleton Beds (Baden-Powell and West, 1960). On this sheet, however, the Crag is uniform in composition and no such subdivision is recognisable. Although it is probable that Crag was deposited over much of the area in the form of a continuous sheet, erosion has so reduced its extent that the distribution of Crag beneath cover is difficult to determine accurately.

On sheet TG 11, exposed Norwich Crag has been recognised only at Costessey [177 119], New Costessey [east of 168 106] and north of the Wensum, eastward of Alderford, where an isolated remnant crops out between [113 190] and [121 184]. Crag is probably present over much of the eastern part of the sheet area where it is covered by later, glacial deposits.

The Pleistocene Period was punctuated by a number of glacial episodes. Several glacial advances are known in Norfolk each characterised by a sequence of boulder clays, sands and gravels and such constructional features as eskers and kames. During warmer periods when the ice-fronts retreated large spreads of sand and gravel were deposited by meltwaters; these deposits represent the major sand and gravel resources of this area.

The nature and complexity of deposition during Pleistocene times varies considerably from place to place. (For a simplified demonstration of the sequence of events throughout the Norwich area refer to Fig. 2).

The earliest indisputably glacial deposit in the sheet area is the Norwich Brickearth, a sandy clay, usually brown or orange-brown in colour, containing scattered pebbles of flint, quartz and quartzite, but locally, for example in the neighbourhood of Horsford Heath [19 18], it passes into a grey-blue sandy clay containing pebbles of chalk up to $\frac{1}{4}$ in (6 mm) in size.

The Brickearth outcrops on the eastern part of the sheet area, north of the River Wensum, where it overlies the Norwich Crag. It is thought to be a lateral equivalent of part of the North Sea Drift of the Cromer coast area of Norfolk (Woodward, 1882). The Norwich Brickearth rests on an irregular surface of the underlying beds and although it is thought to have been deposited directly from land-ice, locally it exhibits current bedding, ripple drift and dropstones (Cox and Nickless, 1972), which are features characteristic of deposition in water.

The eastern edge of the Chalky Boulder Clay runs very approximately south-south-east from Weston Longville [113 158] to Easton [135 109] and has been assumed to indicate the approximate position of the Chalky Boulder Clay ice margin (Cox and Nickless, 1972). It is probable that the Chalky Boulder Clay in the Norwich area, the product of the so-called Lowestoft Ice (which moved from the north-west or west

[1] National Grid References in this publication all lie within the 100 km square TG (63).

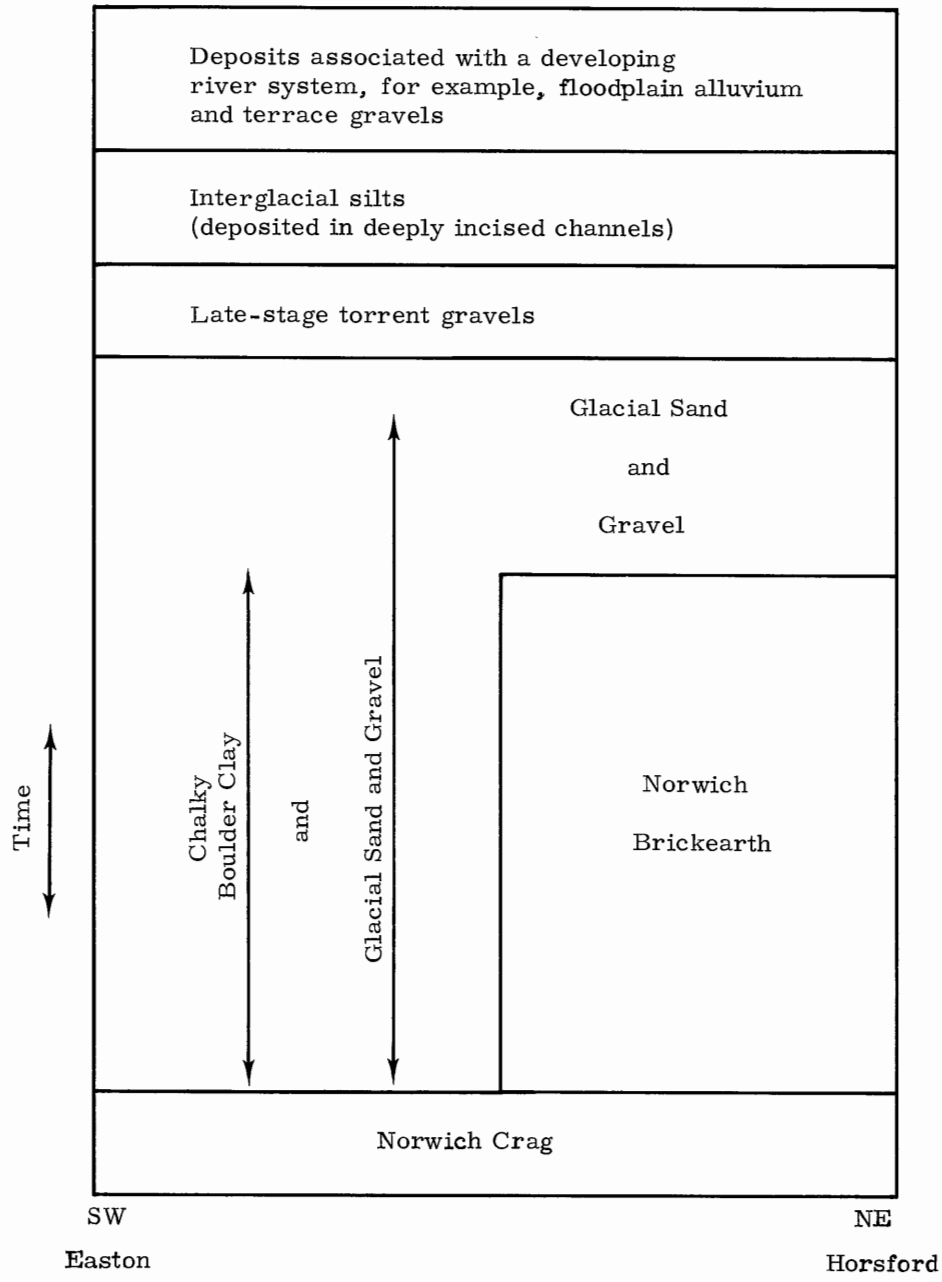
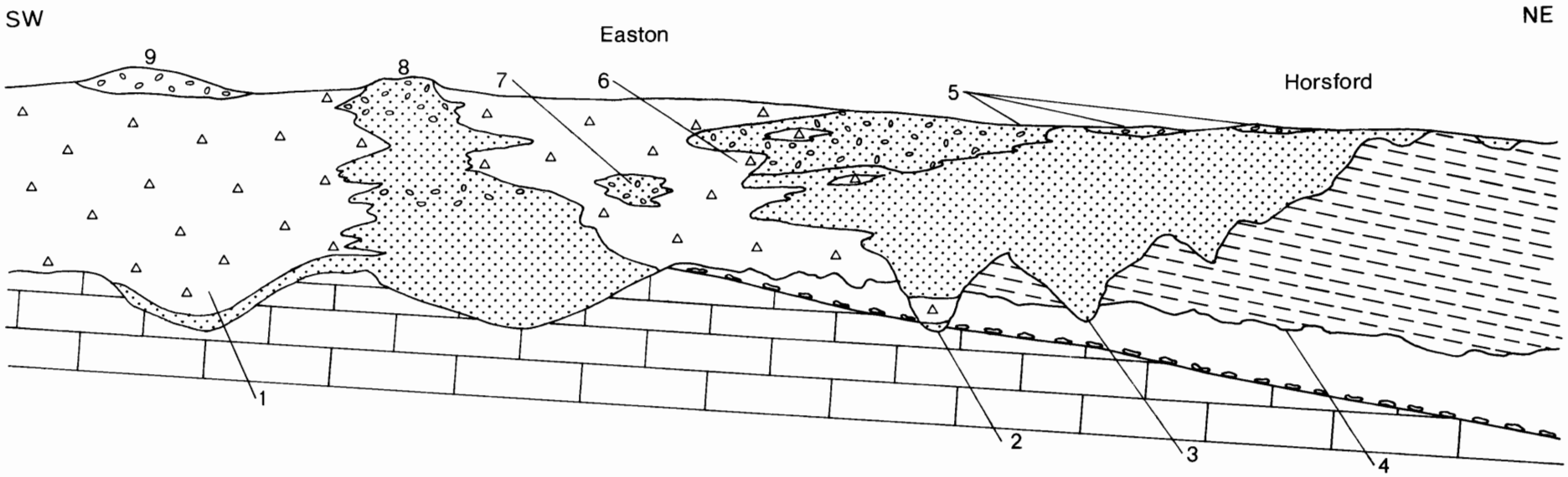


Fig. 2. Diagram to show the general relationships of Pleistocene and Recent deposits in the Norwich area

(West and Donner, 1956)) is of approximately the same age as the Norwich Brickearth, the product of the North Sea Ice (which moved from the north-east).

The Chalky Boulder Clay is a stiff bluish-grey chalky clay with pebbles, cobbles and small boulders of chalk, flint and quartzite. Other rock types are also present, mainly of Jurassic and Lower Cretaceous origin, indicating that the Chalky Boulder Clay ice sheets passed over outcrops of formations now exposed mainly in west Norfolk and Lincolnshire. Various authors (for example, Baden-Powell, 1948; West and Donner, 1956) have considered that the Chalky Boulder Clay, as a whole, is the product of two separate glaciations, the Lowestoft and the Gipping, which are separated from each other by an interglacial period, the Hoxnian. However, the existence of a Gipping glaciation is disputable, since the downward stratigraphic sequence, Gipping Boulder Clay, Hoxnian deposits, Lowestoft Boulder Clay, has not yet been demonstrated in the field (Bristow and Cox, 1973).

As the ice sheets decayed, meltwaters carried vast quantities of clay, sand and gravel



1 Deep channel beneath Chalky Boulder Clay, and infilled with glacial sand

2 Deep channel with long glacial history; shows early advance of Chalky Boulder Clay (e.g. Tud Valley)

3 Channel formed by sandy outwash from Chalky Boulder Clay; frequently cuts out all earlier drifts (e.g. Hellesdon, Drayton Areas)

4 Contact of Norwich Brickearth with Norwich Crag; shows evidence of slight channel development

5 Torrent gravels deposited at final decay stage of Chalky Boulder Clay ice

6 Margin of Boulder Clay interdigitating with outwash deposits

7 Included mass of glacial sand and gravel

8 Gravel mound, its margins interdigitating with Chalky Boulder Clay

9 High level torrent gravels

Glacial Sand and Gravel, predominantly gravelly
Glacial Sand and Gravel, predominantly sandy
Chalky Boulder Clay
Norwich Brickearth
Norwich Crag
Stone Bed
Upper Chalk

Fig. 3. Schematic section across the Chalky Boulder Clay ice front, showing the stratigraphy of the Norwich area

which were deposited beyond the ice margin, for example, in the east of the Wensum. Meanwhile boulder clay, a completely unsorted and unstratified deposit, was dumped behind and at the ice margin where the relationship of boulder clay to sand and gravel (referred to as the Glacial Sand and Gravel) is complex, for example, in that area of the sheet west of the Wensum. Around Swannington [135 191] large masses of boulder clay occur in the sand and gravel in front of the main Chalky Boulder Clay outcrop possibly indicating pulsatory movement of the ice front, although such sedimentary sequences have been explained as the products of a single retreat phase of a glacier with a thick englacial debris load (see, for example, Boulton, 1972).

The Glacial Sand and Gravel consists of poorly sorted slightly clayey sands and gravels which usually contain a little chalk, generally less than 1 per cent by weight. The proportion of sand to gravel varies considerably, vertically and laterally. In some places the sand is devoid of pebbles while in others thick beds of gravel occur.

The last phase of sand and gravel deposition is represented by late-stage, ill-sorted gravels which were rapidly deposited by torrents, the Cannon-shot gravels of Woodward (1882). They have been found to overlie the earlier sand and gravel in many localities, for example, at Deighton Hills [150 158]. The torrent gravels consist predominantly of flints but such exotic rock types as rhyolite, microgranite, felsite and porphyrite are also present.

By the end of Pleistocene time the discharging meltwaters had imposed a new drainage system (Cox and Nickless, 1972), within which a series of fluviatile deposits were formed and are still forming today. Only one terrace level is known. The grading characteristics of this terrace and of the gravels which lie beneath the present floodplains, here referred to as 'suballuvium gravels', are almost identical. They probably represent a single phase of deposition prior to downcutting and formation of the present floodplain. A thin cover of alluvium usually not more than 6.5 ft (2 m) thick forms the floodplains of the rivers.

COMPOSITION OF THE SAND AND GRAVEL DEPOSITS

There are four potentially workable mineral horizons represented in the sheet area: terrace gravels; suballuvium gravels; Glacial Sand and Gravel; Norwich Crag.

The Terrace Gravels

The terrace gravels have a mean grading of fines 8 per cent, sand 44 per cent, gravel 48 per cent (for definition of these terms see Table 3). The gravel fraction consists of fine and coarse, subangular flint. Occasionally subangular flint cobbles occur. Minor amounts of fine subrounded quartz pebbles are also present. The sand is fine and medium, with some coarse grained material. In overall composition the terrace gravels vary from sandy gravel to gravel (see Fig. 8). In two boreholes, SW 24 and SE 16, the mineral is 'clayey', that is, it contains more than 10 per cent of material, including silt grade, which passes the 200 mesh sieve.

On the data from eight sample-points the terrace gravels have a mean thickness of 16.5 ft (5 m) and are covered by a mean thickness of 2.5 ft (0.7 m) of overburden.

The Suballuvium Gravels

The suballuvium gravels have a mean grading of fines 2 per cent, sand 32 per cent, gravel 66 per cent. The gravel fraction consists predominantly of fine to coarse subangular flint with minor amounts of fine subrounded quartz and flint. The sand is medium to coarse. There is little variation in overall composition; the fines content varies from 1 to 3 per cent, the sand from 30 to 41 per cent, and the gravel from 56 to 69 per cent. The suballuvium gravels are similar in composition to the terrace gravels and may belong to the same phase of deposition.

On the data from six sample points the suballuvium gravels have a mean thickness of 8 ft (2.4 m) and are overlain by a mean thickness of 6 ft (1.8 m) of overburden.

The Glacial Sand and Gravel

The Glacial Sand and Gravel as represented in blocks B to G inclusive has a mean grading of fines 6 per cent, sand 81 per cent, gravel 13 per cent. The mean grading of the individual blocks varies from 4 to 8 per cent fines, 73 to 88 per cent sand, 5 to 19 per cent gravel.

The gravel fraction is predominantly composed of fine to coarse subangular flint with minor amounts of fine to medium subrounded quartz and flint. Cobbles of angular to subangular flint and subrounded to rounded quartzite have been recorded. Towards its base the Glacial Sand and Gravel sometimes contains scattered lumps of hard chalk. The grain size of the sand is usually fine to medium, but is occasionally coarse. The sand is predominantly of quartz with subordinate amounts of flint. It is sometimes 'clayey' or 'very clayey' and rarely contains trace amounts of chalk.

In overall composition the Glacial Sand and Gravel grades from sand to sandy gravel. From

the borehole samples studied, there appears to be a regional variation in grade, the mineral generally becoming more sandy and 'dirty' towards the north-east. On a local scale boreholes and exposures show rapid variation in grade both vertically and laterally, especially near the inferred position of the ice margin.

The Norwich Crag

The Norwich Crag as represented in blocks B and C has a mean grading of fines 5 per cent, sand 61 per cent, gravel 34 per cent. The mean grading of the individual blocks varies from 4 to 7 per cent fines, 55 to 65 per cent sand, 28 to 41 per cent gravel.

The Norwich Crag consists of alternations of sands, gravelly and shelly sands and thin clay seams. Although the presence of clay and shell may be generally regarded as deleterious for some uses, the Crag is nevertheless considered to be potentially workable.

The gravel fraction is largely composed of fine to medium, with some coarse, subangular to rounded black flint, with fine subrounded to well rounded quartz and quartzite. The sand is fine to medium with minor amounts of coarse grain size. The sand is frequently 'clayey' as in borehole NE 20 and occasionally shelly.

In overall composition the Crag grades from pebbly sand to gravel but no regional variation can be identified from the small number of sample points.

RESULTS

For methods of resource assessment see Appendix A. The results are summarised in Table 1.

Accuracy of Results

For the eight resource blocks on sheet TG 11, the accuracy of the results at the two-sided 95 per cent confidence level (that is, the probability that 19 times out of 20 the true volume present lies within the given limits of the mean) varies between 29 per cent and 53 per cent. It should be remembered, however, that the true values are more likely to be nearer the figure estimated than either of the limits. Moreover, it is probable that roughly the same percentage limits would apply for the estimate of volume of a very much smaller parcel of ground (say 200 acres) containing similar sand and gravel deposits if the results from the same number of sample-points (as provided by say 10 boreholes) were used in the calculation. Thus, if closer limits are needed for quotation of reserves of part of a block, it can be expected that data from more than 10 sample-points are required, even if the area were quite small. This point can be illustrated by considering the total potentially workable Glacial Sand and Gravel on sheet TG 11, the volume (553 million m^3) of which can be estimated to limits of $\pm$ 15 per cent at the two sided 95 per cent confidence level, by a calculation based on the data from 87 sample points spread across resource blocks B to G inclusive.

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 RESOURCE BLOCKS A TO H

Block A

Chalk outcrops sporadically along the northern side of the Wensum valley and is seen in old marl pits on Alderford Common [129 182]. South-east of Alderford, Glacial Sand and Gravel, Norwich Brickearth, Norwich Crag and Chalk occur in simple downward stratigraphic sequence; elsewhere glacial deposits rest directly on the Chalk.

In the north-west of the block from near Church Farm [103 200] to near Hingrave [129 194] Chalky Boulder Clay overlies Glacial Sand and Gravel. North and east of Swannington [134 193] the disposition of masses of boulder clay up to a kilometre or so in area suggests that they may have been caught up as 'rafts' in the sand and gravel, and may locally rest on potentially workable spreads of sand and gravel.

Most of the block is covered by Glacial Sand and Gravel and it has not been possible to delimit accurately the area of the Norwich Crag buried beneath it. Although of differing ages and origins, these deposits are intimately associated and have been assessed quantitatively as a single bed of mineral.

The thickness of overburden in boreholes proving mineral varies from nil in boreholes 147/472b, 147/409, 147/301, 147/430, 147/426 and NW 21 to 19 ft (5.8 m) in borehole NW 6, the mean value being 15 ft (4.7 m). (Nil values of overburden arise because many Hydrogeological Department borehole records showing sand and gravel at the surface make no mention of the presence of soil. Although in most instances soil or solifluxion materials or Head may be present, the original records have been followed). In boreholes NW 16 and NE 1, 68ft (20.7 m) and 48 ft (14.6 m) respectively of waste rests on Chalk, the latter borehole result conflicting with the geological map.

Table 1. The sand and gravel resources of sheet TG 11.

Statistical assessment of the Glacial Sand and Gravel resources.

Block	Area		Mean Thickness				Volume of Mineral				Mean grading percentages		
	Block	Mineral	Over-burden		Mineral		million	million	95% confid-ence level		Fines	Sand	Gravel
	km^2	km^2	m	ft	m	ft	m^3	yd^3	Limits -%	$\pm$ Vol $10^6 m^3$	-1/16 mm	-4+1/16 mm	+4 mm
B	12.0	12.0	0.7	2.5	6.5	21.5	78	102	33	26	7	88	5
C	12.6	12.5	0.9	3.0	8.4	27.5	105	137	39	41	8	73	19
D	11.7	9.4	1.0	3.5	7.5	24.5	70	92	33	23	6	85	9
E	11.7	11.2	2.0	6.5	9.8	32.0	110	144	35	39	7	78	15
F	15.9	13.0	1.9	6.0	10.0	33.0	130	170	40	52	4	81	15
G	9.4	8.7	10.0	33.0	6.9	22.5	60	79	53	32	6	85	9
Total	73.3	66.8					553	724	15	83	6	81	13

Statistical assessment of the Norwich Crag resources.

B	12.0	7.1	10.0	33.0	6.5	21.5	46	60	29	13	4	55	41
C	12.6	6.4	10.4	34.0	6.2	20.5	40	52	52	21	7	65	28
Total	24.6	13.5	10.2	33.5	6.4	21.0	86	112	25	22	5	61	34

Statistical assessment of undifferentiated Norwich Crag, Glacial Sand and Gravel and suballuvium gravel of block A.

A	14.2	14.2	4.7	15.0	5.2	17.0	74	97	53	39	9	84	7

Statistical assessment of the terrace and suballuvium gravel resources of block H excluding channel-fill deposits.

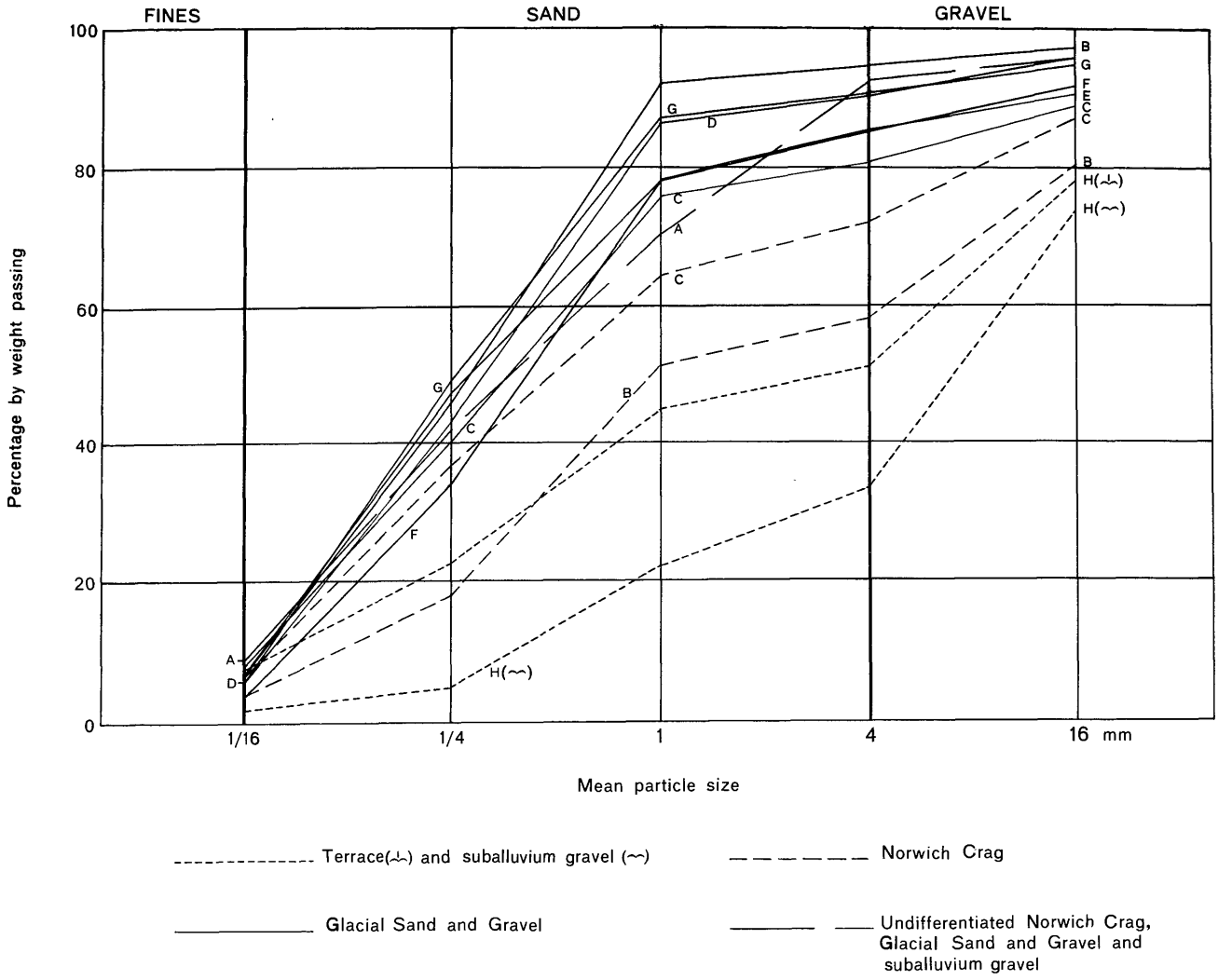
H	10.5	9.9	1.4	4.5	3.2	10.5	32	42	35	11	4	36	60

Subdivisions of block H

Terrace gravel	3.6	3.2	0.7	2.5	5.0	16.5	16	21	36	6	8	44	48
Suballuvium gravel	6.9	6.7	1.8	6.0	2.4	8.0	16	21	Speculative		2	32	66
Channel-fill deposits							C.3	C.4	Speculative				

Inferred assessments for deposits not included in statistical assessments

Lower Glacial Sand and Gravel horizon A 14.2	1.0					5	7	Speculative	10	86	4
Norwich Crag D 11.7	2.0	10.0	33.0	4.5	15.0	9	12	Speculative	6	54	40
Lower Glacial Sand and Gravel horizon E 11.7	5.6					35	46	Speculative	7	77	16



Block	Deposit	Percentage by weight passing				
		1/16 mm	1/4 mm	1 mm	4 mm	16 mm
A	Undifferentiated Norwich Crag, Glacial Sand and Gravel and suballuvium gravel	9	42	70	93	96
B	Glacial Sand and Gravel	7	46	92	95	98
	Norwich Crag	4	18	51	59	81
	Both	6	37	79	84	93
C	Glacial Sand and Gravel	8	41	76	81	89
	Norwich Crag	7	37	64	72	87
	Both	8	40	73	79	88
D	Glacial Sand and Gravel	6	43	86	91	96
E	Glacial Sand and Gravel	7	47	79	85	91
F	Glacial Sand and Gravel	4	34	79	85	92
G	Glacial Sand and Gravel	6	49	87	91	95
H	Terrace gravel (⊥)	8	23	45	52	78
	Suballuvium gravel (~)	2	5	22	34	73
	Both	4	11	30	40	73

Fig. 4. Particle size distribution for the assessed thickness of sand and gravel in the resource blocks A to H of sheet TG 11

The thickness of mineral varies from 9 ft (2.7 m) in boreholes NW 6 and NW 12 to 63 ft (19.2 m) in borehole 147/426 with a mean value of 17 ft (5.2 m). The estimate of volume is 74 million m^3 ± 53 per cent and the mean grading fines 9 per cent, sand 84 per cent, gravel 7 per cent. (All limits quoted for volume estimates are calculated for the two sided 95 per cent confidence level). No systematic variation in grading can be deduced, although an unusually high percentage of gravel was found in borehole NW 12, [1259 1872] which is sited in an un-named tributary valley to the Wensum. The mineral here resembles the terrace and suballuvium gravels of block H in grading and composition and has been classified as suballuvium gravel, rather than as Glacial Sand and Gravel. In the absence of other evidence it has not been possible to determine the extent of this deposit and to assess it separately; for convenience it has been included with the Norwich Crag and Glacial Sand and Gravel in the statistical assessment.

Borehole NW 12 also proved a glacial channel cut into the Chalk infilled with laminated clay and silt. It is thought that this channel may join that which underlies the Wensum above Attlebridge [130 168] (see block H and Fig. 5).

Borehole NW 23 proved upper, middle and lower horizons of sand and gravel the thicknesses of which are 4 ft (1.2 m), 30 ft (9.1 m) and 12 ft (3.7 m) respectively. Because the upper horizon is relatively thin and is separated from the middle horizon by 14 ft (4.3 m) of boulder clay it has not been included in the assessment.

The lower horizon of Glacial Sand and Gravel in boreholes NE 2, NE 3, 147/426 and the equivalent (lowest) horizon in borehole NW 23 has been excluded from the statistical assessment. The area defined by these four boreholes has been taken as the minimum extent of the mineral horizon, for which an inferred volume assessment is 5 million m^3 and the mean grading fines 10 per cent, sand 86 per cent, gravel 4 per cent. Owing to the sparsity of information concerning their extent, neither the second sand and gravel horizon proved in boreholes 147/393, 147/409, NW 17 and NW 21, nor a third proved only in NW 17, have been assessed.

Block B

Most of the block area is covered by Glacial Sand and Gravel which partly envelopes small patches of boulder clay north and west of Felthorpe [167 179]. Whilst in the south-east the probable downward stratigraphic sequence is Glacial Sand and Gravel, Norwich Brickearth, Norwich Crag on Upper Chalk, to the north-west the Norwich Crag is considered to be absent; the line along which it dies out cannot be precisely fixed on the evidence available. The block covers a geologically complex area where it is thought likely that the Norwich Brickearth and Chalky Boulder Clay interdigitate. In exposures and borings the tills are often difficult to identify, the Norwich Brickearth varying from brown sandy clay or silt to bluish-grey chalky clay and the Chalky Boulder Clay from bluish-grey chalky clay to brown and locally very sandy clay.

Both the Glacial Sand and Gravel and Norwich Crag are potentially workable for sand and gravel and each has been statistically assessed. The thickness of overburden on the Glacial Sand and Gravel varies from nil in borehole 147/514 to 23 ft (7 m) in borehole NE 23 with a mean value of 2.5 ft (0.7 m); the thickness of mineral varies from 3.5 ft (1 m) in borehole NE 6 to 48 ft (14.6 m) in borehole NE 11, with a mean value of 21.5 ft (6.5 m). The estimate of volume of Glacial Sand and Gravel is 78 million m^3 ± 33 per cent. Locally boreholes show the Glacial Sand and Gravel to be very clayey at the surface, for example, in boreholes NE 21 and NE 23 where 5 ft (1.5 m) of soil and 'very clayey' sand and 4 ft (1.2 m) of soil and sandy clay, respectively, were proved. For the Norwich Crag the thickness of overburden (including Glacial Sand and Gravel) varies from 19 ft (5.8 m) in borehole NE 21 to 50 ft (15.2 m) in borehole 147/251 with a mean of 33 ft (10 m); the thickness of mineral varies from 16 ft (4.9 m) in borehole NE 12 to 46 ft (14 m) in borehole 147/520 and has a mean of 21.5 ft (6.5 m). The estimate of volume of the Crag is 46 million m^3 ± 29 per cent.

The mean grading of the Glacial Sand and Gravel is fines 7 per cent, sand 88 per cent, gravel 5 per cent. Although the fines content varies markedly from 3 per cent in borehole NE 7 to 18 per cent in borehole NE 23, the gravel content is relatively constant at about 4 per cent, the only notable variation being at borehole NE 22 where 24 per cent was present. The Norwich Crag has a mean grading of fines 4 per cent, sand 55 per cent, gravel 41 per cent; whereas the fines content shows little variation, the gravel content varies from 22 per cent in borehole NE 18 to 55 per cent in borehole NE 12.

Block C

Blocks B and C are geologically very similar. However, there is less difficulty here in distinguishing Norwich

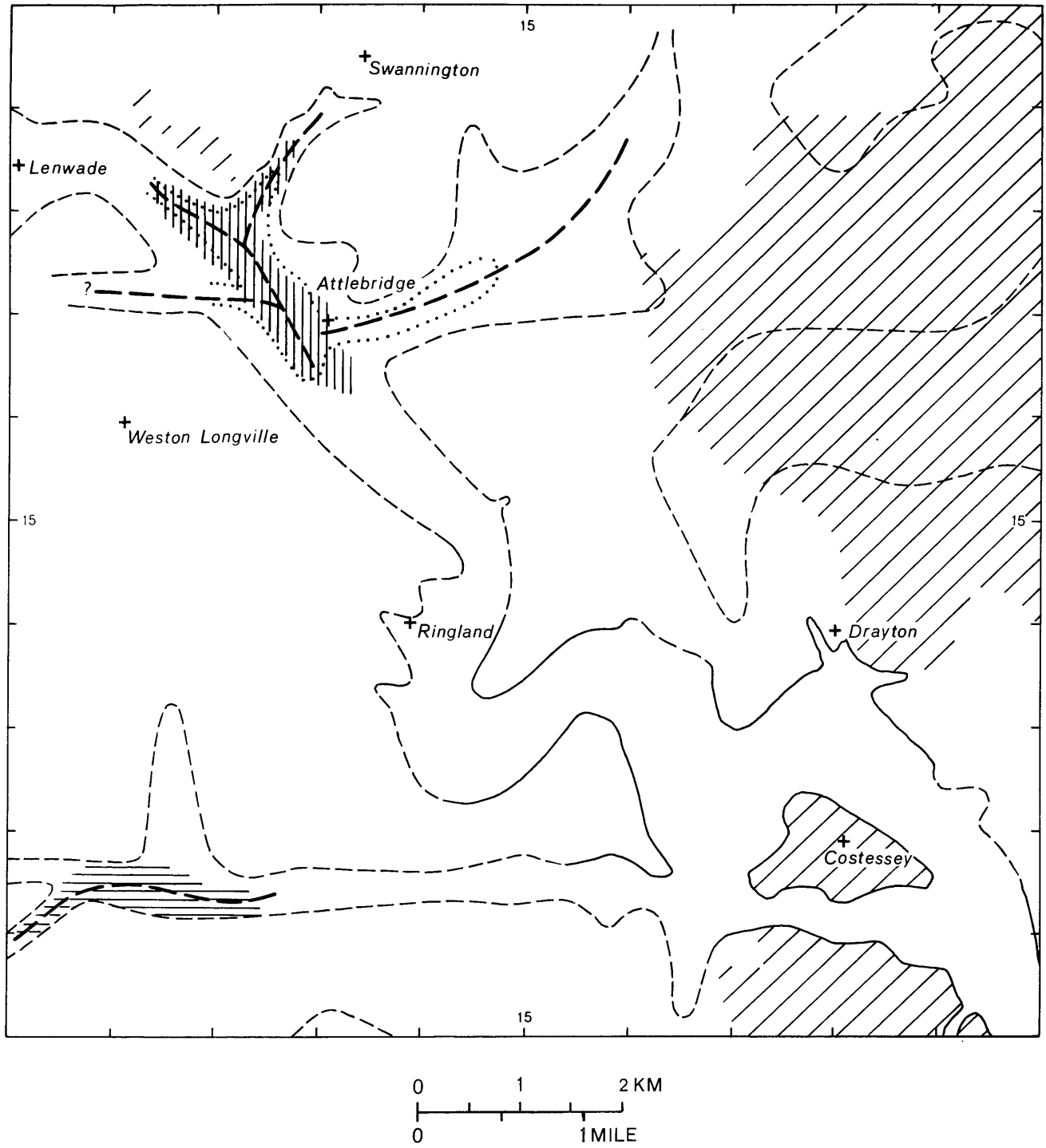


Fig. 5. Map showing the relationship of the glacial channels and their infill to the solid geology

Brickearth from Chalky Boulder Clay. Norwich Crag is present beneath a cover of glacial deposits in the eastern part of the block. The Chalk is exposed only in the old marl pits near Attlebridge Hills at [134 165] and [142 157].

Both the Glacial Sand and Gravel and Crag are potentially workable and each has been statistically assessed. For the Glacial Sand and Gravel the thickness of overburden varies from 1 ft (0.3 m) in boreholes NW 19, NE 4, NE 10 and NE 14 to 17 ft (5.2 m) in borehole NE 25 with a mean value of 3 ft (0.9 m); the mineral varies in thickness from 9 ft (2.7 m) in borehole NE 10 to 48 ft (14.6 m) in borehole 147/297 and has a mean value of 27.5 ft (8.4 m). The estimate of volume of Glacial Sand and Gravel is 105 million $m^3 \pm 39$ per cent. For the Norwich Crag the thickness of overburden (including Glacial Sand and Gravel) varies from 23 ft (7 m) in borehole NE 19 to 43 ft (13 m) in borehole NE 24 with a mean value of 34 ft (10.4 m); the thickness of mineral varies from 11 ft (3.4 m) in borehole NE 19 to 41 ft (12.5 m) in borehole NE 9 with a mean value of 20.5 ft (6.2 m). The estimate of volume of Norwich Crag is 40 million $m^3 \pm 52$ per cent.

The mean grading of the Glacial Sand and Gravel is fines 8 per cent, sand 73 per cent, gravel 19 per cent. An unusually high percentage of fines (33 per cent) was found in borehole NE 20. There appears to be some variation in grade across the block, boreholes in the west generally showing a higher mean percentage of gravel than those in the east, although borehole NW 19, the most westerly, is an exception. The Norwich Crag has a mean grading of fines 7 per cent, sand 65 per cent, gravel 28 per cent and no systematic variation in grade is discernable; an unusually high percentage of gravel (67 per cent) was found in borehole NE 24.

Block D

The Chalk, which outcrops over relatively large areas along the northern side of the valley of the Wensum, forms the bedrock. North-east of Drayton Glacial Sand and Gravel, Norwich Brickearth and Norwich Crag occur in simple downward stratigraphic sequence overlying the Chalk. Elsewhere glacial deposits have been channelled into bedrock.

The Glacial Sand and Gravel with a mean thickness of 24.5 ft (7.5 m) is locally obscured by overburden which has a mean thickness of 3.5 ft (1 m). The assessed mineral thickness varies from 3 ft (0.9 m) in borehole SE 14 to 45 ft (13.7 m) in boreholes SE 6 and SE 18. The thickness of overburden in boreholes proving mineral varies from nil in many boreholes, for example, 147/309, to 16 ft (4.9 m) in borehole 161/376. The estimate of volume of mineral is 70 million $m^3 \pm 33$ per cent.

Borehole SE 21 proved 12 ft (3.6 m) of gravelly Chalky Boulder Clay (on bedrock) rather than Glacial Sand and Gravel as mapped. Six of the boreholes shown on the map prove two horizons of Glacial Sand and Gravel separated by boulder clay except in borehole SE 10 where division is based on differing grading characteristics. Both horizons in borehole SE 10 have been included in the statistical assessment, but elsewhere the boreholes provide insufficient evidence of the extent of the second Glacial Sand and Gravel horizon on which to base an assessment.

The Glacial Sand and Gravel has a mean grading of fines 6 per cent, sand 85 per cent, gravel 9 per cent. Boreholes SW 23, SE 10 and SE 14 contain a higher percentage of fines and boreholes SW 23, SE 1, SE 11 and SE 20 a higher percentage of gravel than the mean, but no systematic variation is apparent.

There is insufficient data for a statistical assessment of the Norwich Crag which is thought to underlie approximately 2 km^2 of the north-eastern part of the block. An inferred assessment of the volume of Crag in this area is 9 million m^3, with a mean grading, based on samples from boreholes SE 13 and SE 14, of fines 6 per cent, sand 54 per cent, gravel 40 per cent.

Block E

Chalk, which is exposed in the western side of the Wensum valley, forms the bedrock to the glacial deposits which cover the remaining area of the block. Neither Norwich Crag nor Norwich Brickearth has been found. The western margin of the block has been drawn to coincide with the mapped feather edge of the Chalky Boulder Clay.

Six of the twelve boreholes in the block prove two or more horizons of sand and gravel separated by boulder clay. In borehole NW 10 the single mineral horizon has been subdivided into sandy gravel overlying sand (for definition of terms see Appendix B). Where two horizons are present, the lowest has been excluded from the statistical assessment. It is assumed, as a very rough approximation, that this horizon is present over half the sampled area of the resource block (see Appendix A), and an inferred assessment of its volume is 35 million m^3. Although the lowest horizon in borehole 161/92b occurs below 80 ft (24.4 m) from the surface, it has been included in the inferred assessment. One borehole in the block, NW 3, proved three beds of sand and gravel; because no estimate is possible of

the extent of the uppermost horizon, 3 ft (0.9 m) thick, it has not been assessed.

The statistically assessed sand and gravel (that is, the uppermost in all boreholes except NW 3) has a mean thickness of 32 ft (9.8 m) and is beneath overburden with a mean thickness of 6.5 ft (2.0 m). The assessed mineral thickness varies from 6 ft (1.8 m) in borehole NW 8 to 51 ft (15.6 m) in borehole SW 12 and the estimate of volume is 110 million m^3 ± 35 per cent. The thickness of overburden in boreholes proving mineral varies from 1 ft (0.3 m) in boreholes NW 9, SW 11, SW 12 and SW 16, where it consists of soil, to 20 ft (6.1 m) in borehole 161/92b, where soil and boulder clay are present.

Because substantial thicknesses of boulder clay were recorded in only two boreholes the calculated mean thickness of overburden for the block is high. However, it is thought that the overburden thickness commonly may not exceed 3 ft (0.9 m). The boulder clay in this block is restricted to small patches mainly in the vicinity of Telegraph Hill [117 136].

In areas such as this, with a varied and complex suite of glacial deposits, it is to be expected that mineral boreholes will reveal errors in detail in the geological maps. Thus, for example, boreholes NW 10, and SW 17 are sited on Glacial Sand and Gravel as mapped but prove 3.7 ft (1.2 m) and 7 ft (2.1 m) respectively of boulder clay overlying sand and gravel. In borehole SW 7, also sited on Glacial Sand and Gravel, the full thickness of boulder clay was not proved as the borehole was terminated at 60 ft (18.3 m).

The mean grading of the assessed Glacial Sand and Gravel is fines 7 per cent, sand 78 per cent, gravel 15 per cent. As shown by the boreholes, there is a marked variation in grading, those in the south generally containing a greater proportion of gravel and less fines. The mean grading of samples from boreholes sited north and south of the grid line 160 north is fines 12 per cent, sand 81 per cent, gravel 7 per cent and fines 5 per cent, sand 78 per cent, gravel 17 per cent based on the evidence of three and seven boreholes respectively.

The mean grading of the lower Glacial Sand and Gravel is fines 7 per cent, sand 77 per cent, gravel 16 per cent and no systematic variation in grading can be deduced.

Block F

The Chalk is exposed over considerable areas of the valley sides of the Wensum and Tud. Outcrops of Norwich Crag have been recognised only at Costessey [177 119] and New Costessey [east of 168 106] to the west of which there is no evidence for the presence of Norwich Crag. Thus the extent of buried Crag is thought to be very limited. Because of its limited extent and the lack of information on thickness and grading, the Norwich Crag has not been assessed.

Most of the block is covered by Glacial Sand and Gravel which rests directly on Chalk or Norwich Crag, Norwich Brickearth being absent. Towards the western margin of the block, which coincides with the mapped feather edge of the Chalky Boulder Clay, masses of till are partly enveloped by sand and gravel, for example, at Brickkiln Clump [125 123].

Three boreholes indicated the need for some revision of the geological map. Boreholes SE 8, SW 18 and SW 19 sited, on Glacial Sand and Gravel, as mapped, proved respectively 7 ft (2.1 m) and 16 ft (4.9 m) of boulder clay at the surface overlying mineral, and 54 ft (16.5 m) of boulder clay on bedrock. Because it has not been possible to outline a barren area, it has been necessary in estimating volume, to include the borehole where mineral was absent in the calculation of mean thickness.

A significant part of the block, 0.75 km^2, consists of made ground or is worked out, and has been excluded from the assessment. The two main areas of workings are west of Model Farm [155 121] and east of Longdell Hills [147 111].

Boreholes SE 2, SE 9, SE 17 and 161/437 prove two mineral horizons separated by boulder clay. There is insufficient evidence on which to base a realistic quantitative assessment of the lower horizon, but the mean grading of samples from three assessment boreholes is fines 6 per cent, sand 72 per cent, gravel 22 per cent. In boreholes SW 27 and SE 3 the mineral horizon has been subdivided into an upper gravelly and lower sandy horizon.

For the block as a whole, mineral with a mean thickness of 33ft (10 m) lies beneath a mean thickness of 6 ft (1.9 m) of overburden although in most assessment boreholes less than 3 ft (0.9 m) of overburden, mainly soil, was recorded. The assessed mineral thickness varies from 6 ft (1.8 m) in boreholes SE 17 and 161/177 to 80 ft (24.4 m) in borehole 161/545. The estimate of volume is 130 million m^3 ± 40 per cent. The overburden thickness in boreholes proving mineral varies from nil in boreholes 161/118, 161/177, 161/437 and 161/545 to 23 ft (7 m) in borehole 161/35a.

As in the preceeding block there are marked differences in the mean grading of mineral in individual boreholes; those located in the centre of the block generally containing more pebble grade material than others. The mean grading for the block is fines 4 per cent, sand 81 per cent, gravel 15 per cent. The mean grading of the eight assessment boreholes lying between the 133 and 160 east is fines 3 per cent, sand 75 per cent, gravel 22 per cent; the seven remaining boreholes in the block have a mean grading of fines 4 per cent, sand 81 per cent, gravel 15 per cent.

Borehole information suggests that the Tud valley west of [125 116] follows the line of a glacial channel (see Fig.5). However, it is not clear whether similar control has influenced the course of the river in its lower reaches. Boreholes indicate that the channel fill consists of alternations of clay with sand and gravel. Locally, substantial thicknesses of sand and gravel may be present but an assessment of resources is not possible.

Block G

Norwich Crag and Norwich Brickearth are absent from this area. The eastern margin of the block is determined by the mapped extent of the Chalky Boulder Clay. The relationship between the glacial deposits overlying the Chalk is complex (see Fig. 3, notes 1 and 8). Scattered patches of Glacial Sand and Gravel near Grange Lane at [111 107], [113 107], [118 105] and [123 115] are likely to be thin and to overlie boulder clay. Sand and gravel outcrops from beneath boulder clay at Honingham [105 116] and at Grange Plantation [108 110].

The valley of the Tud follows the course of a glacial channel cut into the Chalk (see Fig.5). Characteristically the channel fill consists of alternations of clay with sand and gravel, as in borehole 161/380, but occasionally of sand and gravel alone, as in borehole 161/193 where 141 ft (43 m) was proved. The longitudinal and transverse profiles are likely to be exceedingly irregular.

In the south-western corner of the map is an area where the thickness of overburden is believed generally to exceed 60 ft (18.3 m) and consequently sand and gravel that may be present is judged to be not potentially workable. The area, which may be more or less extensive than shown, has been outlined from a consideration of topography, of geological setting, and of borehole information from outside the sheet area.

Six of the 19 boreholes used in the assessment of resources proved the absence of mineral, but their distribution is such that other areas of barren ground cannot be outlined. (For cartographic reasons it is not always possible to enter all borehole information on the map. However, all mineral assessment unit data are shown). The remainder of the block has been assigned to the category of 'discontinuous spreads of sand and gravel beneath overburden'.

The results of borehole SW 5 are inconsistent with the geological map, which shows boulder clay at the surface. Drilling proved 22 ft (6.4 m) of mineral beneath the soil before boulder clay was reached. All assessment boreholes in the block proved only one mineral horizon within 80 ft (24.4 m) of the surface, but boreholes 147/326 and 147/546 proved a second bed of sand and gravel at greater depth. In borehole SW 15 the mineral has been subdivided into upper gravelly and lower sandy horizons.

Mineral of mean thickness 22.5 ft (6.9 m) lies beneath a mean thickness of 33 ft (10 m) of overburden. The assessed mineral thickness varies from 6 ft (1.8 m) in borehole 161/380 to 80 ft (24.4 m) in borehole 161/193. The thickness of overburden in boreholes proving mineral varies from nil in borehole 161/193 to 45 ft (13.7 m) in borehole 147/546. The volume of mineral is estimated to be 60 million m^3 ± 53 per cent, with a mean grading of fines 6 per cent, sand 85 per cent, gravel 9 per cent.

Block H

The limits of this block are drawn to include the terrace and floodplain gravels, both of which are potentially workable, of the Wensum and lower reaches of the Tud.

The terrace forms an easily recognisable feature standing about 6.5 ft (2 m) above the floodplain. The eight sample-points (seven of which are shown on the map) indicate that the mean thickness of the overburden, which comprises mainly soil on clay, is 2.5 ft (0.7 m); the underlying mineral has a mean thickness of 16.5 ft (5 m), and the volume of mineral is estimated to be 16 million m^3 ± 36 per cent. The mean grading is fines 8 per cent, sand 44 per cent, gravel 48 per cent.

The Wensum valley above Attlebridge [130 168] follows the course of a glacial channel cut into the Chalk. Overdeepened by subglacial meltwaters it was later the site of an early postglacial lake (Cox and Nickless, 1972). The longitudinal and transverse profiles are irregular. The deepest part of

the channel known on TG 11 is near Attlebridge, at borehole 147/513 [1305 1682] where the Chalk surface lies at 90 ft (27.4 m) below Ordnance Datum. Below Attlebridge alluvial deposits rest on the Chalk, whilst in the channel they lie on interglacial clay and silt.

Because of the substantial variations in the thicknesses of suballuvium gravels recorded from the few boreholes, some of which proved thick mineral deposits associated with the buried glacial channel, inferred assessments of the volume of channel fill and of suballuvium (flood-plain) gravels have been made. The flood-plain gravels average 8 ft (2.4 m) in thickness with an inferred volume of 16 million m^3. Their mean grading is fines 2 per cent, sand 32 per cent, gravel 66 per cent. They are overlain by an average thickness of 6 ft (1.8 m) of overburden, consisting of alluvial clay, silt, sand and peat.

In places the interglacial clay and silt fill of the buried channel above Attlebridge has been removed and substantial thicknesses of gravel deposited, as shown by boreholes NW 2 and NW 14, which proved 36 ft (11.0 m) and 29 ft (8.8 m) respectively of gravel. The volume of mineral is estimated to be of the order of 3 million m^3.

The grading of the terrace and suballuvium gravels is similar and it is probable that they represent a single phase of deposition. The combined volumes of terrace and suballuvium gravels is estimated to be 32 million m^3 $\pm$ 35 per cent with a mean grading of fines 4 per cent, sand 36 per cent, gravel 60 per cent.

In the Wensum valley, sand and gravel extraction has left large flooded areas which have been excluded from the assessment of resources. The total area of worked out ground is 0.6 km^2, terrace and suballuvium gravels having been worked over 0.4 km^2 and 0.2 km^2 respectively. The principal areas where terrace gravel was won are near Morton Warren, [1150 1805] and [1170 1775], near Blyth Wood [1450 1280] and on Costessey Common at [1580 1345], [1640 1290] and [1650 1245]: suballuvium gravel was dug near Lenwade Station [1010 1855], near Great Witchingham Hall at [1080 1850] and [1115 1840], and near Costessey Mill [1755 1275].

LIST OF QUARRIES

In May 1971, four sand and gravel quarries were known to be in operation in the area. All others are abandoned.

Table 2. List of quarries and their location

Location	Grid Reference		Worked Horizon
Working Quarries			
Near Foxburrow Plantation, Attlebridge	1460	1615	Glacial Sand and Gravel
Model Farm, Costessey	1540 1535	1210 1190	
Longdell Hills, Easton	1495	1120	
Abandoned Quarries			
Lenwade	1010	1855	Suballuvium Gravel
Near Great Witchingham Hall	1080 1115	1850 1840	
Costessey Mill	1755	1275	
The Warren, Morton	1150	1805	Terrace Gravel
Morton Warren	1170	1775	
Blyth's Wood, Taverham	1450	1280	
Costessey Common	1580 1640 1650	1345 1290 1245	
Breck Barn Farm	1240	1415	Glacial Sand and Gravel
Near Model Farm, Costessey	1500	1220	
Scotch Hill, Taverham	1580	1440	
Costessey Pit	1550	1110	

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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 km^2 and containing a minimum of five evenly-spaced boreholes.

2. If the sampled area of mineral is between 0.25 and 2 km^2 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 km^2.

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 $2\frac{1}{2}$ per cent or 1 in 40 chance that the result exceeds the stated upper limit and a corresponding $2\frac{1}{2}$ 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

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

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

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

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 $l_1, l_2, \ldots l_n$, then the best estimate of mean thickness, $\bar{l}$ =

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

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

$$S_{\bar{l}} = \frac{1}{\bar{l}} \sqrt{\frac{\sum(l - \bar{l})^2}{n\,(n-1)}}$$ where l 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 planimetering 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

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

It follows from equation (2) that

$$S_{\bar{l}} \leqslant S_V \leqslant 1.05\, S_{\bar{l}} \quad \ldots\ldots\ldots (3)$$

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:

BLOCK CALCULATION

1:25 000 Sheet } Fictitious
Block }

Area

Block: 11.08 km^2
Mineral: 8.32 km^2

Thickness

Overburden: 2.5 m
Mineral: 4.5 m

Volume

Overburden: 21 million m^3
Mineral: 38 million m^3

95 per cent confidence limits of the estimate of mineral volume

Percentage: ± 53 per cent
Units of volume: ± 20 million m^3

Thickness estimate (l = thickness)
Measurements in metres

Sample point	Weighting w	Overburden lo	Overburden wlo	Mineral lm	Mineral wlm	Remarks
SE 14	1	1.5	1.5	5.2	5.2	
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	MAU Boreholes
SE 23	1	6.2	6.2	5.7	5.7	
SE 24	1	4.3	4.3	6.5	6.5	
SE 17	½	1.2	1.6	4.2	3.9	
123/45	½	2.0		3.6		Hydrogeol. Dept. record
1	¼	2.4		3.4		
2	¼	4.5	2.5(25)*	0.8	3.6(25)*	Close group of four boreholes (commercial)
4	¼	0.4		4.3		
5	¼	2.8		6.0		
Totals	∑w = 8	∑wlo = 20.1(25)*		∑wlm = 36.3(25)*		
Averages		$\bar{l}o$ = 2.5(16)*		$\bar{l}m$ = 4.5(41)*		

Calculation of Confidence Limits

l	(l - $\bar{l}$)	(l - $\bar{l}$)^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
∑l = 36.3 (25)	∑(l - $\bar{l}$)^2 = 56.15	
n = 8		
$\bar{l}$ = 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. 6. Example of resource block assessment: statement and calculation

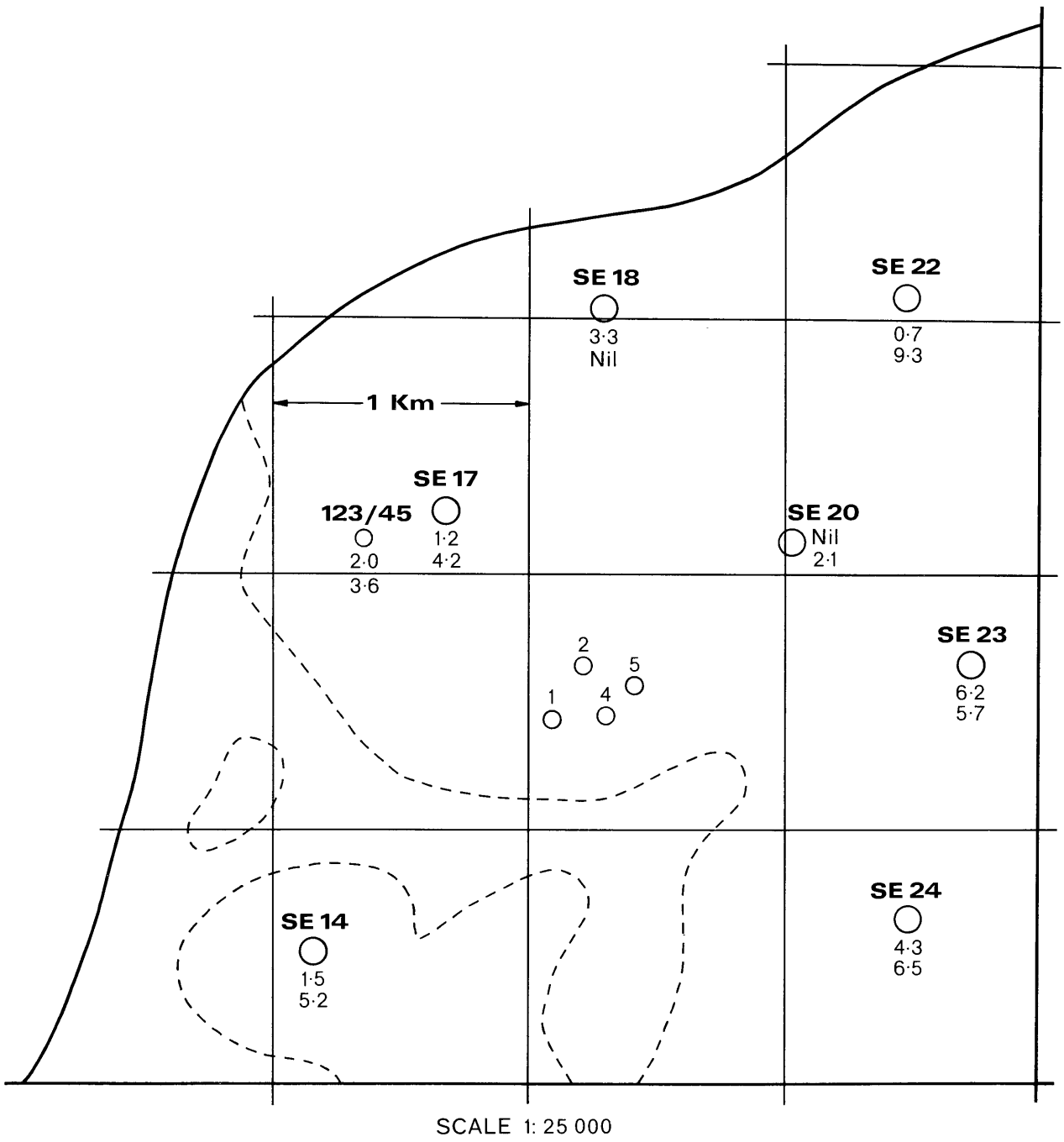


Fig. 7. Example of resource block assessment: map of a fictitious block

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:

$$L_{\bar{l}} \leqslant L_V \leqslant 1.05 \; L_{\bar{l}}$$

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

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

and when n is greater than 20, as

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

13. An illustration of the procedures outlined above is given in Figs. 6 and 7, 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 km^2 and 2 km^2 an assessment is inferred based on geological and topographical information usually supported by the data from one or two 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 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.26).

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 3, 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 (-¼ + 1/16 mm), medium (-1 + ¼ mm) and coarse (-4 +1 mm). The boundary at 16 mm distinguishes a range of finer gravel (-16 + 4 mm), often characterised by abundance of worn tough pebbles of vein quartz, from 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 1377:1967). 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, ¼ mm, 1 mm, 4 mm, 16 mm, and so on as required. Original sample grading curves are available for reference at the appropriate office of the Institute.

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

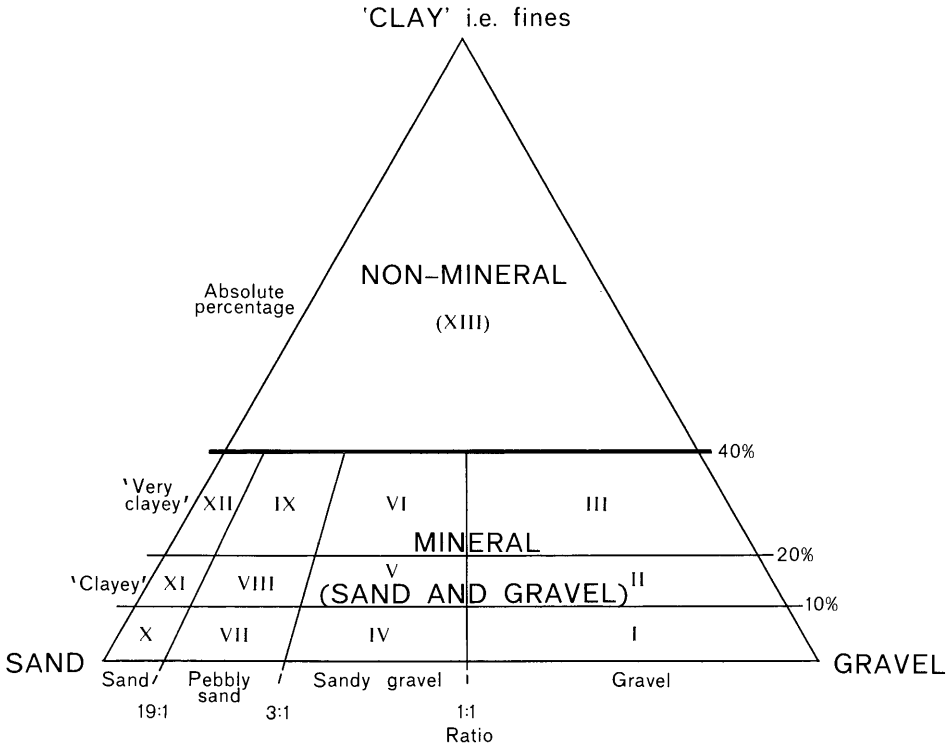
Subrounded: showing considerable wear. The edges and corners are rounded off to smooth curves. Original grain shape is still distinct.

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 3. Classification of Gravel, Sand and Fines

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



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

MINERAL

(XIII) NON-MINERAL

Fig. 8. Diagram to show the descriptive categories used in the classification of sand and gravel

Appendix C: Borehole Records

EXPLANATION

Annotated Example of a Borehole Record

TG 11 NW 4[1] 1051 1642[2] Weston Longville[3]

Surface level (+43.6 m) +142 ft[4]
Groundwater conditions not recorded[5]
Wirth B1, 8 inch diam.[6]
October 1969

Overburden[7] (4.5 m) 15 ft
Mineral (10.7 m+) 35 ft+[8]

		Thickness (m)	Thickness ft	Depth[11] (m)	Depth[11] ft
	Soil[10]	(0.9)	3	(0.9)	3
Boulder Clay[9]	Grey chalky clay	(0.9)	3	(1.8)	6
	Brown chalky clay	(2.7)	9	(4.5)	15
Glacial Sand and Gravel	Sand Gravel mainly in upper 21 ft (6.4 m). Some hard chalk fragments in upper 12 ft (3.7 m). Gravel: fine, subangular to subrounded flint. Sand: medium with fine subrounded, quartz. Yellow to orange.	(10.7+)	35+	(15.2)	50

[14] %		mm		%
		+64	:	0
Gravel	3	-64+16	:	1
		-16+4	:	2
		-4+1	:	3
Sand	95	-1+$\frac{1}{4}$	:	51
		-$\frac{1}{4}$+1/16	:	41
Fines	2	-1/16	:	2

Depth below[12] surface (ft)	Percentage[13] Fines	Sand	Gravel
15 - 18	1	92	7
18 - 21	1	96	3
21 - 24	5	89	6
24 - 27	2	88	10
27 - 30	2	98	0
30 - 33	5	92	3
33 - 36	0	94	6
36 - 39	0	99	1
39 - 42	1	99	0
42 - 45	1	95	4
45 - 48	1	99	0
48 - 50	2	98	0

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

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

1) The number of the 1:25000 sheet on which the borehole lies, for example, TG 11.
2) The quarter of the 1:25000 sheet on which the borehole lies and its number in a series for that quarter, for example, NW 4.

Thus the full Registration Number is TG 11 NW 4. Usually this is abbreviated to NW 4 in the text.

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

3. Location.
The borehole location is generally referred to the nearest named locality on the 1:25000 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 have been used in this survey; a Shell and Auger rig and Wirth B1 and B0 machines (cased power auger rigs). The type of machine, the external diameter of the casing used, and the month and year of completion of the borehole are stated.

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

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

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.
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; coarse sand, -4+1 mm; medium sand, -1+¼ mm; fine sand, -¼+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 MINERAL ASSESSMENT UNIT BOREHOLES

BOREHOLE NUMBER (by sheet quadrant)	GRID REFERENCES (all fall in 100 km square TG)	
TG 11 NW		
1	1055	1953
2	1038	1850
3	1054	1751
4	1051	1642
5	1061	1563
6	1155	1961
7	1163	1809
8	1134	1742
9	1143	1650
10	1130	1548
11	1242	1959
12	1259	1872
13	1205	1752
14	1278	1674
15	1244	1550
16	1371	1972
17	1338	1837
18	1360	1767
19	1369	1643
20	1395	1565
21	1478	1966
22	1453	1863
23	1472	1769
24	1443	1632
25	1454	1545
TG 11 NE		
1	1561	1957
2	1576	1844
3	1549	1737
4	1529	1628
5	1551	1546
6	1633	1966
7	1659	1828
8	1653	1750
9	1637	1641
10	1652	1536
11	1745	1964
12	1737	1857
13	1760	1746
14	1752	1640
15	1748	1545
16	1870	1933
17	1897	1835
18	1846	1757
19	1850	1633
20	1860	1549
21	1954	1949
22	1966	1854
23	1937	1752
24	1936	1646
25	1946	1552

BOREHOLE NUMBER	GRID REFERENCES	
TG 11 SW		
1	1042	1440
2	1065	1361
3	1057	1234
4	1064	1151
5	1064	1072
6	1136	1457
7	1164	1365
8	1175	1251
9	1188	1174
10	1158	1042
11	1253	1445
12	1243	1348
13	1234	1271
14	1267	1112
15	1235	1038
16	1350	1467
17	1317	1374
18	1352	1239
19	1319	1168
20	1361	1044
21	1423	1412
22	1418	1368
23	1459	1354
24	1428	1292
25	1436	1201
26	1437	1131
27	1441	1043
TG 11 SE		
1	1540	1480
2	1556	1279
3	1557	1205
4	1579	1061
5	1680	1464
6	1693	1384
7	1699	1248
8	1648	1116
9	1673	1030
10	1778	1453
11	1762	1359
12	1760	1267
13	1876	1461
14	1885	1383
15	1888	1330
16	1851	1229
17	1840	1177
18	1953	1453
19	1948	1335
20	1959	1245
21	1940	1201
22	1931	1122

TG 11 NW 1 10551953 Sheepwalk Plantation, Great Witchingham

Surface level (+40.5 m) +133 ft
Water not struck
Wirth B1, 8 inch diam.
December 1969

Overburden (0.6 m) 2 ft
Mineral (10.7 m) 35 ft
Waste (13.0 m+) 43 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Sand. Gravel only between 26 and 32 ft (7.9 and 9.8 m). Clayey in parts Gravel: subangular flint Sand: fine with medium, subangular; brown	(10.7)	35	(11.3)	37
Boulder Clay	Brown chalky clay	(5.8)	19	(17.1)	56
Glacial Sand and Gravel	'Clayey' sand. Gravel: fine subangular flint Sand: fine, light brown	(2.4)	8	(19.5)	64
Boulder Clay	Light brown chalky clay	(2.1)	7	(21.6)	71
Glacial Sand and Gravel	Chalk sand Gravel: fine subangular flint with some chalk pebbles Sand: fine, subangular; with coarse chalk fragments; light brown	(1.8)	6	(23.4)	77
Boulder Clay	Brown chalky clay	(0.9+)	3+	(24.3)	80

	%	mm	%
		+64	0
Gravel	2	-64+16	0
		-16+4	2
		-4+1	3
Sand	97	-1+$\frac{1}{4}$	91
		-$\frac{1}{4}$+1/16	3
Fines	1	-1/16	1

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	10	90	0
5 - 8	2	98	0
8 - 11	5	95	0
11 - 14	6	94	0
14 - 17	4	96	0
17 - 20	14	86	0
20 - 23	26	74	0
23 - 26	4	96	0
26 - 29	3	81	16
29 - 32	1	94	5
32 - 35	20	80	0
35 - 37	11	89	0

TG 11 NW 2 1038 1850 Railway Station, Lenwade

Surface level (+12. 9 m) +42 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (0. 3 m) 1 ft
Mineral (11. 0 m) 36 ft
Bedrock (0. 9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
	Soil	(0. 3)	1	(0. 3)	1
Suballuvium Gravel	Gravel. Fines almost absent Gravel: fine to coarse, sub-angular, brown flint, with traces of fine subrounded quartz and quartzite Sand: medium with coarse, sub-angular, mainly flint with chalk; brown	(11. 0)	36	(11. 3)	37
Upper Chalk	Chalk	(0. 9+)	3+	(12. 2)	40

	%	mm		%
		+64	:	0
Gravel	58	-64+16	:	26
		-16+4	:	32
		-4+1	:	15
Sand	41	-1+$\frac{1}{4}$	:	23
		-$\frac{1}{4}$+1/16	:	3
Fines	1	-1/16	:	1

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	1	40	59
4 - 7	0	36	64
7 - 10	0	36	64
10 - 13	0	39	61
13 - 16	3	36	61
16 - 19	1	82	17
19 - 22	0	43	57
22 - 25	0	41	59
25 - 28	0	28	72
28 - 31	0	35	65
31 - 34	0	37	63
34 - 37	2	43	55

TG 11 NW 3 1054 1751 The Rough Grounds, Lenwade

Surface level (+27.7 m) +91 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (0.6) 2 ft
Mineral (0.9 m) 3 ft
Waste (2.7 m) 9 ft
Mineral (6.4 m) 21 ft
Waste (0.9 m) 3 ft
Mineral (8.2 m) 27 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a) 'Clayey' pebbly sand Gravel: coarse sub-angular flint Sand: fine with medium, subangular; brown	(0.9)	3	(1.5)	5
Boulder Clay	Slightly sandy brown clay with traces of gravel	(2.7)	9	(4.2)	14
Glacial Sand and Gravel	(b) Pebbly sand. Gravel mainly in lower 6 ft (1.8 m). 'Clayey' at the top. Traces of hard chalk fragments Gravel: fine with coarse, subangular flint Sand: fine and medium, subangular; brown	(6.4)	21	(10.6)	35
Boulder Clay	Brown chalky clay	(0.9)	3	(11.5)	38
Glacial Sand and Gravel	(c) Pebbly sand. Gravel mainly in upper 12 ft (3.7 m). 'Clayey' in upper 3 ft (0.9 m). Traces of hard chalk fragments Gravel: fine and coarse subangular flint Sand: medium with fine, subangular; brown	(8.2)	27	(19.7)	65
Upper Chalk	Chalk	(0.9+)	3+	(20.6)	68

	%	mm	%
(a)		+64	0
	Gravel 17	-64+16	15
		-16+4	2
		-4+1	5
	Sand 65	-1+¼	30
		-¼+1/16	30
	Fines 18	-1/16	18
(b)		+64	0
	Gravel 7	-64+16	2
		-16+4	5
		-4+1	6
	Sand 87	-1+¼	33
		-¼+1/16	48
	Fines 6	-1/16	6
(c)		+64	0
	Gravel 9	-64+16	5
		-16+4	4
		-4+1	5
	Sand 88	-1+¼	50
		-¼+1/16	33
	Fines 3	-1/16	3

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	18	65	17
14 - 17	16	82	2
17 - 20	8	92	0
20 - 23	3	97	0
23 - 26	5	95	0
26 - 29	4	94	2
29 - 32	4	81	15
32 - 35	5	66	29
38 - 41	11	87	2
41 - 44	6	73	21
44 - 47	2	77	21
47 - 50	2	75	23
50 - 53	2	98	0
53 - 56	1	98	1
56 - 59	0	100	0
59 - 62	1	99	0
62 - 65	4	80	16

TG 11 NW 4 1051 1642 Weston Longville

Surface level (+43.6 m) + 142 ft
Groundwater conditions not recorded
Wirth B1, 8 inch diam.
October 1969

Overburden (4.5 m) 15 ft
Mineral (10.7 m+) 35 ft+

		Thickness (m)	ft	Depth (m)	ft
	Soil	(0.9)	3	(0.9)	3
Boulder Clay	Grey chalky clay	(0.9)	3	(1.8)	6
	Brown chalky clay	(2.7)	9	(4.5)	15
Glacial Sand and Gravel	Sand. Gravel mainly in upper 21 ft (6.4 m) Some hard chalk fragments in upper 12 ft (3.7 m) Gravel: fine subangular to subrounded flint. Sand: medium with fine subrounded quartz; yellow to orange.	(10.7+)	35+	(15.2)	50

%	mm		%
	+64	:	0
Gravel 3	-64+16	:	1
	-16+4	:	2
	-4+1	:	3
Sand 95	-1+$\frac{1}{4}$	:	51
	-$\frac{1}{4}$+1/16	:	41
Fines 2	-1/16	:	2

Depth below surface (ft)	Percentage Fines	Sand	Gravel
15 - 18	1	92	7
18 - 21	1	96	3
21 - 24	5	89	6
24 - 27	2	88	10
27 - 30	2	98	0
30 - 33	5	92	3
33 - 36	0	94	6
36 - 39	0	99	1
39 - 42	1	99	0
42 - 45	1	95	4
45 - 48	1	99	0
48 - 50	2	98	0

TG 11 NW 5 1061 1563 The Rectory, Weston Longville

Surface level (+47.9 m) +157 ft
Water not struck
Wirth B1, 8 inch diam.
October 1969

Waste (18.3 m+) 60 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
Boulder Clay	Soil and brown stony clay	(6.1)	20	(6.1)	20
	Brown clay	(9.1)	30	(15.2)	50
	Grey clay	(3.1+)	10+	(18.3)	60

TG 11 NW 6 1155 1961 Halfmoon Plantation, Great Witchingham

Surface level (+43.1 m) +141 ft
Water not struck
Wirth B1, 8 inch diam.
November 1969

Overburden (5.8 m) 19 ft
Mineral (2.7 m) 9 ft
Waste (15.9 m+) 52 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
Boulder Clay	Soil on slightly sandy brown clay with traces of chalk pebbles.	(1.5)	5	(1.5)	5
Glacial Sand (a) and Gravel	'Very clayey' pebbly sand. Gravel: fine, subangular flint. Sand: fine with medium, subangular; brown to orange.	(0.9)	3	(2.4)	8
Boulder Clay	Brown clay with traces of chalk fragments.	(3.4)	11	(5.8)	19
Glacial Sand (b) and Gravel	Sand. Gravel absent. Sand: fine with medium, subangular; orange.	(2.7)	9	(8.5)	28
Boulder Clay	Grey and brown chalky clays.	(10.7)	35	(19.2)	63
Glacial Sand (c) and Gravel	Sand. Gravel in lower 2 ft (0.6 m). Some hard chalk fragments.	(1.5)	5	(20.7)	68
Boulder Clay	Brown chalky clay with traces of sand.	(3.7+)	12+	(24.4)	80

	%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
		+64	: 0	5 - 8	28	68	4
(a) Gravel	4	-64+16	: 0				
		-16+4	: 4				
		-4+1	: 3				
Sand	68	-1+¼	: 19				
		-¼+1/16	: 46				
Fines	28	-1/16	: 28				
		-64	: 0	19 - 22	5	95	0
(b) Gravel	0	-64+16	: 0	22 - 25	2	98	0
		-16+4	: 0	25 - 28	1	99	0
		-4+1	: 3				
Sand	97	-1+¼	: 30				
		-¼+1/16	: 64				
Fines	3	-1/16	: 3				
		+64	: 0	63 - 66	2	98	0
(c) Gravel	2	-64+16	: 0	66 - 68	10	85	5
		-16+4	: 2				
		-4-1	: 3				
Sand	93	-1+¼	: 41				
		-¼+1/16	: 49				
Fines	5	-1/16	: 5				

TG 11 NW 7 1163 1809 Ploughed Meadow Plantation, Alderford

Surface level (+10.9 m) +36 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (1.8 m) 6 ft
Mineral (2.7 m) 9 ft
Waste (13.1 m) 43 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Alluvium	Soil and peaty brown silt and clay.	(1.8)	6	(1.8)	6
Suballuvium Gravel	Gravel Gravel: fine to coarse, subangular flint, traces of subrounded quartz and flint. Sand: medium and coarse, subangular; grey to brown.	(2.7)	9	(4.5)	15
Interglacial Deposits	Grey silt with chalk sand and traces of gravel.	(13.1)	43	(17.6)	58
Upper Chalk	Chalk	(0.9+)	3+	(18.5)	61

%	mm	%
	+64	: 0
Gravel 66	-64+16	: 33
	-16+4	: 33
	-4+1	: 13
Sand 33	-1+$\frac{1}{4}$	: 17
	-$\frac{1}{4}$+1/16	3
Fines 1	-1/16	: 1

Depth below surface (ft)	Percentage Fines	Sand	Gravel
6 - 9	1	40	59
9 - 12	0	36	64
12 - 15	1	24	75

TG 11 NW 8 1134 1742 Oak Plantation, Morton

Surface level (+27.0 m) +89 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (0.6 m) 2 ft
Mineral (1.8 m) 6 ft
Waste (3.7 m) 12 ft
Mineral (1.8 m) 6 ft
Bedrock (0.9 m+) 3 ft+

		Soil	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	'Clayey' sandy gravel. Sandy and chalky at base. Gravel: coarse with fine subangular with traces of subrounded, flint. Sand: fine and medium, subangular; brown.	(1.8)	6	(2.4)	8
Boulder Clay		Soft brown chalky clay, with traces of sand and gravel.	(3.7)	12	(6.1)	20
Glacial Sand and Gravel	(b)	'Clayey' pebbly sand. Gravel in upper 3 ft (0.9 m). Gravel: coarse, subangular flint, with subangular to subrounded chalk. Sand: fine, with traces of medium, subangular; brown.	(1.8)	6	(7.9)	26
Upper Chalk		Chalk	(0.9+)	3+	(8.8)	29

	%	mm		%	Depth below surface (ft)	Fines	Sand	Gravel
		+64	:	0	2 - 5	10	75	15
(a) Gravel	21	-64+16	:	8	5 - 8	25	69	6
		-16+4	:	3				
		-4+1	:	3				
Sand	62	-1+¼	:	30				
		-¼+1/16	:	39				
Fines	17	-1/16	:	17				
		+64	:	0	20 - 23	13	63	24
(b) Gravel	12	-64+16	:	11	23 - 26	21	79	0
		-16+4	:	1				
		-4+1	:	1				
Sand	71	-1+¼	:	13				
		-¼+1/16	:	57				
Fines	17	-1/16	:	17				

TG 11 NW 9 1143 1650 Norwich Belt, Weston Longville

Surface level (+40.4 m) +132 ft
Water not struck
Wirth B1, 8 inch diam.
December 1969

Overburden (0.3 m) 1 ft
Mineral (15.5 m) 51 ft
Waste (7.6 m+) 25 ft+

	Soil	Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	'Clayey' pebbly sand. Gravel mainly in upper half of deposit. 'Clayey' mainly in upper 18 ft (5.5 m) and lower 12 ft (3.7 m). Traces of hard chalk pebbles. Gravel: coarse, subangular to angular flint. Sand: fine with medium, subangular; brown.	(15.5)	51	(15.8)	52
Boulder Clay	Silty fine sand with traces of clay.	(0.9)	3	(16.8)	55
	Brown chalky clay	(7.6+)	25+	(24.4)	80

%	mm		%
	+64	:	0
Gravel 6	-64+16	:	4
	-16+4	:	2
	-4+1	:	3
Sand 80	-1+$\frac{1}{4}$	:	23
	-$\frac{1}{4}$+1/16	:	54
Fines 14	-1/16	:	14

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	14	36	50
4 - 7	19	72	9
7 - 10	20	65	15
10 - 13	24	72	4
13 - 16	23	62	15
16 - 19	11	89	0
19 - 22	10	90	0
22 - 25	1	92	7
25 - 28	4	96	0
28 - 31	2	98	0
31 - 34	8	92	0
34 - 37	8	92	0
37 - 40	8	92	0
40 - 43	29	71	0
43 - 46	20	80	0
46 - 49	15	85	0
49 - 52	10	90	0

TG 11 NW 10 1130 1548 Weston Longville

Surface level (+40.3 m) +132 ft
Groundwater conditions not recorded
Wirth B1, 8 inch diam.
October 1969

Overburden (1.2 m) 4 ft
Mineral (13.1 m) 43 ft
Bedrock (0.9 m+) 3 ft+

			Thickness (m)	ft	Depth (m)	ft
Boulder Clay		Soil and clay	(1.2)	4	(1.2)	4
Glacial Sand and Gravel	(a)	Sandy gravel. Traces of hard chalk fragments. Gravel: fine and coarse, subangular to angular flint. Sand: medium with fine subangular; brown.	(3.7)	12	(4.9)	16
	(b)	Sand. Gravel in the lower 4 ft (1.2 m) of the deposit. Gravel: fine subangular flint. Sand: fine with medium, subangular; brown to orange.	(9.4)	31	(14.3)	47
Upper Chalk		Chalk.	(0.9+)	3+	(15.2)	50

		%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
(a)			+64	: 0	4 - 7	3	47	50
	Gravel	40	-64+16	: 24	7 - 10	2	38	60
			-16+4	: 16	10 - 13	2	84	14
					13 - 16	0	65	35
			-4+1	: 5				
	Sand	58	-1+$\frac{1}{4}$	: 34				
			-$\frac{1}{4}$+1/16	: 19				
	Fines	2	-1/16	: 2				
(b)			+64	: 0	16 - 19	1	99	0
	Gravel	2	-64+16	: 0	19 - 22	2	98	0
			-16+4	: 2	22 - 25	5	95	0
					25 - 28	2	98	0
			-4+1	: 1	28 - 31	7	93	0
	Sand	94	-1+$\frac{1}{4}$	: 25	31 - 34	6	93	1
			-$\frac{1}{4}$+1/16	: 68	34 - 37	5	95	0
					37 - 40	3	97	0
	Fines	4	-1/16	: 4	40 - 43	1	99	0
					43 - 47	7	78	15

TG 11 NW 11 1242 1959 Kate's Lane, Hingrave

Surface level (+38.2 m) +125 ft
Water not struck
Wirth B1, 8 inch diam.
October 1969

Overburden (3.4 m) 11 ft
Mineral (3.0 m) 10 ft
Waste (8.2 m) 27 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
Boulder Clay	Soil and firm brown clay.	(3.4)	11	(3.4)	11
Glacial Sand and Gravel	Pebbly sand. Gravel mainly at base. 'Clayey' at the top. Gravel: fine subangular to subrounded, flint. Sand: fine with medium, subangular flint, iron-stained in places; orange, brown and yellow.	(3.0)	10	(6.4)	21
Boulder Clay	Brown sandy clay.	(5.5)	18	(11.9)	39
	Dark brown clay.	(2.7)	9	(14.6)	48
Upper Chalk	Chalk	(0.9+)	3+	(15.5)	51

%	mm		%
	+64	:	0
Gravel 5	-64+16	:	0
	-16+4	:	5
	-4+1	:	5
Sand 88	-1+¼	:	39
	-¼+1/16	:	44
Fines 7	-1/16	:	7

Depth below surface (ft)	Percentage Fines	Sand	Gravel
11 - 14	11	87	2
14 - 17	8	92	0
17 - 21	3	86	11

TG 11 NW 12 1259 1872 Church Farm, Alderford

Surface level (+14.5 m) +48 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (0.6 m) 2 ft
Mineral (2.7 m) 9 ft
Waste (14.0 m) 46 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
	Made ground.	(0.6)	2	(0.6)	2
Suballuvium Gravel	Gravel. Gravel: fine to coarse, subangular to subrounded flint, with some flint cobbles, traces of fine to medium subrounded quartz. Sand: medium with coarse, subangular. Slightly silty near the base; brown.	(2.7)	9	(3.3)	11
Interglacial Deposits	Dark brown to grey silty clay, with fragments of shell and some fine pebbles. Occasional hard chalk fragments near the base.	(13.1)	43	(16.4)	54
Upper Chalk	Grey chalky clay with some chalk pebbles.	(0.9)	3	(17.3)	57
	Chalk	(0.9+)	3+	(18.2)	60

%	mm		%
	+64	:	0
Gravel 71	-64+16	:	40
	-16+4	:	31
	-4+1	:	10
Sand 25	-1+$\frac{1}{4}$	:	11
	-$\frac{1}{4}$+1/16	:	4
Fines 4	-1/16	:	4

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	3	28	69
5 - 8	2	21	77
8 - 11	6	28	66

TG 11 NW 13 1205 1752 Morton Warren, Morton

Surface level (+12.9 m) +42 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (0.6 m) 2 ft
Mineral (3.7 m) 12 ft
Waste (19.2 m) 63 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil	(0.6)	2	(0.6)	2
Terrace Gravel	Gravel. 'Clayey' from 8 to 11 ft (2.4 to 3.5 m). Gravel: fine to coarse, angular to subangular flint with traces of fine subrounded quartz. Sand: medium and fine with some coarse, subangular to subrounded quartz and flint; brown.	(3.7)	12	(4.3)	14
Interglacial Deposits	Grey silty clay with traces of fine sand and hard chalk, with occasional pebbles.	(19.2)	63	(23.5)	77
Upper Chalk	Chalk	(0.9+)	3+	(24.4)	80

%	mm	%
	+64	0
Gravel 56	-64+16	23
	-16+4	33
	-4+1	7
Sand 35	-1+$\frac{1}{4}$	16
	-$\frac{1}{4}$+1/16	12
Fines 9	-1/16	9

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	6	27	67
5 - 8	7	37	56
8 - 11	18	36	46
11 - 14	4	42	54

TG 11 NW 14 1278 1674 Morton Bridge

Surface level (+11.0 m) +36 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (0.6 m) 2 ft
Mineral (8.8 m) 29 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil	(0.6)	2	(0.6)	2
Suballuvium Gravel	Gravel. 'Clayey' from 23 to 26 ft (7.0 to 7.9 m). Gravel: fine to coarse, subangular to subrounded, brown and black flint, some subangular white flint and fine subrounded quartz; traces of quartz and quartzite cobbles in lower half of deposit. Sand: medium with coarse, subrounded quartz, with subangular to subrounded flint; brown to grey.	(8.8)	29	(9.5)	31
Upper Chalk	Chalk	(0.9+)	3+	(10.4)	34

%	mm	:	%
	+64	:	0
Gravel 56	-64+16	:	26
	-16+4	:	30
	-4+1	:	13
Sand 41	-1+$\frac{1}{4}$	:	23
	-$\frac{1}{4}$+1/16	:	5
Fines 3	-1/16	:	3

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	6	56	38
5 - 8	1	35	64
8 - 11	1	37	62
11 - 14	1	35	64
14 - 17	1	54	45
17 - 20	1	35	64
20 - 23	0	53	47
23 - 26	12	46	42
26 - 29	8	25	67
29 - 31	3	26	71

TG 11 NW 15 1244 1550 Morton Hall

Surface level (+37.9 m) +125 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (0.3 m) 1 ft
Mineral (11.0 m) 36 ft
Waste (3.4 m) 11 ft
Mineral (7.0 m) 23 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
	Soil	(0.3)	1	(0.3)	1
Glacial Sand (a) and Gravel	Pebbly sand. Gravel mainly in lower 15 ft (4.6 m). Traces of hard chalk in upper half of deposit. 'Clayey' from 25 to 31 ft (7.6 to 9.4 m). Gravel: fine and coarse, subangular, flint with quartz. Sand: medium with fine, subangular; brown.	(11.0)	36	(11.3)	37
Boulder Clay	Brown chalky clay with bands of fine sand.	(3.3)	11	(14.6)	48
Glacial Sand (b) and Gravel	'Clayey' pebbly sand. Gravel mainly in lower 5 ft (1.5 m) of deposit. 'Clayey' from 57 to 60 ft (17.4 to 18.3 m). Gravel: fine and coarse, subangular to subrounded flint, traces of quartz and quartzite. Sand: medium with fine, subangular. Traces of hard chalk near the top; light brown.	(5.2)	17	(19.8)	65
Upper Chalk	Chalk	(0.9+)	3+	(20.7)	68

	%	mm		%
		+64	:	0
(a) Gravel	22	-64+16	:	11
		-16+4	:	11
		-4+1	:	5
Sand	73	-1+$\frac{1}{4}$	:	38
		-$\frac{1}{4}$+1/16	:	30
Fines	5	-1/16	:	5
		+64	:	0
(b) Gravel	19	-64+16	:	11
		-16+4	:	8
		-4+1	:	6
Sand	70	-1+$\frac{1}{4}$	:	43
		-$\frac{1}{4}$+1/16	:	21
Fines	11	-1/16	:	11

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	7	87	6
4 - 7	2	52	46
7 - 10	3	96	1
10 - 13	1	98	1
13 - 16	2	98	0
16 - 19	1	99	0
19 - 22	0	97	3
22 - 25	1	84	15
25 - 28	16	46	38
28 - 31	13	43	44
31 - 34	9	38	53
34 - 37	5	39	56
48 - 51	12	58	30
51 - 54	2	98	0
54 - 57	2	92	6
57 - 60	30	66	4
60 - 63	14	58	28
63 - 65	2	46	52

TG 11 NW 16 1371 1972 Swannington

Surface level (+36.0 m) +118 ft
Water struck at (+27.4 m) +90 ft
Wirth B1, 8 inch diam.
November 1969

Waste (20.7 m) 68 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
	Soil	(0.3)	1	(0.3)	1
Boulder Clay	Brown sandy clay	(4.6)	15	(4.9)	16
	Brown chalky clay	(3.0)	10	(7.9)	26
Glacial Sand and Gravel	'Clayey' sand. Gravel absent. Sand: medium with fine, subangular to subrounded; orange to brown	(0.6)	2	(8.5)	28
Boulder Clay	Brown clay with shell fragments	(1.8)	6	(10.3)	34
	Grey chalky clay with comminuted shell debris	(9.8)	32	(20.1)	66
? Norwich Crag	Sandy gravel Gravel: fine, subrounded to well-rounded flint, traces of subrounded quartz. Sand: medium and fine subrounded to subangular quartz, traces of subangular to angular flint; silver-grey.	(0.6)	2	(20.7)	68
Upper Chalk	Chalk.	(0.9+)	3+	(21.6)	71

TG 11 NW 17 1338 1837 Near Alderford Common

Surface level (+34.8 m) +114 ft
Water not struck
Wirth B1, 8 inch diam.
September 1969

Overburden (1.2 m) 4 ft
Mineral (5.5 m) 18 ft
Waste (4.9 m) 16 ft
Mineral (2.7 m) 9 ft
Waste (3.4 m) 11 ft
Mineral (4.0 m) 13 ft
Bedrock (0.9 m+) 3 ft

			Thickness (m)	ft	Depth (m)	ft
		Soil.	(1.2)	4	(1.2)	4
Glacial Sand and Gravel	(a)	Pebbly sand. Gravel in lower half of deposit. 'Clayey', in lower 6 ft (1.8 m). Gravel: fine subrounded to well-rounded flint with quartzite. Sand: fine with medium, subangular to subrounded quartz; yellow to brown.	(5.5)	18	(6.7)	22
Boulder Clay		Brown chalky clay.	(4.9)	16	(11.6)	38
Glacial Sand	(b)	'Clayey' pebbly sand. 'Clayey' mainly in upper 3 ft (0.9 m). Gravel concentrated in lower 3 ft (0.9 m). Gravel: fine and coarse, subrounded to rounded black flint, with subrounded to rounded quartz. Fine gravel is predominant at the top of the deposit, coarse gravel is predominant at the base. Sand: fine and medium, subangular to subrounded, mainly quartz; silver-grey.	(2.7)	9	(14.3)	47
Boulder Clay		Brown sandy clay.	(3.4)	11	(17.7)	58
Glacial Sand and Gravel	(c)	Sandy gravel. 'Clayey' between 61 and 67 ft (18.6 and 20.4 m). Gravel: coarse with fine, subrounded to rounded flint with quartz, traces of quartzite. Sand: medium with fine, subrounded and subangular, mainly quartz; silver-grey.	(4.0)	13	(21.7)	71
Upper Chalk		Chalk.	(0.9+)	3+	(22.6)	74

		%	mm		%	Depth below surface (ft)	Fines	Percentage Sand	Gravel
(a)			+64	:	0	4 - 7	4	96	0
	Gravel	6	-64+16	:	1	7 - 10	1	99	0
			-16+4	:	5	10 - 13	3	97	0
						13 - 16	5	75	20
			-4+1	:	2	16 - 19	22	78	0
	Sand	84	-1+$\frac{1}{4}$	:	32	19 - 22	26	60	14
			-$\frac{1}{4}$+1/16	:	50				
	Fines	10	-1/16	:	10				

		%	mm		%	Depth below surface (ft)	Fines	Percentage sand	Gravel
(b)			+64	:	0	38 - 41	24	74	2
	Gravel	11	-64+16	:	9	41 - 44	1	99	0
			-16+4	:	2	44 - 47	3	56	31
			-4+1	:	4				
	Sand	76	-1+$\frac{1}{4}$	:	38				
			-$\frac{1}{4}$+1/16	:	34				
	Fines	13	-1/16	:	13				
(c)			+64	:	0	58 - 61	1	44	55
	Gravel	43	-64+16	:	28	61 - 64	18	50	32
			-16+4	:	15	64 - 67	15	51	34
						67 - 70	1	44	55
			-4+1	:	7	70 - 71	6	58	36
	Sand	49	-1+$\frac{1}{4}$	:	27				
			-$\frac{1}{4}$+1/16	:	15				
	Fines	8	-1/16	:	8				

TG 11 NW 18 1360 1767 Near Breck Farm, Attlebridge

Surface level (+34. 7 m) +114 ft
Water not struck
Wirth B1, 8 inch diam.
September 1969

Overburden (0. 5 m) 1. 5 ft
Mineral (3. 0 m) 10 ft
Waste (13. 4 m) 40. 5 ft
Bedrock (0. 9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil	(0. 5)	1. 5	(0. 5)	1. 5
Glacial Sand and Gravel	Sand. Gravel only between 4. 5 and 7. 5 ft (1. 4 and 2. 3 m). Gravel: fine to coarse, angular flint. Sand: medium with fine, subangular to subrounded quartz; silver to yellow.	(3. 0)	10	(3. 5)	11. 5
Boulder Clay	Soft brown clay.	(3. 8)	12. 5	(7. 3)	25
	Brown earthy clay with chalk fragments.	(4. 6)	15	(11. 9)	39
	Firm brown clay.	(4. 0)	13	(15. 9)	52
Upper Chalk	Chalk.	(0. 9+)	3+	(16. 8)	55

%	mm	%
	+64	: 0
Gravel 2	-64+16	: 1
	-16+4	: 1
	-4+1	: 2
Sand 96	-1+$\frac{1}{4}$	: 55
	-$\frac{1}{4}$+1/16	: 39
Fines 2	-1/16	: 2

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1. 5 - 4. 5	4	96	0
4. 5 - 7. 5	2	92	6
7. 5 - 11. 5	0	100	0

TG 11 NW 19 1369 1643 Attlebridge Hills

Surface level (+34. 9 m) +115 ft
Water not struck
Wirth B1, 8 inch diam.
October 1969

Overburden (0. 3 m) 1 ft
Mineral (13. 7 m) 45 ft
Waste (1. 2 m) 4 ft
Mineral (9. 1 m+) 30 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil	(0. 3)	1	(0. 3)	1
Glacial Sand and Gravel	(a)	Sand. Gravel only in top 6 ft (1. 8 m). Gravel: fine, subangular with subrounded flint and occasional hard chalk. Sand: fine with medium, subangular to subrounded, mainly quartz with flint; orange to brown.	(13. 7)	45	(14. 0)	46
Boulder Clay		Brown chalky clay.	(1. 2)	4	(15. 2)	50
Glacial Sand and Gravel	(b)	Sand. Gravel absent. 'Clayey' in upper 9 ft (2. 7 m). Sand: fine with medium, subangular to subrounded, mainly flint with quartz and chalk; yellow.	(9. 1+)	30+	(24. 3)	80

	%	mm		%
		+64	:	0
(a) Gravel	1	-64+16	:	0
		-16+4	:	1
		-4+1	:	2
Sand	94	-1+¼	:	40
		-¼+1/16	:	52
Fines	5	-1/16	:	5
		+64	:	0
(b) Gravel	0	-64+16	:	0
		-16+4	:	0
		-4+1	:	4
Sand	95	-1+¼	:	31
		-¼+1/16	:	60
Fines	5	-1/16	:	5

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	2	94	4
4 - 7	0	91	9
7 - 10	2	98	0
10 - 13	3	97	0
13 - 16	11	89	0
16 - 19	8	92	0
19 - 22	3	97	0
22 - 25	9	91	0
25 - 28	2	98	0
28 - 31	2	98	0
31 - 34	1	99	0
34 - 37	1	99	0
37 - 40	2	98	0
40 - 43	0	100	0
43 - 46	30	70	0
50 - 53	15	85	0
53 - 56	2	98	0
56 - 59	13	87	0
59 - 62	2	98	0
62 - 65	3	97	0
65 - 68	4	94	2
68 - 71	1	99	0
71 - 74	5	95	0
74 - 77	2	98	0
77 - 80	2	98	0

TG 11 NW 20 1395 1565 Attlebridge Hall

Surface level (+10.9 m) +36 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (0.6 m) 2 ft
Mineral (8.5 m) 28 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Terrace Gravel	Gravel. 'Clayey' in the top 3 ft (0.9 m) Gravel: fine to coarse, subangular with some subrounded brown flint; traces of subrounded quartz, and traces of flint cobbles. Sand: medium with fine and coarse, mainly flint; brown.	(8.5)	28	(9.1)	30
Upper Chalk	Chalk.	(0.9+)	3+	(10.0)	33

%	mm		%
	+64	:	0
Gravel 68	-64+16	:	35
	-16+4	:	33
	-4+1	:	8
Sand 30	-1+$\frac{1}{4}$	:	15
	-$\frac{1}{4}$+1/16	:	7
Fines 2	-1/16	:	2

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	12	44	44
5 - 8	1	42	57
8 - 11	0	82	18
11 - 14	1	44	55
14 - 17	3	15	82
17 - 20	1	15	84
20 - 23	1	9	90
23 - 26	0	7	93
26 - 30	0	17	83

TG 11 NW 21 1478 1966 Moegoe's Plantation, Swannington

Surface level (+38.1 m) +125 ft
Damp at (+38.0 m) +125 ft
Wirth B1, 8 inch diam.
November 1969

Mineral (7.3 m) 24 ft
Waste (4.3 m) 14 ft
Mineral (2.7 m) 9 ft
Waste (4.9 m) 16 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
Glacial Sand (a) and Gravel	Pebbly sand. Gravel mainly below 9 ft (2.7 m). 'Clayey' in upper 3 ft (0.9 m). Gravel: coarse with fine, mainly subrounded flint. Sand: fine and medium, subangular becoming subrounded towards the base, mainly quartz; brown.	(7.3)	24	(7.3)	24
Boulder Clay	Brown sandy clay with comminuted shell.	(4.3)	14	(11.6)	38
Glacial Sand (b) and Gravel	'Clayey' sand. Gravel: fine subangular to subrounded flint. Sand: fine with medium, mainly quartz; light brown.	(2.7)	9	(14.3)	47
Boulder Clay	Grey chalky clay.	(3.7)	12	(18.0)	59
	Brown clay.	(1.2)	4	(19.2)	63
Upper Chalk	Chalk.	(0.9+)	3+	(20.1)	66

		%	mm		%
			+64	:	0
(a)	Gravel	13	-64+16	:	8
			-16+4	:	5
			-4+1	:	3
	Sand	83	-1+$\frac{1}{4}$	:	46
			-$\frac{1}{4}$+1/16	:	34
	Fines	4	-1/16	:	4
			+64	:	0
(b)	Gravel	1	-64+16	:	0
			-16+4	:	1
			-4+1	:	3
	Sand	80	-1+$\frac{1}{4}$	:	23
			-$\frac{1}{4}$+1/16	:	54
	Fines	19	-1/16	:	19

Depth below surface (ft)	Percentage Fines	Sand	Gravel
0 - 3	21	72	7
3 - 6	4	96	0
6 - 9	1	99	0
9 - 12	0	80	20
12 - 15	1	60	39
15 - 18	2	86	12
18 - 21	2	98	0
21 - 24	0	72	28
38 - 41	13	85	2
41 - 44	13	85	2
44 - 47	31	69	0

TG 11 NW 22 1453 1863 Joles Farm, Swannington

Surface level (+22.1 m) +72 ft
Water struck at (+16.5 m) +54 ft
Wirth B1, 8 inch diam.
November 1969

Overburden (5.5 m) 18 ft
Mineral (1.8 m) 6 ft
Waste (4.9 m) 16 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Boulder Clay	Soil and brown sandy clay.	(3.7)	12	(3.7)	12
Glacial Sand and Gravel	'Clayey' sand. Sand: fine with traces of medium; yellow.	(0.9)	3	(4.6)	15
Boulder Clay	Brown sandy clay.	(0.9)	3	(5.5)	18
Glacial Sand and Gravel	'Clayey' sandy gravel. Gravel mainly in upper 3 ft (0.9 m). Gravel: fine to coarse, subrounded with some sub-angular black flint, with subrounded to rounded quartz. Sand: medium with fine, sub-angular, quartz with some flint; brown.	(1.8)	6	(7.3)	24
Boulder Clay	Firm blue chalky clay.	(4.3)	14	(11.6)	38
	Brown sandy clay.	(0.6)	2	(12.2)	40
Upper Chalk	Chalk.	(0.9+)	3+	(13.1)	43

%		mm		%
		+64	:	0
Gravel	20	-64+16	:	11
		-16+4	:	9
		-4+1	:	6
Sand	67	-1+$\frac{1}{4}$	:	36
		-$\frac{1}{4}$+1/16	:	25
Fines	13	-1/16	:	13

Depth below surface (ft)	Percentage Fines	Sand	Gravel
18 - 21	10	55	35
21 - 24	15	80	5

TG 11 NW 23 1472 1769 Swannington Common

Surface level (+29.5 m) +97 ft
Water not struck
Wirth B1, 8 inch diam.
November 1969

Overburden (0.3 m) 1 ft
Mineral (1.2 m) 4 ft
Waste (4.3 m) 14 ft
Mineral (9.1 m) 30 ft
Waste (2.4 m) 8 ft
Mineral (3.7 m+) 12 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	'Very clayey' sand. Gravel: fine, subangular to angular, flint. Sand: fine and medium, subangular; brown.	(1.2)	4	(1.5)	5
Boulder Clay		Brown earthy clay.	(4.3)	14	(5.8)	19
Glacial Sand and Gravel	(b)	'Very clayey' sand. Gravel Sand: fine with traces of medium, subangular, silt, traces of chalk; light brown.	(9.1)	30	(14.9)	49
Boulder Clay		Grey with traces of fine chalk pebbles.	(2.4)	8	(17.3)	57
Glacial Sand and Gravel	(c)	'Clayey' sand. Gravel absent. Sand: fine with traces of medium, subangular, with traces of chalk; light brown.	(3.7+)	12+	(21.0)	69

	%	mm		%
		+64	:	0
(a) Gravel	2	-64+16	:	1
		-16+4	:	1
		-4+1	:	2
Sand	69	-1+¼	:	20
		-¼+1/16	:	47
Fines	29	-1/16	:	29
		+64	:	0
(b) Gravel	0	-64+16	:	0
		-16+4	:	0
		-4+1	:	1
Sand	75	-1+¼	:	10
		-¼+1/16	:	64
Fines	25	-1/16	:	25

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 3	27	70	3
3 - 5	36	63	1
19 - 22	32	68	0
22 - 25	19	81	0
25 - 28	32	68	0
28 - 31	27	73	0
31 - 34	36	64	0
34 - 37	31	69	0
37 - 40	18	82	0
40 - 43	21	79	0
43 - 46	20	80	0
46 - 49	18	82	0

		%	mm		%
			+64	:	0
(c)	Gravel	0	-64+16	:	0
			-16+4	:	0
			-4+1	:	1
	Sand	80	-1+$\frac{1}{4}$	:	11
			-$\frac{1}{4}$+1/16	:	68
	Fines	20	-1/16	:	20

Depth below surface (ft)	Percentage Fines	Sand	Gravel
57 - 60	20	80	0
60 - 63	18	82	0
63 - 66	21	79	0
66 - 69	19	81	0

TG 11 NW 24 1443 1632 Triumph Plantation, Attlebridge

Surface level (+45.4 m) +149 ft
Water not struck
Wirth B1, 8 inch diam.
November 1969

Overburden (1.8 m) 6 ft
Mineral (17.7 m) 58 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil and brown stony clay.	(1.8)	6	(1.8)	6
Glacial Sand and Gravel	Sandy gravel. 'Clayey' in the upper half of the deposit. Gravel: coarse with fine, subangular to subrounded flint with traces of chalk and quartzite, occasional flint cobbles. Sand: fine and medium with some coarse, subangular, mainly flint; brown.	(17.7)	58	(19.5)	64
Upper Chalk	Chalk.	(0.9+)	3+	(20.4)	67

%	mm		%
	+64	:	0
Gravel 40	-64+16	:	31
	-16+4	:	9
	-4+1	:	4
Sand 50	-1+$\frac{1}{4}$	:	24
	-$\frac{1}{4}$+1/16	:	22
Fines 10	-1/16	:	10

Depth below surface (ft)	Percentage Fines	Sand	Gravel
6 - 9	6	71	23
9 - 12	22	50	28
12 - 15	5	70	25
15 - 18	16	69	15
18 - 21	25	59	16
21 - 24	18	57	25
24 - 27	16	25	59
27 - 30	12	26	62
30 - 33	16	40	44
33 - 36	14	38	48
36 - 39	12	50	38
39 - 42	0	30	70
42 - 45	6	59	35
45 - 48	1	23	76
48 - 51	6	43	51
51 - 54	2	50	48
54 - 57	8	53	39
57 - 60	5	81	14
60 - 64	2	54	44

TG 11 NW 25 1454 1545 Attlebridge Hills

Surface level (+20.8 m) +68 ft
Water not struck
Wirth B1, 8 inch diam.
November 1969

Overburden (0.6 m) 2 ft
Mineral (13.4 m) 44 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Sandy gravel. Gravel: fine to coarse, subangular with subrounded, mainly flint with quartz and quartzite. Sand: medium with coarse and traces of fine, subangular, mainly flint; brown to orange.	(13.4)	44	(14.0)	46
Upper Chalk	Chalk.	(0.9+)	3+	(14.9)	49

	%
Gravel	32
Sand	65
Fines	3

mm		%
+64	:	0
-64+16	:	16
-16+4	:	16
-4+1	:	10
-1+$\frac{1}{4}$	:	49
-$\frac{1}{4}$+1/16	:	6
-1/16	:	3

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	0	81	19
5 - 8	0	47	53
8 - 11	0	71	29
11 - 14	2	76	22
14 - 17	0	70	30
17 - 20	5	59	36
20 - 23	4	52	44
23 - 26	0	50	50
26 - 29	5	67	28
29 - 31	2	69	29
31 - 34	0	72	28
34 - 37	4	56	40
37 - 40	2	70	28
40 - 43	10	75	15
43 - 46	6	61	33

TG 11 NE 1 1561 1957 Milestone Covert, Felthorpe

Surface level (+36.1 m) +119 ft
Water not struck
Wirth B1, 8 inch diam.
November 1969

Waste (14.6 m) 48 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Boulder Clay	Soil and brown clay with sandy bands and traces of fine chalk pebbles.	(7.6)	25	(7.6)	25
	Brown clay with traces of grey silt.	(2.4)	8	(10.1)	33
	Light brown clay with occasional bands of sand and gravel.	(4.5)	15	(14.6)	48
Upper Chalk	Chalk.	(0.9+)	3+	(15.5)	51

TG 11 NE 2 1576 1844 Mill Hill Plantation, Felthorpe

Surface level (+22.7 m) +74 ft
Water struck at (+22.6 m) +74 ft
Shell and auger, 8 inch diam.
November 1969

Overburden (0.3 m) 1 ft
Mineral (5.5 m) 18 ft
Waste (1.2 m) 4 ft
Mineral (7.3 m) 24 ft
Bedrock (0.9 m+) 3 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly sand. Gravel mainly in lower 9 ft (2.7 m). Some hard chalk fragments. Gravel: fine with coarse, subangular, mainly flint. Sand: fine with medium and traces coarse, subangular, mainly flint. Coarsens slightly towards base; grey.	(5.5)	18	(5.8)	19
Boulder Clay		Grey clay with traces of chalk.	(1.2)	4	(7.0)	23
Glacial Sand and Gravel	(b)	Pebbly sand. Gravel in lower 9 ft (2.7 m). Clayey from 26 to 32 ft (7.9 and 9.8 m). Shell fragments in upper half of deposit. Traces of chalk pebbles. Gravel: fine with coarse, subangular flint. Sand: medium with fine and traces of coarse, subangular mainly chalk and quartz; grey.	(7.3)	24	(14.3)	47
Upper Chalk		Chalk.	(0.9+)	3+	(15.2)	50

		%	mm		%
(a)	Gravel	11	+64	:	0
			-64+16	:	3
			-16+4	:	8
	Sand	84	-4+1	:	8
			-1+$\frac{1}{4}$	:	35
			-$\frac{1}{4}$+1/16	:	41
	Fines	5	-1/16	:	5
(b)	Gravel	6	+64	:	0
			-64+16	:	2
			-16+4	:	4
	Sand	88	-4+1	:	5
			-1+$\frac{1}{4}$	:	43
			-$\frac{1}{4}$+1/16	:	40
	Fines	6	-1/16	:	6

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	5	87	8
4 - 7	2	96	2
7 - 10	6	94	0
10 - 13	6	78	16
13 - 16	4	74	22
16 - 19	4	78	18
23 - 26	1	97	2
26 - 29	16	84	0
29 - 32	13	87	0
32 - 35	8	91	1
35 - 38	1	97	2
38 - 41	1	81	18
41 - 44	3	86	11
44 - 47	4	78	18

TG 11 NE 3 1549 1737 Gilham's Heath Plantation, Felthorpe

Surface level (+39.1 m) +128 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
April 1970

Overburden (0.6 m) 2 ft
Mineral (12.2 m) 40 ft
Waste (1.5 m) 5 ft
Mineral (1.8 m) 6 ft
Waste (2.1 m+) 7 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	Sand. Gravel mainly in upper 6 ft (1.8 m). Silty from 5 to 11 ft (1.5 to 3.4 m) and from 36 to 39 ft. (11.0 to 11.9 m). Gravel: fine to coarse subangular flint; some fine subrounded flint, quartz and quartzite. Sand: fine and medium, mainly subangular flint; light brown.	(12.2)	40	(12.8)	42
Boulder Clay		Brown sandy clay with traces of gravel and chalk pebbles.	(1.5)	5	(14.3)	47
Glacial Sand and Gravel	(b)	Sand. Gravel at base. Traces of hard chalk fragments. Gravel: fine to coarse subangular flint, with some fine subrounded flint and quartz. Sand: fine and medium subangular; light brown.	(1.8)	6	(16.1)	53
Boulder Clay		Light brown clay with traces of gravel and chalk pebbles.	(1.2)	4	(17.3)	57
		Light grey clay with chalk pebbles.	(0.9+)	3+	(18.2)	60

	%	mm	:	%
		+64	:	0
(a) Gravel	2	-64+16	:	1
		-16+4	:	1
		-4+1	:	3
Sand	90	-1+¼	:	47
		-¼+1/16	:	40
Fines	8	-1/16	:	8
		+64	:	0
(b) Gravel	5	-64+16	:	2
		-16+4	:	3
		-4+1	:	2
Sand	91	-1+¼	:	49
		-¼+1/16	:	40
Fines	4	-1/16	:	4

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	2	94	4
5 - 8	28	58	14
8 - 11	11	89	0
11 - 14	4	96	0
14 - 17	3	97	0
17 - 20	2	98	0
20 - 23	3	96	1
23 - 26	1	91	8
26 - 29	3	97	0
29 - 32	8	92	0
32 - 35	4	96	0
35 - 36	3	97	0
36 - 39	34	63	3
39 - 42	1	99	0
47 - 50	5	95	0
50 - 53	3	87	10

TG 11 NE 4 1529 1628 Potato Plantation, Taverham

Surface level (+41.2 m) +135 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
September 1969

Overburden (0.3 m) 1 ft
Mineral (13.4 m) 44 ft
Waste (6.7 m) 22 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Pebbly sand. Gravel mainly in upper 12 ft (3.7 m). 'Clayey' from 16 to 19 ft. (4.9 to 5.8 m). Gravel: mainly fine with coarse, traces of cobble, subangular, flint, some fine subrounded quartz and quartzite. Sand: fine with medium, subangular, mainly flint; brown.	(13.4)	44	(13.7)	45
	'Very clayey' pebbly sand	(0.9)	3	(14.6)	48
Boulder Clay	Brown sandy clay.	(3.0)	10	(17.6)	58
	Brown chalky clay.	(2.8)	9	(20.4)	67
Upper Chalk	Chalk with cobbles at the top.	(0.9+)	3+	(21.3)	70

	%	mm		%
		+64	:	0
Gravel	12	-64+16	:	3
		-16+4	:	9
		-4+1	:	3
Sand	80	-1+$\frac{1}{4}$	:	31
		-$\frac{1}{4}$+1/16	:	46
Fines	8	-1/16	:	8

Depth below surface (ft)	Fines	Percentage Sand	Gravel
1 - 4	2	31	67
4 - 7	3	55	42
7 - 10	2	67	31
10 - 13	5	84	11
13 - 16	8	90	2
16 - 19	26	73	1
19 - 22	19	81	0
22 - 24	26	73	1
24 - 27	13	87	0
27 - 30	8	92	0
30 - 33	3	97	0
33 - 36	3	97	0
36 - 39	2	97	1
39 - 42	2	83	15
42 - 45	4	92	4

TG 11 NE 5 1551 1546 Walsingham Plantation, Attlebridge

Surface level (+35.4 m) +116 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
September 1969

Overburden (0.6 m) 2 ft
Mineral (5.5 m) 18 ft
Waste (5.2 m) 17 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Sandy gravel. Gravel: fine to coarse, with occasional cobbles, fine gravel is mainly subangular, coarse gravel mainly subrounded. Mainly flint with traces of quartz and quartzite. Sand: medium with fine and coarse, subangular to subrounded, mainly quartz with flint; yellow to brown.	(5.5)	18	(6.1)	20
Boulder Clay	Soft brown sandy clay.	(4.0)	13	(10.1)	33
	Firm brown clay with chalk pebbles.	(1.2)	4	(11.3)	37
Upper Chalk	Chalk	(0.9+)	3+	(12.2)	40

%	mm		%
	+64	:	0
Gravel 25	-64+16	:	12
	-16+4	:	13
	-4+1	:	14
Sand 72	-1+$\frac{1}{4}$	:	39
	-$\frac{1}{4}$+1/16	:	19
Fines 3	-1/16	:	3

Depth below surface (ft)	Percentage Fines	sand	Gravel
2 - 5	2	83	15
5 - 8	2	48	50
8 - 11	2	70	28
11 - 14	1	68	31
14 - 17	7	86	7
17 - 20	1	77	22

TG 11 NE 6 1633 1966 Long Covert, Felthorpe

Surface level (+29.5 m) +97 ft
Water struck at (+20.4 m) +67 ft
Wirth B1, 8 inch diam.
November 1969

Overburden (0.5 m) 1.5 ft
Mineral (1.0 m) 3.5 ft
Waste (16.5 m) 54 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
	Soil	(0.5)	1.5	(0.5)	1.5
Glacial Sand and Gravel	'Clayey' pebbly sand. Gravel: fine subangular to subrounded flint. Sand: medium with fine, subangular; brown. Clay: light brown to grey.	(1.0)	3.5	(1.5)	5
Boulder Clay	Brown clay with traces of sand and gravel, occasional shell fragments.	(4.9)	16	(6.4)	21
	Grey silty clay with shell fragments.	(4.3)	14	(10.7)	35
	Grey silty clay with shell fragments and variable amounts of chalk.	(7.3)	24	(18.0)	59
Upper Chalk	Chalk.	(0.9+)	3+	(18.9)	62

%	mm	:	%
	+64	:	0
Gravel 9	-64+16	:	1
	-16+4	:	8
	-4+1	:	4
Sand 74	-1+¼	:	42
	-¼+1/16	:	28
Fines 17	-1/16	:	17

Depth below surface (ft)	Percentage Fines	sand	Gravel
1.5 - 5.0	17	74	9

TG 11 NE 7 1659 1828 Hall Farm, Felthorpe

Surface level (+31.9 m) +105 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam
April 1970

Overburden (0.5 m) 1.5 ft
Mineral (3.6 m) 12 ft
Waste (6.6 m) 21.5 ft
Mineral (2.1 m) 7 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.5)	1.5	(0.5)	1.5
Glacial Sand and Gravel	(a) Sand. Gravel in lower 3 ft (0.9 m) Gravel: fine to coarse subangular flint. Sand: medium and fine, subangular; grey-brown to orange.	(3.6)	12	(4.1)	13.5
Boulder Clay	Grey silty clay with traces of fine sand and small pebbles, becomes brown at the base.	(6.6)	21.5	(10.7)	35
Glacial Sand and Gravel	(b) Sandy gravel. Gravel in lower 4 ft (1.2 m). Gravel: fine to coarse, mainly subrounded flint, with traces of fine subrounded quartz. Sand: mainly fine with traces of medium, subangular, mainly flint; grey-brown.	(2.1)	7	(12.8)	42
Upper Chalk	Chalk.	(0.9+)	3+	(13.7)	45

	%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
		+64	0	1.5 - 5	6	94	0
(a)	Gravel 3	-64+16	2	5 - 8	2	98	0
		-16+4	1	8 - 11	1	99	0
				11 - 13.5	3	84	13
		-4+1	2				
	Sand 94	-1+$\frac{1}{4}$	52				
		-$\frac{1}{4}$+1/16	40				
	Fines 3	-1/16	3				
		+64	0	35 - 38	5	95	0
(b)	Gravel 35	-64+16	14	38 - 42	2	36	62
		-16+4	21				
		-4+1	1				
	Sand 62	-1+$\frac{1}{4}$	24				
		-$\frac{1}{4}$+1/16	37				
	Fines 3	-1/16	3				

TG 11 NE 8 1653 1750 Church Lane, Felthorpe

Surface level (+40.2 m) +132 ft
Groundwater conditions not recorded
Wirth B1, 8 inch diam.
November 1969

Overburden (0.3 m) 1 ft
Mineral (11.9+) 39 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Pebbly sand. Gravel concentrated in the upper 9 ft (2.7 m). Silty from 7 to 10 ft. (2.1 to 3.7 m). Gravel: coarse with fine, subrounded flint. Sand: fine and medium, subangular flint with subrounded quartz; orange to grey and brown.	(11.9+)	39+	(12.2)	40

%	mm	%
	+64	: 0
Gravel 7	-64+16	: 5
	-16+4	: 2
	-4+1	: 2
Sand 89	-1+$\frac{1}{4}$	: 41
	-$\frac{1}{4}$+1/16	: 46
Fines 4	-1/16	: 4

Depth below Surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	6	72	22
4 - 7	0	46	54
7 - 10	21	68	11
10 - 13	10	90	0
13 - 16	1	99	0
16 - 19	2	98	0
19 - 22	1	99	0
22 - 25	0	100	0
25 - 28	8	92	0
28 - 31	1	99	0
31 - 34	0	100	0
34 - 37	2	98	0
37 - 40	3	97	0

TG 11 NE 9 1637 1641 East of Freeland Corner, Felthorpe

Surface level (+36.1 m) +118 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
September 1969

Overburden (1.2 m) 4 ft
Mineral (4.0 m) 13 ft
Waste (3.0 m) 10 ft
Mineral (12.5 m) 41 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
	Soil and black clay	(1.2)	4	(1.2)	4
Glacial Sand and Gravel	(a) Pebbly sand. Gravel mainly in lower 4 ft (1.2 m). Traces of hard chalk near base. Gravel: coarse with fine, subangular with some subrounded, mainly flint, traces of quartz. Sand: medium with fine, subangular, flint; light brown.	(4.0)	13	(5.2)	17
Norwich Brickearth	Brown sandy clay with traces of fine and medium gravel.	(3.0)	10	(8.2)	27
Norwich Crag	(b) Pebbly sand. Gravel mainly below 42 ft (12.8 m). Clay band from 59 to 62 ft (18.0 to 18.9 m). Gravel: fine to coarse, subangular and subrounded flint with some quartz. Sand: medium with fine, coarsening slightly towards base, subangular, mainly flint; dark grey. Clay: black, sandy.	(12.5)	41	(20.7)	68
Upper Chalk	Chalk.	(0.9+)	3+	(21.6)	71

		%	mm	%
(a)	Gravel	14	+64	0
			-64+16	9
			-16+4	5
	Sand	80	-4+1	5
			-1+¼	52
			-¼+1/16	23
	Fines	6	-1/16	6
(b)	Gravel	18	+64	0
			-64+16	8
			-16+4	10
	Sand	72	-4+1	7
			-1+¼	39
			-¼+1/16	26
	Fines	10	-1/16	10

Depth below surface (ft)	Percentage Fines	Sand	Gravel
4 - 7	18	80	2
7 - 10	4	96	0
10 - 13	1	98	1
13 - 15	3	52	45
15 - 17	2	54	44
27 - 30	4	93	3
30 - 33	22	78	0
33 - 36	7	93	0
36 - 39	5	90	5
39 - 42	6	94	0
42 - 46	15	66	19
46 - 49	9	76	15
49 - 52	13	56	31
52 - 55	3	71	26
55 - 59	18	59	23
59 - 62	Clay seam		
62 - 65	7	32	61
65 - 68	5	69	26

TG 11 NE 10 1652 1536 Breck Farm, Taverham

Surface level (+32.0 m) +105 ft
Water not struck
Wirth B1, 8 inch diam.
November 1969

Overburden (0.3 m) 1 ft
Mineral (2.7 m) 9 ft
Waste (1.5 m) 5 ft
Mineral (2.1 m) 7 ft
Waste (12.2 m+) 40 ft+

			Thickness (m)	ft	Depth (m)	ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly sand. Gravel in lower 6 ft (1.8 m). 'Clayey' in upper 3 ft (0.9 m). Gravel: coarse with fine, subangular to subrounded flint with traces of fine quartz. Sand: medium with traces of fine, subangular flint with traces of hard chalk; light brown.	(2.7)	9	(3.0)	10
Boulder Clay		Light brown clay with traces of fine chalk and flint pebbles, becoming slightly pink at depth.	(1.5)	5	(4.5)	15
Glacial Sand and Gravel	(b)	Sandy gravel. Traces of hard chalk. Gravel: coarse with fine, subangular to subrounded flint with fine subrounded quartz. Sand: medium with coarse and fine, subangular flint; light brown.	(2.1)	7	(6.6)	22
Boulder Clay		Grey silty clay with trace of quartz and chalk pebbles.	(4.0)	13	(10.6)	35
		Blue silty clay.	(3.7)	12	(14.3)	47
		Grey chalky clay.	(4.6+)	15+	(18.9)	62

		%	mm		%
			+64	:	0
(a)	Gravel	19	-64+16	:	11
			-16+4	:	8
			-4+1	:	4
	Sand	71	-1+¼	:	50
			-¼+1/16	:	17
	Fines	10	-1/16	:	10
			+64	:	0
(b)	Gravel	34	-64+16	:	21
			-16+4	:	13
			-4+1	:	9
	Sand	61	-1+¼	:	44
			-¼+1/16	:	8
	Fines	5	-1/16	:	5

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	20	80	0
4 - 7	9	73	18
7 - 10	1	61	38
15 - 18	0	50	50
18 - 22	9	69	22

TG 11 NE 11 1745 1964 Holt Road, Felthorpe

Surface level (+37.0 m) +121 ft
Water not struck. Damp at (+37.0 m) +121 ft
Wirth B1, 8 inch diam.
November 1969

Overburden (0.3 m) 1 ft
Mineral (14.6 m) 48 ft
Waste (5.5 m) 18 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Sand. Gravel mainly between 34 and 37 ft (10.4 and 11.3 m). 'Clayey' between 1 and 15 ft (0.3 and 4.6 m). Gravel: fine to coarse, subangular to sub-rounded, mainly flint with traces of fine chalk and quartz. Sand: fine and medium, subangular; orange-brown with grey mottle.	(14.6)	48	(14.9)	49
?Norwich Brickearth	Brown silt.	(4.0)	13	(18.9)	62
	Grey silt.	(1.5)	5	(20.4)	67
Upper Chalk	Chalk.	(0.9+)	3+	(21.3)	70

%	mm	%
	+64	: 0
Gravel 3	-64+16	: 1
	-16+4	: 2
	-4+1	: 3
Sand 90	-1+$\frac{1}{4}$	: 41
	-$\frac{1}{4}$+1/16	: 46
Fines 7	-1/16	: 7

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	24	73	3
4 - 7	20	80	0
7 - 10	15	85	0
10 - 13	3	97	0
13 - 16	9	91	0
16 - 19	1	99	0
19 - 22	1	84	15
22 - 25	1	99	0
25 - 28	4	96	0
28 - 31	2	98	0
31 - 34	0	100	0
34 - 37	0	72	28
37 - 40	7	90	3
40 - 43	11	86	3
43 - 46	10	90	0
46 - 49	9	91	0

TG 11 NE 12 1737 1857 Small Hope Plantation, Felthorpe

Surface level (+35. 6 m) +117 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (0. 6 m) 2 ft
Mineral (8. 2 m) 27 ft
Waste (6. 1 m) 20 ft
Mineral (4. 9 m) 16 ft
Bedrock (0. 9 m+) 3 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0. 6)	2	(0. 6)	2
Glacial Sand and Gravel	(a)	Sand. 'Clayey' in upper 3 ft (0. 9 m) Traces of shell fragments. Gravel: fine to coarse, subangular to subrounded flint with some fine quartz and some hard chalk at base. Sand: fine and medium, subangular with subrounded flint and quartz; brown.	(8. 2)	27	(8. 8)	29
Boulder Clay		Dark grey clay with traces of chalk and shell fragments.	(6. 1)	20	(14. 9)	49
Norwich Crag	(b)	Gravel: 'Clayey' in upper 3 ft (0. 9 m). Gravel: fine to coarse, subrounded, mainly black flint with some fine rounded quartz and occasional flint cobbles. Sand: fine with medium and a little coarse subangular flint with subrounded quartz and occasional shell fragments; grey.	(4. 9)	16	(19. 8)	65
Upper Chalk		Chalk.	(0. 9+)	3+	(20. 7)	68

		%	mm	%
			+64	: 0
(a)	Gravel	2	-64+16	: 1
			-16+4	: 1
			-4+1	: 2
	Sand	89	-1+$\frac{1}{4}$	: 41
			-$\frac{1}{4}$+1/16	: 46
	Fines	9	-1/16	: 9
			+64	: 0
(b)	Gravel	55	-64+16	: 25
			-16 + 4	: 30
			-4+1	: 5
	Sand	41	-1+$\frac{1}{4}$	: 16
			-$\frac{1}{4}$+1/16	: 20
	Fines	4	-1/16	: 4

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	35	59	6
5 - 8	6	92	2
8 - 11	11	89	0
11 - 14	9	90	1
14 - 17	4	94	2
17 - 20	3	95	2
20 - 23	3	97	0
23 - 26	4	96	0
26 - 29	3	90	7
49 - 52	13	28	59
52 - 55	3	39	58
55 - 58	1	40	59
58 - 61	1	60	39
61 - 65	2	40	58

TG 11 NE 13 1760 1746 Houghen Plantation, Felthorpe

Surface level (+37.7 m) +124 ft
Water struck at (+31.7 m) +104 ft
Wirth B1, 8 inch diam.
November 1969

Overburden (0.3 m) 1 ft
Mineral (8.2 m+) 27 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Sand.	(8.2+)	27+	(8.5)	28

Sand: medium with fine and traces of coarse, subangular to subrounded, mainly flint and quartz with some chalk near the base.

%	mm	%
	+64	0
Gravel 0	-64+16	0
	-16+4	0
	-4+1	7
Sand 98	-1+¼	60
	-¼+1/16	31
Fines 2	-1/16	2

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	2	97	1
4 - 7	2	98	0
7 - 10	2	98	0
10 - 13	2	98	0
13 - 16	0	99	1
16 - 19	2	98	0
19 - 22	3	96	1
22 - 25	3	97	0
25 - 28	2	98	0

TG 11 NE 14 1752 1640 Drayton Drewray, Drayton

Surface level (+30.5 m) +100 ft
Groundwater conditions not recorded
Wirth B1, 8 inch diam.
November 1969

Overburden (0.3 m) 1 ft
Mineral (10.1 m+) 33 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Sand. Gravel concentrated in the upper 3 ft (0.9 m). 'Clayey' in upper 3 ft (0.9 m). Traces of shell fragments. Gravel: mainly fine subangular flint. Sand: fine with medium, subangular with some subrounded; grey to brown.	(10.1+)	33+	(10.4)	34

%	mm	%
	+64	: 0
Gravel 0	-64+16	: 0
	-16+4	: 0
	-4+1	: 2
Sand 95	-1+$\frac{1}{4}$	: 30
	-$\frac{1}{4}$+1/16	: 63
Fines 5	-1/16	: 5

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	20	76	4
4 - 7	5	95	0
7 - 10	5	95	0
10 - 13	2	98	0
13 - 16	5	95	0
16 - 19	5	95	0
19 - 22	2	98	0
22 - 25	3	97	0
25 - 28	3	97	0
28 - 31	1	99	0
31 - 34	1	99	0

TG 11 NE 15 1748 1545 Reepham Road, Drayton

Surface level (+36.8 m) +121 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
September 1969

Overburden (0.6 m) 2 ft
Mineral (4.6 m) 15 ft
Waste (6.7 m) 22 ft
Mineral (2.7 m) 9 ft
Waste (0.9 m) 3 ft
Mineral (2.7 m) 9 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Pebbly sand. 'Clayey' in upper 3 ft (0.9 m). Silty from 14 to 17 ft (4.3 to 5.2 m.). Gravel: coarse with fine, becoming fine towards the base, subangular to subrounded flint with some fine subrounded quartz. Sand: medium with fine and traces of coarse, mainly subangular flint; light brown.	(4.6)	15	(5.2)	17
Norwich Brickearth	Brown sandy clay with traces of chalk.	(6.7)	22	(11.9)	39
Norwich Crag	'Clayey' sand. Traces of gravel in lower 3 ft (0.9 m). Gravel: fine subangular flint with chalk. Sand: fine and medium subangular, some hard chalk and shell fragments at the base; brown-grey.	(2.7)	9	(14.6)	48
	Grey sandy clay with traces of chalk and gravel.	(0.9)	3	(15.5)	51
	'Clayey' gravel. Becoming 'very clayey' in lower 3 ft (0.9 m). Gravel: mainly fine with coarse subangular, flint. Sand: medium with fine subangular traces grey clay.	(2.7)	9	(18.2)	60
Upper Chalk	Chalk.	(0.9+)	3+	(19.1)	63

%	mm	%
	+64	: 0
Gravel 14	-64+16	: 9
	-16+4	: 5
	-4+1	: 5
Sand 79	-1+$\frac{1}{4}$	: 59
	-$\frac{1}{4}$+1/16	: 15
Fines 7	-1/16	: 7

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	12	78	10
5 - 8	5	86	9
8 - 11	1	75	24
11 - 14	3	95	2
14 - 17	15	62	23

TG 11 NE 16 1870 1933 Claypit Plantation, Stratton Strawless

Surface level (+31.2 m) +102 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
April 1970

Overburden (0.6 m) 2 ft
Mineral (6.1 m) 20 ft
Waste (7.9 m) 26 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Pebbly sand. Silty in upper 3 ft (0.9 m). Gravel: mainly fine, subangular with subrounded, flint. Sand: medium with fine, subangular; grey to brown.	(6.1)	20	(6.7)	22
?Norwich Brickearth	Grey silty and sandy clay with sand and green silt laminations in the lower half.	(2.4)	8	(9.1)	30
	Grey silty clay with traces of gravel.	(0.9)	3	(10.0)	33
	Grey silty clay with chalk pebbles.	(1.2)	4	(11.2)	37
	Grey silty clay with traces of gravel and soft chalk at base.	(3.4)	11	(14.6)	48
Upper Chalk	Chalk.	(0.9+)	3+	(15.5)	51

%	mm	%
	+64	0
Gravel 6	-64+16	1
	-16+4	5
	-4+1	8
Sand 87	$-1+\frac{1}{4}$	66
	$-\frac{1}{4}+1/16$	13
Fines 7	-1/16	7

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	31	64	5
5 - 8	8	85	7
8 - 11	1	96	3
11 - 14	3	93	4
14 - 17	2	91	7
17 - 20	2	90	8
20 - 22	1	89	10

TG 11 NE 17 1897 1835 Horsford Heath

Surface level (+30.0 m) +98 ft
Water struck at (+29.0 m) +95 ft
Shell and auger, 8 inch diam.
April 1970

Overburden (0.6 m) 2 ft
Mineral (13.4 m) 44 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel (a)	Sand. Clay seam from 11 to 15 ft (3.4 to 4.6 m). Chalky near base. Gravel: fine, subangular flint with subrounded quartz. Sand: medium becoming fine near base, some shell in lower part of deposit; grey. Clay: blue-grey	(7.6)	25	(8.2)	27
Norwich Crag (b)	Pebbly sand. Gravel: fine with coarse, rounded and sub-rounded flint with some fine rounded quartz. Sand: mainly medium, subangular, with some coarse subrounded; grey.	(5.8)	19	(14.0)	46
Upper Chalk	Chalk	(0.9+)	3+	(14.9)	49

		%	mm	%
			+64	0
(a)	Gravel	2	-64+16	0
			-16+4	2
			-4+1	7
	Sand	92	-1+¼	51
			-¼+1/16	34
	Fines	6	-1/16	6
			+64	0
(b)	Gravel	22	-64+16	6
			-16+4	16
			-4+1	9
	Sand	76	-1+¼	55
			-¼+1/16	12
	Fines	2	-1/16	2

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	3	97	0
5 - 8	2	97	1
8 - 11	16	79	5
11 - 15	Clay seam		
15 - 18	6	94	0
18 - 21	5	93	2
21 - 24	4	91	5
24 - 27	6	94	0
27 - 30	4	86	10
30 - 33	3	84	13
33 - 36	3	97	0
36 - 39	1	73	26
39 - 42	0	20	80
42 - 45	2	41	57
45 - 46	3	77	20

TG 11 NE 18 1846 1757 Horsford Heath

Surface level (+37.3 m) +122 ft
Water struck at (+36.0 m) +118 ft
Shell and auger, 8 inch diam.
April 1970

Overburden (0.3 m) 1 ft
Mineral (5.5 m) 18 ft
Waste (6.1 m) 20 ft
Mineral (8.2 m) 27 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel (a)	Sand. Gravel mainly in lower 3 ft (0.9 m). 'Clayey' in upper 3 ft (0.9 m). Gravel: mainly fine, subangular to subrounded, flint. Sand: medium with fine, subrounded, mainly quartz; yellow to brown.	(5.5)	18	(5.8)	19
Norwich Brickearth	Brown-grey sandy clay with flint pebbles and traces of hard chalk.	(1.5)	5	(7.3)	24
	Blue-grey silty clay with some flint pebbles and traces of hard chalk.	(4.6)	15	(11.9)	39
Norwich Crag(b)	Pebbly sand. Gravel mainly in lower 9 ft (2.7 m). 'Clayey' in upper 3 ft (0.9 m). Clay seam from 45 to 48 ft (13.7 to 14.6 m). Gravel: fine to coarse, subangular with subrounded flint, with some fine subrounded quartz. Sand: medium with fine coarsening slightly towards base, mainly subrounded quartz with flint; grey. Clay: soft, grey, with pellets of hard chalk and occasional flint and quartz pebbles.	(8.2)	27	(20.1)	66
Upper Chalk	Chalk.	(0.9+)	3+	(21.0)	69

		%	mm	%
(a)	Gravel	5	+64	0
			-64+16	1
			-16+4	4
	Sand	90	-4+1	5
			-1+¼	56
			-¼+1/16	29
	Fines	5	-1/16	5
(b)	Gravel	22	+64	0
			-64+16	11
			-16+4	11
	Sand	73	-4+1	7
			-1+¼	42
			-¼+1/16	24
	Fines	5	-1/16	5

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	11	86	3
4 - 7	4	95	1
7 - 10	5	95	0
10 - 13	5	95	0
13 - 16	0	100	0
16 - 19	2	74	24
39 - 42	16	84	0
42 - 45	6	86	8
45 - 48	Clay seam		
48 - 51	7	73	20
51 - 54	6	94	0
54 - 57	3	97	0
57 - 60	2	83	15
60 - 63	1	31	68
63 - 66	2	36	62

TG 11 NE 19 1850 1633 Pyehurn Lane, Horsford

Surface level (+27.3 m) +89 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (7.0 m) 23 ft
Mineral (3.4 m) 11 ft
Waste (6.1 m) 20 ft.
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
	Soil	(0.6)	2	(0.6)	2
Norwich Brickearth	Grey sandy silt with orange laminations.	(3.7)	12	(4.3)	14
	Light grey fine sand-silt, with traces of gravel.	(0.9)	3	(5.2)	17
	Brown-grey clay with traces of hard chalk and gravel.	(1.8)	6	(7.0)	23
Norwich Crag	'Clayey' sandy gravel. Occasional thin clay and silt bands. Gravel: fine with coarse, subangular to subrounded flint, with fine subrounded quartz. Sand: medium and fine with coarse subangular and subrounded; grey.	(3.4)	11	(10.4)	34
	Grey silt and fine sand with traces of gravel and some soft chalk near the base.	(6.1)	20	(16.5)	54
Upper Chalk	Chalk.	(0.9+)	3+	(17.4)	57

%	mm	%
	+64	0
Gravel 34	-64+16	7
	-16+4	27
	-4+1	9
Sand 51	-1+$\frac{1}{4}$	23
	-$\frac{1}{4}$+1/16	19
Fines 15	-1/16	15

Depth below surface (ft)	Percentage Fines	Sand	Gravel
23 - 26	17	68	15
26 - 29	19	40	41
29 - 32	9	50	41
32 - 34	15	46	39

TG 11 NE 20 1860 1549 Dog Lane, Horsford

Surface level (+28.5 m) +93 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (0.6 m) 2 ft
Mineral (3.6 m) 12 ft
Waste (7.3 m) 24 ft
Mineral (4.6 m) 15 ft
Bedrock (0.9 m+) 3 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	'Very clayey' pebbly sand. Gravel content increases with depth. Gravel: fine and coarse, subangular mainly flint with some hard chalk. Sand: fine to medium with some coarse, subangular; brown.	(3.6)	12	(4.2)	14
Norwich Brickearth		Brown silty clay with traces of hard chalk, and traces of sand and gravel.	(1.8)	6	(6.0)	20
		Grey clayey silt with traces of hard chalk, fragments of shell at top.	(5.5)	18	(11.5)	38
Norwich Crag	(b)	'Clayey' sandy gravel. Gravel absent from upper 3 ft (0.9 m). Traces of hard chalk. Gravel: fine and coarse subangular flint, with traces of fine subrounded quartzite. Sand: fine with medium, subangular; grey.	(4.6)	15	(16.1)	53
Upper Chalk		Chalk.	(0.9+)	3+	(17.0)	56

		%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
			+64	0	2 - 5	38	62	0
(a)	Gravel	12	-64+16	7	5 - 8	39	57	4
			-16+4	5	8 - 11	38	47	15
					11 - 14	18	53	29
			-4+1	3				
	Sand	55	-1+¼	25				
			-¼+1/16	27				
	Fines	33	-1/16	33				
			+64	0	38 - 41	20	80	0
(b)	Gravel	26	-64+16	12	41 - 44	18	68	14
			-16+4	14	44 - 47	8	47	45
					47 - 50	15	44	41
			-4+1	6	50 - 53	7	53	40
	Sand	60	-1+¼	21				
			-¼+1/16	33				
	Fines	14	-1/16	14				

TG 11 NE 21 1954 1949 Stratton Strawless

Surface level (+26.8 m) 88 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (1.5 m) 5ft
Mineral (2.8 m) 9 ft
Waste (1.5 m) 5 ft
Mineral (6.4 m) 21 ft
Bedrock (0.9 m+) 3 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
Glacial Sand and Gravel		Soil and very clayey sand.	(1.5)	5	(1.5)	5
	(a)	Sand. Gravel: fine with coarse subangular mainly flint. Sand: fine with medium, subangular with traces of subrounded, flint with traces of quartz; light brown.	(2.8)	9	(4.3)	14
Norwich Brickearth		Grey chalky clay with a 2 ft (0.6 m) thick weathered mantle.	(1.5)	5	(5.8)	19
Norwich Crag	(b)	Gravel. 'Clayey' in upper 3 ft (0.9 m). Gravel: fine and coarse subrounded to subangular, mainly quartz with black flint, occasional flint cobbles near the base. Sand: medium with fine and coarse, subangular with subrounded, traces of hard chalk in parts; brown and grey.	(6.4)	21	(12.2)	40
Upper Chalk		Chalk.	(0.9+)	3+	(13.1)	43

		%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
(a)	Gravel	5	+64	0	5 - 8	5	90	5
			-64+16	1	8 - 11	3	88	9
			-16+4	4	11 - 14	5	94	1
			-4+1	3				
	Sand	91	-1+$\frac{1}{4}$	37				
			-$\frac{1}{4}$+1/16	51				
	Fines	4	-1/16	4				
(b)	Gravel	49	+64	0	19 - 22	13	79	8
			-64+16	21	22 - 25	2	41	57
			-16+4	28	25 - 28	3	66	31
					28 - 31	2	39	59
			-4+1	9	31 - 34	3	41	56
	Sand	47	-1+$\frac{1}{4}$	27	34 - 37	2	35	63
			-$\frac{1}{4}$+1/16	11	37 - 40	3	25	72
	Fines	4	-1/16	4				

TG 11 NE 22 1966 1854 Horsford Heath

Surface level (+30.5 m) +100 ft
Water struck at (+30.2 m) +99 ft
Shell and auger, 8 inch diam.
April 1970

Waste (13.7 m) 45 ft
Bedrock (1.5 m+) 5 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
Norwich Brickearth	Soil and brown to grey mottled silt with traces of sand.	(2.4)	8	(2.4)	8
	Brown to grey clayey sand.	(4.6)	15	(7.0)	23
	Grey chalky clay with some flint pebbles.	(2.4)	8	(9.4)	31
Norwich Crag	Pebbly sand. Gravel mainly in lower 6 ft (1.8 m). Gravel: fine with coarse, subrounded to rounded flint with fine rounded quartz. Sand: medium with fine and some coarse, subangular to subrounded, mainly quartz with some flint; grey.	(2.1)	7	(11.5)	38
	Grey-green laminated silty clay with occasional pebbles and thin claystone band at top.	(1.4)	4.5	(12.9)	42.5
	'Clayey' pebbly sand. Gravel: mainly fine subrounded flint. Sand: fine to coarse, subangular; grey.	(0.8)	2.5	(13.7)	45
Upper Chalk	Chalk with some gravel in upper 2 ft (0.6 m).	(1.5+)	5+	(15.2)	50

	%	mm	%
		+64	0
Gravel	24	-64+16	9
		-16+4	15
		-4+1	8
Sand	72	-1+$\frac{1}{4}$	40
		-$\frac{1}{4}$+1/16	24
Fines	4	-1/16	4

Depth below surface (ft)	Percentage Fines	Sand	Gravel
31 - 34	6	85	9
34 - 37	2	66	32
37 - 38	3	50	47

TG 11 NE 23 1937 1752 Greenlane Cottage, Horsford

Surface level (+33.1 m) +109 ft
Water struck at (+29.9 m) +98 ft
Shell and auger, 8 inch diam.
April 1970

Overburden (7.0 m) 23 ft
Mineral (2.4 m) 8 ft
Waste (0.6 m) 2 ft
Mineral (6.4 m) 21 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
Glacial Sand and Gravel	Soil and brown sandy clay with traces of gravel.	(1.2)	4	(1.2)	4
	Grey-brown laminated silt with fine sand.	(5.8)	19	(7.0)	23
(a)	'Clayey' sand. Gravel absent. Silty at top and bottom. Sand: mainly fine with medium; grey-brown.	(2.4)	8	(9.4)	31
Norwich Brickearth	Brown to grey chalky clay with some pebbles.	(0.6)	2	(10.0)	33
Norwich Crag (b)	Gravel. Clay seam from 38 to 39 ft. (11.6 to 11.9 m). Gravel: fine with coarse becoming coarser below 42 ft (12.8 m), mainly subrounded, quartz with flint. Sand: mainly medium with coarse, finer in top 9 ft (2.7 m), subangular, traces of chalk; grey. Clay: silty with traces of sand and gravel; blue-grey.	(6.4)	21	(16.4)	54
Upper Chalk	Chalk.	(0.9+)	3+	(17.3)	57

		%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
			+64 :	0	23 - 26	23	77	0
(a)	Gravel	0	-64+16 :	0	26 - 29	11	89	0
			-16+4 :	0	29 - 31	20	80	0
			-4+1 :	1				
	Sand	82	-1+¼ :	19				
			-¼+1/16 :	62				
	Fines	18	-1/16 :	18				
			+64 :	0	33 - 36	5	65	30
(b)	Gravel	54	-64+16 :	21	36 - 38	4	71	25
			-16+4 :	33	38 - 39	Clay Seam		
					39 - 42	4	78	18
			-4+1 :	10	42 - 45	2	23	75
	Sand	44	-1+¼ :	27	45 - 48	0	30	70
			-¼+1/16 :	7	48 - 51	0	25	75
					51 - 54	1	22	77
	Fines	2	-1/16 :	2				

TG 11 NE 24 1936 1646 North of Horsford Village

Surface level (+32.9 m) +108 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (0.6 m) 2 ft
Mineral (1.8 m) 6 ft
Waste (0.9 m) 3 ft
Mineral (7.9 m) 26 ft
Waste (1.8 m) 6 ft
Mineral (5.2 m) 17 ft
Bedrock (0.9 m+) 3 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	'Clayey' sandy gravel. Gravel: fine with coarse, subangular and subrounded, mainly flint and quartz. Sand: medium with fine and traces of coarse, subangular; brown.	(1.8)	6	(2.4)	8
		Clayey orange-brown sand.	(0.9)	3	(3.3)	11
	(b)	'Very clayey' sand. Gravel: fine subangular to subrounded, mainly flint. Sand: fine with medium, subangular; brown.	(7.9)	26	(11.2)	37
Norwich Crag		Grey silty clay with traces of hard chalk, shell fragments and gravel.	(1.8)	6	(13.0)	43
	(c)	Gravel. Gravel: fine with coarse, subangular with some subrounded flint, with subrounded quartz and quartzite. Sand: fine with medium and coarse, subangular with traces of subrounded; grey.	(5.2)	17	(18.2)	60
Upper Chalk		Chalk.	(0.9+)	3+	(19.1)	63

		%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
			+64	: 0				
(a)	Gravel	38	-64+16	: 14	2 - 5	17	59	24
			-16+4	: 24	5 - 8	14	34	52
			-4+1	: 8				
	Sand	46	$-1+\frac{1}{4}$	: 22				
			$-\frac{1}{4}+1/16$	: 16				
	Fines	16	-1/16	: 16				
			+64	: 0	11 - 14	23	75	2
(b)	Gravel	1	-64+16	: 0	14 - 17	24	76	0
			-16+4	: 1	17 - 20	17	82	1
					20 - 23	22	78	0
			-4+1	: 2	23 - 26	25	72	3
	Sand	77	$-1+\frac{1}{4}$	: 31	26 - 29	29	70	1
			$-\frac{1}{4}+1/16$	: 44	29 - 32	27	71	2
					32 - 35	17	81	2
	Fines	22	-1/16	: 22	35 - 37	16	83	1

		%	mm	%
			+64	: 0
(c)	Gravel	67	-64+16	: 30
			-16+4	: 47
			-4+1	: 8
	Sand	29	-1+$\frac{1}{4}$	: 8
			-$\frac{1}{4}$+1/16	: 13
	Fines	4	-1/16	: 4

Depth below surface (ft)	Percentage Fines	Sand	Gravel
43 - 46	8	27	65
46 - 49	5	27	68
49 - 52	3	18	79
52 - 55	4	26	70
55 - 58	2	34	64
58 - 60	3	49	48

TG 11 NE 25 1946 1552 Horsford Village

Surface level (+28.3 m) +93 ft
Water struck at (+27.7 m) +91 ft
Shell and auger, 8 inch diam.
April 1970

Overburden (5.2 m) 17 ft
Mineral (4.0 m) 13 ft
Waste (1.5 m) 5 ft
Mineral (4.9 m) 16 ft
Bedrock (0.9 m+) 3 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
Glacial Sand and Gravel		Soil and light brown clayey sand with a sand band from 9 to 10 ft (2.7 m to 3.0 m).	(5.2)	17	(5.2)	17
	(a)	Pebbly sand. Gravel concentrated in lower 4 ft (1.2 m). Silty between 26 and 29 ft (7.9 and 8.8 m). Gravel: fine to coarse, mainly subangular, flint with some subrounded quartz and chalk. Sand: fine and medium, subangular traces of shell fragments at base; brown.	(4.0)	13	(9.2)	30
Norwich Brickearth		Grey chalky clay with traces of gravel, with a weathered mantle.	(1.5)	5	(10.7)	35
Norwich Crag	(b)	Pebbly sand. Gravel mainly in the upper 6 ft (1.8 m). Gravel: coarse with fine, mainly subangular flint, with some subrounded quartz with a trace of chalk near the base. Sand: medium with fine and a little coarse, subangular to subrounded quartz and flint; grey.	(4.6)	15	(15.3)	50
		Cobble gravel with some sand.	(0.3)	1	(15.6)	51
Upper Chalk		Chalk.	(0.9+)	3+	(16.5)	54

		%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
			+64	0	17 - 20	6	94	0
(a)	Gravel	13	-64+16	7	20 - 23	3	97	0
			-16+4	6	23 - 26	9	90	1
					26 - 29	22	45	33
			-4+1	4	29 - 30	4	50	46
	Sand	76	-1+$\frac{1}{4}$	38				
			-$\frac{1}{4}$+1/16	36				
	Fines	9	-1/16	9				
			+64	0	35 - 38	2	73	25
(b)	Gravel	15	-64+16	9	38 - 41	3	79	18
			-16+4	6	41 - 44	5	91	4
					44 - 47	5	95	0
			-4+1	8	47 - 50	4	87	9
	Sand	81	-1+$\frac{1}{4}$	43				
			-$\frac{1}{4}$+1/16	30				
	Fines	4	-1/16	4				

TG 11 SW 1 1042 1440 · Weston Green

Surface level (+48.2 m) +158 ft
Water not struck
Wirth B1, 8 inch diam.
October 1968

Overburden (5.5 m) 18 ft
Mineral (16.5 m) 54 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
Boulder Clay	Soil and brown stony clay.	(5.5)	18	(5.5)	18
Glacial Sand and Gravel	Sand. Gravel mainly in upper 6 ft (1.8 m). Traces of chalk near base. Gravel: fine with coarse and occasional cobbles, subangular flint. Sand: fine with medium, subangular; brown.	(16.5)	54	(22.0)	72
Upper Chalk	Chalk.	(0.9+)	3+	(22.9)	75

%		mm		%
		+64	:	0
Gravel	3	-64+16	:	1
		-16+4	:	2
		-4+1	:	3
Sand	93	-1+$\frac{1}{4}$	:	35
		-$\frac{1}{4}$+1/16	:	55
Fines	4	-1/16	:	4

Depth below surface (ft)	Percentage Fines	Sand	Gravel
18 - 21	10	72	18
21 - 24	4	79	17
24 - 27	4	96	0
27 - 30	2	98	0
30 - 33	2	98	0
33 - 36	10	90	0
36 - 39	6	94	0
39 - 42	1	99	0
42 - 45	1	99	0
45 - 48	1	84	15
48 - 51	6	94	0
51 - 54	2	98	0
54 - 57	2	98	0
57 - 60	3	97	0
60 - 63	8	92	0
63 - 66	2	98	0
66 - 69	2	90	8
69 - 72	0	100	0

TG 11 SW 2 1065 1361 The Broadway, Weston Longville

Surface level (+52.1 m) +171 ft
Water not struck
Wirth B1, 8 inch diam.
October 1969

Overburden (0.6 m) 2 ft
Mineral (5.5 m) 18 ft
Waste (8.2 m) 27 ft
Mineral (10.1 m+) 33 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a) 'Clayey' sandy gravel. 'Very clayey' from 8 to 11 ft (2.4 to 3.4 m). Some hard chalk near base. Gravel: coarse with fine, subangular with traces of subrounded flint and fine subrounded quartz. Sand: medium and fine with traces of coarse, subangular; light brown	(5.5)	18	(6.1)	20
Boulder Clay	Brown chalky clay.	(8.2)	27	(14.3)	47
Glacial Sand and Gravel	(b) Pebbly sand. Low gravel content between 65 and 74 ft (19.8 and 22.6 m). Traces of hard chalk. 'Clayey' in upper 6 ft (1.8 m). Gravel: coarse with fine, subangular with traces of subrounded flint, with fine subrounded quartz. Sand: medium with fine and traces of coarse, subangular; light brown.	(10.1+)	33+	(24.4)	80

		%	mm	%	Depth below surface (ft)	Fines	Sand	Gravel
			+64	0	2 - 5	1	50	49
(a)	Gravel	24	-64+16	16	5 - 8	14	73	13
			-16+4	8	8 - 11	40	54	6
					11 - 14	19	61	20
			-4+1	8	14 - 17	19	52	29
	Sand	58	-1+¼	24	17 - 20	16	46	38
			-¼+1/16	26				
	Fines	18	-1/16	18				
			+64	0	47 - 50	12	39	49
(b)	Gravel	24	-64+16	17	50 - 53	14	73	13
			-16+4	7	53 - 56	11	80	9
					56 - 59	1	69	30
			-4+1	8	59 - 62	1	54	45
	Sand	72	-1+¼	38	62 - 65	1	74	25
			-¼+1/16	26	65 - 68	3	87	10
					68 - 71	3	97	0
	Fines	4	-1/16	4	71 - 74	2	88	10
					74 - 77	1	41	58
					77 - 80	0	95	5

TG 11 SW 3 1057 1234 Star Covert, Honingham

Surface level (+43.0 m) +141 ft
Water not struck
Wirth B1, 8 inch diam.
October 1969

Overburden (5.5 m) 18 ft
Mineral (11.0 m) 36 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
Boulder Clay	Soil and brown chalky clay, with sandy seam from 9 to 12 ft (2.7 to 3.7 m).	(5.5)	18	(5.5)	18
Glacial Sand and Gravel	'Clayey' pebbly sand. Gravel almost absent from lower 12 ft (3.7 m). Chalky near base. Gravel: coarse with fine (coarse predominant in upper 9 ft (2.7 m)), subangular with sub-rounded, mainly flint. Sand: medium and fine, subangular; brown to orange.	(11.0)	36	(16.5)	54
Upper Chalk	Chalk.	(0.9+)	3+	(17.4)	57

	%
Gravel	13
Sand	73
Fines	14

mm	%
+64	0
-64+16	8
-16+4	5
-4+1	5
-1+$\frac{1}{4}$	35
-$\frac{1}{4}$+1/16	33
-1/16	14

Depth below surface (ft)	Fines	Sand	Gravel
18 - 21	15	70	15
21 - 24	11	54	35
24 - 27	1	66	33
27 - 30	16	75	9
30 - 33	24	68	8
33 - 36	20	70	10
36 - 39	24	63	13
39 - 42	1	70	29
42 - 45	48	50	2
45 - 48	2	98	0
48 - 51	4	91	5
51 - 54	5	95	0

TG 11 SW 4 1064 1151 Buttons Grove, Honingham

Surface level (+33.9 m) +111 ft
Groundwater conditions not recorded
Wirth B1, 8 inch diam.
November 1969

Waste (18.3 m+) 60 ft+

		Thickness (m)	ft	Depth (m)	ft
Boulder Clay	Brown chalky clay	(4.6)	15	(4.6)	15
	Grey chalky clay.	(6.7)	22	(11.3)	37
	Grey silty clay.	(3.4)	11	(14.7)	48
	Grey chalky clay.	(3.6+)	12+	(18.3)	60

TG 11 SW 5 1064 1072 Grange Plantation, Honingham

Surface level (+38.3 m) +126 ft
Water not struck
Wirth B1, 8 inch diam.
November 1969

Overburden (0.3 m) 1 ft
Mineral (6.4 m) 21 ft
Waste (9.2 m) 30 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Pebbly sand. Gravel concentrated in upper 6 ft (1.8 m). Gravel: coarse with fine, subangular, mainly flint. Sand: medium and fine subangular; light brown.	(6.4)	21	(6.7)	22
Boulder Clay	Brown clay, with traces of sand and occasional pebbles at the top.	(4.9)	16	(11.6)	38
	Grey chalky clay	(4.3)	14	(15.9)	52
Upper Chalk	Chalk.	(0.9+)	3+	(16.8)	55

%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
	+64	0	1 - 4	2	50	48
Gravel 8	-64+16	6	4 - 7	1	89	10
	-16+4	2	7 - 10	1	99	0
			10 - 13	1	99	0
	-4+1	2	13 - 16	1	99	0
Sand 91	-1+$\frac{1}{4}$	48	16 - 19	1	99	0
	-$\frac{1}{4}$+1/16	41	19 - 21	1	99	0
Fines 1	-1/16	1				

TG 11 SW 6 1136 1457 East of Weston Green

Surface level (+46.9 m) +154 ft
Water not struck
Wirth B1, 8 inch diam.
October 1969

Waste (19.8 m+) 65 ft+

		Thickness (m)	ft	Depth (m)	ft
Boulder Clay	Soil and brown stony clay.	(3.4)	11	(3.4)	11
Glacial Sand and Gravel	'Clayey' sandy gravel. Gravel: coarse with fine, subangular flint. Sand: fine with medium and traces of coarse, subangular; brown.	(0.9)	3	(4.3)	14
Boulder Clay	Brown chalky clay with occasional flint cobbles.	(2.1)	7	(6.4)	21
Glacial Sand and Gravel	'Very clayey' pebbly sand. Gravel: fine, subangular, flint. Sand: fine with traces of medium, subangular; traces of chalk; brown.	(1.2)	4	(7.6)	25
Boulder Clay	Brown-grey chalky clay	(12.2+)	40+	(19.8)	65

%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
	+64	0	11 - 14	18	47	35
Gravel 35	-64+16	24				
	-16+4	11				
	-4+1	5				
Sand 47	$-1+\frac{1}{4}$	15				
	$-\frac{1}{4}+1/16$	27				
Fines 18	-1/16	18				

TG 11 SW 7 1164 1365 Telegraph Hill, Honingham

Surface level (+59. 5 m) +195 ft Waste (18. 3 m+) 60 ft+
Groundwater conditions not recorded
Wirth B1, 8 inch diam.
October 1969

		Thickness (m)	ft	Depth (m)	ft
Boulder Clay	Soil and brown clay with traces of sand and gravel in places.	(12. 8)	42	(12. 8)	42
	Dark grey stony clay becoming dark brown with depth.	(5. 5+)	18+	(18. 3)	60

TG 11 SW 8 1175 1251 Hall Hills, Honingham

Surface level (+54.7 m) +179 ft
Water not struck
Wirth B1, 8 inch diam.
November 1969

Overburden (0.3 m) 1 ft
Mineral (24.1 m+) 79 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Sand. Gravel concentrated from 16 to 28 ft (4.9 to 8.5 m), and 49 to 52 ft (14.9 to 15.8 m). Clayey from 49 to 52 ft (14.9 to 15.8 m). Traces of hard chalk in lower half of deposit. Gravel: fine to coarse becoming fine with depth, subangular with traces of subrounded, mainly flint. Sand: fine and medium with traces of coarse; light brown.	(24.1+)	79+	(24.4)	80

%	mm	%
	+64	: 0
Gravel 4	-64+16	: 2
	-16+4	: 2
	-4+1	: 3
Sand 93	-1+$\frac{1}{4}$	: 43
	-$\frac{1}{4}$+1/16	: 47
Fines 3	-1/16	: 3

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	2	98	0
4 - 7	0	100	0
7 - 10	1	99	0
10 - 13	0	100	0
13 - 16	1	99	0
16 - 19	3	82	15
19 - 22	5	83	12
22 - 25	1	79	20
25 - 28	0	94	6
28 - 31	0	96	4
31 - 34	1	99	0
34 - 37	1	99	0
37 - 40	1	99	0
40 - 43	0	93	7
43 - 46	2	92	6
46 - 49	4	96	0
49 - 52	23	39	38
52 - 55	5	95	0
55 - 58	2	98	0
58 - 61	1	99	0
61 - 64	1	99	0
64 - 67	2	98	0
67 - 70	1	98	1
70 - 73	4	96	0
73 - 76	6	94	0
76 - 79	1	99	0
79 - 80	15	71	14

TG 11 SW 9 1188 1174 Church Plantation, Honingham

Surface level (+39.0 m) +128 ft
Water not struck
Wirth B1, 8 inch diam.
October 1969

Overburden (0.6 m) 2 ft
Mineral (9.1 m) 30 ft
Waste (10.4 m) 34 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Pebbly sand. Gravel concentrated in lower 12 ft (3.6 m). Traces of hard chalk. 'Clayey' at base. Gravel: fine to coarse, subangular flint with traces of quartz. Sand: medium with fine and traces of coarse, subangular, flint; light brown.	(9.1)	30	(9.7)	32
Boulder Clay	Brown and light grey chalky clay with a 2 ft (0.6 m) thick sandy gravel seam at base.	(10.4)	34	(20.1)	66
	Dark brown clay	(0.9)	3	(21.0)	69
Upper Chalk	Chalk.	(0.9+)	3+	(21.9)	72

%	mm	%
	+64	0
Gravel 6	-64+16	3
	-16+4	3
	-4+1	7
Sand 88	-1+$\frac{1}{4}$	45
	-$\frac{1}{4}$+1/16	36
Fines 6	-1/16	6

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	4	96	0
5 - 8	3	96	1
8 - 11	2	98	0
11 - 14	9	91	0
14 - 17	5	95	0
17 - 20	1	99	0
20 - 23	1	74	25
23 - 26	10	77	13
26 - 29	10	86	4
29 - 32	18	61	21

TG 11 SW 10 1158 1042 Blind Lane, Honingham

Surface level (+41.4 m) +136 ft
Water not struck
Wirth B1, 8 inch diam.
November 1969

Overburden (10.1 m) 33 ft
Mineral (5.8 m) 19 ft
Waste (2.7 m) 9 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Boulder Clay	Soil and brown stony clay.	(3.4)	11	(3.4)	11
	Grey and brown chalky clays.	(6.7)	22	(10.1)	33
Glacial Sand and Gravel	'Clayey' sand. Gravel: fine, subangular with traces of sub-rounded, mainly flint with some fine quartz. Sand: fine with medium and traces of coarse, subrounded mainly flint with some quartz and traces of chalk; light brown.	(5.8)	19	(15.9)	52
Boulder Clay	Brown stony clay.	(2.7)	9	(18.6)	61
Upper Chalk	Chalk.	(0.9+)	3+	(19.5)	64

%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
	+64	0	33 - 36	10	88	2
Gravel 1	-64+16	0	36 - 39	18	82	0
	-16+4	1	39 - 42	12	88	0
			42 - 45	9	91	0
	-4+1	4	45 - 48	14	82	4
Sand 84	-1+$\frac{1}{4}$	32	48 - 52	26	72	2
	-$\frac{1}{4}$+1/16	48				
Fines 15	-1/16	15				

TG 11 SW 11 1253 1445 Gravel Pit Plantation, Ringland

Surface level (+33.8 m) +111 ft
Water not struck
Wirth B1, 8 inch diam.
October 1969

Overburden (0.3 m) 1 ft
Mineral (14.3 m) 47 ft
Waste (3.4 m) 11 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Pebbly sand. Gravel concentrated in upper 18 ft (5.5 m), absent from 19 to 34 ft (5.8 to 10.4 m). Clayey in lower 8 ft (2.4 m). Gravel: fine to coarse, subangular, mainly flint. Sand: medium with fine and traces of coarse, subangular; light brown.	(14.3)	47	(14.6)	48
Boulder Clay	Grey chalky clay.	(3.4)	11	(18.0)	59
Upper Chalk	Chalk.	(0.9+)	3+	(18.9)	62

%	mm	%
	+64	0
Gravel 14	-64+16	8
	-16+4	6
	-4+1	12
Sand 79	-1+$\frac{1}{4}$	42
	-$\frac{1}{4}$+1/16	25
Fines 7	-1/16	7

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	0	88	12
4 - 7	0	98	2
7 - 10	4	60	36
10 - 13	3	26	71
13 - 16	5	43	52
16 - 19	8	79	13
19 - 22	2	98	0
22 - 25	0	100	0
25 - 28	0	100	0
28 - 31	1	99	0
31 - 34	0	100	0
34 - 37	1	96	3
37 - 40	5	83	12
40 - 43	32	63	5
43 - 46	26	64	10
46 - 48	22	72	6

TG 11 SW 12 1243 1348 Blackbeck Plantation, Ringland

Surface level (+39.0 m) +128 ft
Water not struck
Wirth B1, 8 inch diam.
October 1969

Overburden (0.3 m) 1 ft
Mineral (15.6 m) 51 ft
Waste (1.8 m) 6 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Pebbly sand. Gravel occasionally absent. Gravel: coarse with fine, subangular with traces of subrounded, mainly flint with traces of fine subrounded quartz, with occasional flint cobbles in parts. Sand: fine and medium with traces of coarse, subangular; light to dark brown.	(15.6)	51	(15.9)	52
Boulder Clay	Grey chalky clay.	(1.8)	6	(17.7)	58
Upper Chalk	Chalk.	(0.9+)	3+	(18.6)	61

	%
Gravel	20
Sand	78
Fines	2

mm	%
+64	0
-64+16	13
-16+4	7
-4+1	5
-1+$\frac{1}{4}$	39
-$\frac{1}{4}$+1/16	34
-1/16	2

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	2	76	22
4 - 7	1	62	37
7 - 10	0	63	37
10 - 13	1	78	21
13 - 16	1	74	25
16 - 19	2	98	0
19 - 22	3	83	14
22 - 25	6	94	0
25 - 28	0	67	33
28 - 31	8	62	30
31 - 34	2	98	0
34 - 37	1	64	35
37 - 40	0	72	28
40 - 43	0	100	0
43 - 46	2	67	31
46 - 49	2	94	4
49 - 52	11	64	25

TG 11 SW 13 1234 1271 Ringland Clump, Ringland

Surface level (+52.8 m) +173 ft
Water not struck
Wirth B1, 8 inch diam.
October 1969

Overburden (0.3 m) 1 ft
Mineral (21.9 m) 72 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Sand. Gravel almost absent. Gravel: coarse, with fine, mainly subangular flint with fine subrounded quartz. Sand: fine and medium, subangular, with traces of coarse chalk in the upper half of the deposit; light brown to orange.	(21.9)	72	(22.2)	73
Upper Chalk	Chalk.	(0.9+)	3+	(23.1)	76

%	mm	%
	+64	0
Gravel 3	-64+16	2
	-16+4	1
	-4+1	2
Sand 94	-1+¼	42
	-¼+1/16	50
Fines 3	-1/16	3

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	1	99	0
4 - 7	3	97	0
7 - 10	5	95	0
10 - 13	4	96	0
13 - 16	3	97	0
16 - 19	1	99	0
19 - 22	4	96	0
22 - 25	0	100	0
25 - 28	14	86	0
28 - 31	2	98	0
31 - 34	3	97	0
34 - 37	3	61	36
37 - 40	2	98	0
40 - 43	1	99	0
43 - 46	7	73	20
46 - 49	9	91	0
49 - 52	3	97	0
52 - 55	0	100	0
55 - 58	2	98	0
58 - 61	2	98	0
61 - 64	9	91	0
64 - 67	1	99	0
67 - 70	2	98	0
70 - 73	0	86	14

TG 11 SW 14 1267 1112 Dereham Road, Easton

Surface level (+29.0 m) +95 ft
Water not struck
Wirth B1, 8 inch diam.
October 1969

Waste (18.3 m+) 60 ft+

		Thickness (m)	ft	Depth (m)	ft
Boulder Clay	Soil and brown chalky clay.	(11.3)	37	(11.3)	37
	Grey chalky clay.	(7.0+)	23+	(18.3)	60

TG 11 SW 15 1235 1038 Broom Lane, Easton

Surface level (+47.7 m) +157 ft
Water not struck
Shell and auger, 8 inch diam.
October 1969

Overburden (2.7 m) 9 ft
Mineral (15.6 m) 51 ft
Waste (2.7 m) 9 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
Boulder Clay	Soil and brown sandy and chalky clay.	(2.7)	9	(2.7)	9
Glacial Sand and Gravel	(a) Gravel. Gravel: coarse with fine, subangular to subrounded flint with traces of fine subrounded quartz and chalk, occasional flint cobbles. Sand: medium with coarse and fine, subangular flint.	(5.5)	18	(8.2)	27
	(b) Sand. Gravel almost absent. Gravel: fine subangular flint and traces of chalk. Sand: fine and medium, subangular, flint; light brown to cream.	(10.1)	33	(18.3)	60
Boulder Clay	Brown chalky clay.	(2.7)	9	(21.0)	69
Upper Chalk	Chalk.	(0.9+)	3+	(21.9)	72

	%	mm	%
(a) Gravel	59	+64	0
		-64+16	33
		-16+4	26
		-4+1	11
Sand	38	-1+¼	18
		-¼+1/16	9
Fines	3	-1/16	3
(b) Gravel	1	+64	0
		-64+16	0
		-16+4	1
		-4+1	1
Sand	93	-1+¼	42
		-¼+1/16	50
Fines	6	-1/16	6

Depth below surface (ft)	Percentage Fines	Sand	Gravel
9 - 12	5	25	70
12 - 15	2	33	65
15 - 18	5	29	66
18 - 21	1	36	63
21 - 24	1	39	60
24 - 27	4	66	30
27 - 30	5	95	0
30 - 33	5	94	1
33 - 36	16	83	1
36 - 39	9	91	0
39 - 42	6	94	0
42 - 45	6	94	0
45 - 48	6	93	1
48 - 51	5	94	1
51 - 54	4	94	2
54 - 57	5	95	0
57 - 60	3	96	1

TG 11 SW 16 1350 1467 Royal Hill, Ringland

Surface level (+36.2 m) +119 ft
Water not struck
Wirth B1, 8 inch diam.
October 1969

Overburden (0.3 m) 1 ft
Mineral (11.9 m) 39 ft
Waste (5.5 m) 18 ft
Mineral (1.8 m) 6 ft
Bedrock (0.9 m+) 3 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly sand. Gravel mainly in upper 9 ft (2.7 m). Gravel: coarse with fine, subangular flint. Sand: fine with medium and traces of coarse, subangular; light brown.	(11.9)	39	(12.2)	40
Boulder Clay		'Very clayey' sand. Traces of gravel, light brown clay and hard chalk.	(5.5)	18	(17.7)	58
Glacial Sand and Gravel	(b)	'Very clayey' pebbly sand. Gravel: fine with coarse, subangular to sub-rounded flint. Sand: fine and medium, subangular, with light brown and grey clay; light grey.	(1.8)	6	(19.5)	64
Upper Chalk		Chalk.	(0.9+)	3+	(20.4)	67

		%	mm	%
(a)	Gravel	16	+64	0
			-64+16	11
			-16+4	5
	Sand	82	-4+1	9
			-1+¼	29
			-¼+1/16	44
	Fines	2	-1/16	2
(b)	Gravel	5	+64	0
			-64+16	1
			-16+4	4
	Sand	70	-4+1	2
			-1+¼	16
			-¼+1/16	52
	Fines	25	-1/16	25

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	0	38	62
4 - 7	0	62	38
7 - 10	0	32	68
10 - 13	1	99	0
13 - 16	1	99	0
16 - 19	1	99	0
19 - 22	7	93	0
22 - 25	9	91	0
25 - 28	3	82	15
28 - 31	2	98	0
31 - 34	0	100	0
34 - 37	1	71	28
37 - 40	1	99	0
58 - 61	29	66	5
61 - 64	20	74	6

TG 11 SW 17 1317 1374 Jennis's Wood, Ringland

Surface level (+19.7 m) +65 ft
Water not struck
Wirth B1, 8 inch diam.
October 1969

Overburden (2.1 m) 7 ft
Mineral (3.7 m) 12 ft
Bedrock (1.8 m+) 6 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
Boulder Clay	Soil and light brown to grey sandy clay.	(2.1)	7	(2.1)	7
Glacial Sand and Gravel	'Clayey' pebbly sand. 'Clayey' in lower 6 ft (1.8 m). Gravel: fine to coarse, subangular flint. Sand: medium and fine, subangular; light brown.	(3.7)	12	(5.8)	19
Upper Chalk	Chalk with some sand and traces of gravel.	(0.9)	3	(6.7)	22
	Chalk.	(0.9+)	3+	(7.6)	25

%	mm	%
	+64	: 0
Gravel 21	-64+16	: 9
	-16+4	: 12
	-4+1	: 3
Sand 66	$-1+\frac{1}{4}$	: 30
	$-\frac{1}{4}+1/16$	: 33
Fines 13	-1/16	: 13

Depth below surface (ft)	Percentage Fines	Sand	Gravel
7 - 10	6	59	35
10 - 13	4	65	31
13 - 16	19	75	6
16 - 19	21	68	11

TG 11 SW 18 1352 1239 Ringland Hills

Surface level (+48.7 m) +160 ft
Water not struck
Wirth B1, 8 inch diam.
September 1969

Overburden (4.9 m) 16 ft
Mineral (3.7 m) 12 ft
Waste (8.5 m) 28 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
Boulder Clay	Made ground and brown clay with flint pebbles.	(4.9)	16	(4.9)	16
Glacial Sand and Gravel	Sandy gravel. Traces of chalk at base. Gravel: coarse with fine, and occasional cobbles near the base, mainly subangular flint. Sand: medium with fine and a little coarse, subangular; brown.	(3.7)	12	(8.6)	28
	'Clayey' sand with traces of gravel.	(0.9)	3	(9.5)	31
Boulder Clay	Brown clay.	(7.6)	25	(17.1)	56
Upper Chalk	Chalk.	(0.9+)	3+	(18.0)	59

%	mm	%
	+64	1
Gravel 42	-64+16	28
	-16+4	13
	-4+1	6
Sand 53	-1+¼	30
	-¼+1/16	17
Fines 5	-1/16	5

Depth below surface (ft)	Percentage Fines	Sand	Gravel
16 - 19	1	53	46
19 - 22	4	66	30
22 - 25	4	66	30
25 - 28	10	28	62

TG 11 SW 19 1319 1168 Hill Farm, Easton

Surface level (+31.4 m) +103 ft
Water not struck
Wirth B1, 8 inch diam.
September 1969

Waste (16.5 m) 54 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Boulder Clay	Brown stony clay.	(3.7)	12	(3.7)	12
	Brown chalky clay.	(9.1)	30	(12.8)	42
	Grey silty clay.	(3.7)	12	(16.5)	54
Upper Chalk	Chalk.	(0.9+)	3+	(17.4)	67

TG 11 SW 20 1361 1044 Upper Farm, Easton

Surface level (+44.1 m) +145 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
October 1969

Overburden (0.6 m) 2 ft
Mineral (13.7 m) 45 ft
Waste (9.4 m) 31 ft
Bedrock (0.6 m+) 2 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Pebbly sand. Some hard chalk in lower half of deposit. Gravel: fine to coarse, with coarse predominant at top of deposit, subangular with traces of subrounded, mainly flint with some subrounded quartz. Sand: medium with fine and traces of coarse, subangular; brown to cream.	(13.7)	45	(14.3)	47
Boulder Clay	Light brown chalky and sandy clay with traces of gravel.	(3.0)	10	(17.3)	57
	Brown stony and chalky clay.	(6.4)	21	(23.7)	78
Upper Chalk	Chalk.	(0.6+)	2+	(24.3)	80

%	mm	%
	+64	0
Gravel 17	-64+16	10
	-16+4	7
	-4+1	5
Sand 79	-1+¼	44
	-¼+1/16	30
Fines 4	-1/16	4

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	11	41	48
5 - 8	3	30	67
8 - 11	2	25	73
11 - 14	2	82	16
14 - 17	1	89	10
17 - 20	6	92	2
20 - 23	8	89	3
23 - 26	5	93	2
26 - 29	2	95	3
29 - 32	9	90	1
32 - 35	3	95	2
35 - 38	2	93	5
38 - 41	3	94	3
41 - 44	1	94	5
44 - 47	2	86	12

TG 11 SW 21 1423 1412 The Vicarage, Ringland

Surface level (+11.6 m) +38 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
September 1969

Overburden (0.6 m) 2 ft
Mineral (4.6 m) 15 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Terrace Gravel	Sandy gravel. 'Clayey' in upper 6 ft (1.8 m). Gravel: fine with coarse, subangular, with some subrounded flint. Sand: medium with fine and traces of coarse, subangular, flint, traces of chalk at base; brown.	(4.6)	15	(5.2)	17
Upper Chalk	Chalk.	(0.9+)	3+	(6.1)	20

%	mm	%
	+64	0
Gravel 35	-64+16	15
	-16+4	20
	-4+1	8
Sand 57	-1+$\frac{1}{4}$	34
	-$\frac{1}{4}$+1/16	15
Fines 8	-1/16	8

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	20	67	13
5 - 8	13	71	16
8 - 11	3	55	42
11 - 14	1	47	52
14 - 17	2	45	53

TG 11 SW 22 1418 1368 Low Common, Ringland

Surface level (+8.9 m) +29 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
September 1969

Overburden (2.1 m) 7 ft
Mineral (0.9 m) 3 ft
Bedrock (1.8 m+) 6 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil and black silty clay.	(2.1)	7	(2.1)	7
Suballuvium Gravel	Gravel.	(0.9)	3	(3.0)	10
	Gravel: coarse with fine, subangular with traces of subrounded, mainly flint with traces of fine subrounded quartz. Sand: medium with coarse and traces of fine, subangular; black to grey.				
Upper Chalk	Clayey and chalky gravel with traces of sand.	(0.9)	3	(3.9)	13
	Chalk.	(0.9+)	3+	(4.8)	16

%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
	+64	: 0	7 - 10	1	30	69
Gravel 69	-64+16	: 42				
	-16+4	: 27				
	-4+1	: 8				
Sand 30	-1+$\frac{1}{4}$	: 18				
	-$\frac{1}{4}$+1/16	: 4				
Fines 1	-1/16	: 1				

TG 11 SW 23 1459 1354 Taverham Hall Farm, Taverham

Surface level (+27.4 m) +90 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
September 1969

Overburden (0.6 m) 2 ft
Mineral (1.8 m) 6 ft
Waste (3.7 m) 12 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	'Clayey' sandy gravel. Gravel: fine and coarse and occasional cobbles, mainly subangular flint. Sand: fine and medium, with a trace of coarse, subangular brown.	(1.8)	6	(2.4)	8
Boulder Clay	Brown-yellow clay with partings of medium sand and fine to coarse gravel.	(3.7)	12	(6.1)	20
Upper Chalk	Chalk.	(0.9+)	3+	(7.0)	23

%	mm	%
	+64	0
Gravel 31	-64+16	17
	-16+4	14
	-4+1	5
Sand 47	-1+¼	21
	-¼+1/16	21
Fines 22	-1/16	22

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	25	56	19
5 - 8	18	39	43

TG 11 SW 24 1428 1292 Three Corner Plantation, Ringland

Surface level (+11.4 m) +37 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
September 1969

Overburden (0.6 m) 2 ft
Mineral (1.8 m) 6 ft
Bedrock (2.4 m+) 8 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Terrace Gravel	'Clayey' sandy gravel. Traces of soft chalk at base. Gravel: fine and coarse, subangular flint. Sand: medium with fine and traces of coarse, subangular; brown.	(1.8)	6	(2.4)	8
Upper Chalk	Chalk with traces of sand and gravel at the top.	(2.4+)	8+	(4.8)	16

%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
	+64	0	2 - 5	18	58	24
Gravel 25	-64+16	14	5 - 8	18	56	26
	-16+4	11				
	-4+1	5				
Sand 57	-1+$\frac{1}{4}$	31				
	-$\frac{1}{4}$+1/16	21				
Fines 18	-1/16	18				

TG 11 SW 25 1436 1201 Easton Reeds, Easton

Surface level (+44.1 m) +145 ft
Water not struck
Wirth B1, 8 inch diam.
September 1969

Overburden (0.3 m) 1 ft
Mineral (6.4 m) 21 ft
Waste (8.2 m) 27 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Sandy gravel. Gravel: coarse with fine, subangular with a little subrounded, mainly flint with a trace of fine subrounded quartzite. Sand: medium with fine and coarse, subangular with angular; brown.	(6.4)	21	(6.7)	22
Boulder Clay	Brown clay.	(8.2)	27	(14.9)	49
Upper Chalk	Chalk.	(0.9+)	3+	(15.8)	52

%	mm	%
	+64	0
Gravel 45	-64+16	29
	-16+4	16
	-4+1	9
Sand 54	-1+¼	33
	-¼+1/16	12
Fines 1	-1/16	1

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	0	64	36
4 - 7	2	57	41
7 - 10	1	50	49
10 - 13	1	29	70
13 - 16	0	45	55
16 - 19	2	84	14
19 - 22	1	52	47

TG 11 SW 26 1437 1131 Long Dell, Easton

Surface level (+31.4 m) +103 ft
Water not struck
Wirth B1, 8 inch diam.
September 1969

Overburden (0.3 m) 1 ft
Mineral (9.1 m) 30 ft
Waste (6.1 m) 20 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Sandy gravel. 'Clayey' in lower 6 ft (2.4 m). Gravel mainly in upper 18 ft (5.5 m). Gravel: coarse with fine, subangular with subrounded, mainly flint with quartzite. Sand: medium with fine and traces of coarse, subangular and subrounded, flint and quartz; brown to yellow.	(9.1)	30	(9.4)	31
Boulder Clay	Brown clay.	(6.1)	20	(15.5)	51
Upper Chalk	Chalk.	(0.9+)	3+	(16.4)	54

%	mm	%
	+64	0
Gravel 26	-64+16	15
	-16+4	11
	-4+1	4
Sand 69	-1+¼	36
	-¼+1/16	29
Fines 5	-1/16	5

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	4	42	54
4 - 7	7	44	49
7 - 10	1	83	16
10 - 13	1	40	59
13 - 16	0	77	23
16 - 19	0	81	19
19 - 22	1	99	0
22 - 25	0	68	32
25 - 28	14	78	8
28 - 31	20	80	0

TG 11 SW 27 1441 1043 Dunham's Grove, Easton

Surface level (+44.0 m) +144 ft
Water not struck
Shell and auger, 8 inch diam.
October 1969

Overburden (0.3 m) 1 ft
Mineral (17.4 m) 57 ft
Waste (6.4 m) 21 ft
Bedrock (0.3 m+) 1 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Gravel. 'Clayey' in upper 3 ft (0.9 m). Traces of cobbles. Gravel: coarse with fine, some cobbles, mainly angular and subangular flint. Sand: medium subangular, with coarse subangular to angular, mainly flint; brown.	(6.4)	21	(6.7)	22
	(b)	Pebbly sand. Chalky near base. Gravel: fine with coarse, subangular flint with subrounded quartz. Sand: medium with fine traces of coarse, subangular; brown, chalky at base.	(11.0)	36	(17.7)	58
Boulder Clay		Brown chalky clay.	(6.4)	21	(24.1)	79
Upper Chalk		Chalk.	(0.3+)	1+	(24.4)	80

		%	mm	%
			+64	0
(a)	Gravel	65	-64+16	44
			-16+4	21
			-4+1	9
	Sand	32	-1+¼	16
			-¼+1/16	7
	Fines	3	-1/16	3
			+64	0
(b)	Gravel	12	-64+16	4
			-16+4	8
			-4+1	12
	Sand	83	-1+¼	44
			-¼+1/16	27
	Fines	5	-1/16	5

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	17	56	27
4 - 7	2	22	76
7 - 10	0	12	88
10 - 13	0	23	77
13 - 16	0	48	52
16 - 19	1	49	50
19 - 22	1	19	80
22 - 25	3	71	26
25 - 28	9	82	9
28 - 31	11	85	4
31 - 34	4	79	17
34 - 37	3	72	25
37 - 40	4	79	17
40 - 43	6	89	5
43 - 46	5	84	11
46 - 49	6	93	1
49 - 52	3	82	15
52 - 55	3	83	14
55 - 58	3	93	4

TG 11 SE 1 1540 1480 Taverham

Surface level (+36.9 m) +121 ft
Water not struck
Wirth B1, 8 inch diam.
November 1969

Overburden (0.9 m) 3 ft
Mineral (12.8 m) 42 ft
Waste (10.7 m+) 35 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil and soft brown clay.	(0.9)	3	(0.9)	3
Glacial Sand and Gravel	Pebbly sand. Gravel absent from upper 12 ft (3.7 m). Silty in places. Gravel: fine and coarse, subangular to rounded flint with fine and medium rounded quartz and quartzite. Sand: medium with fine and traces of coarse, mainly subangular with some subrounded quartz, traces of hard chalk; yellow.	(12.8)	42	(13.7)	45
Boulder Clay	Soft grey clay.	(6.7)	22	(20.4)	67
	Grey chalky clay.	(4.0+)	13+	(24.4)	80

%		mm	%
		+64	: 0
Gravel	17	-64+16	: 10
		-16+4	: 7
		-4+1	: 4
Sand	75	-1+$\frac{1}{4}$	:
		-$\frac{1}{4}$+1/16	: 38
Fines	8	-1/16	: 8

Depth below surface (ft)	Percentage Fines	Sand	Gravel
3 - 6	9	91	0
6 - 9	11	89	0
9 - 12	6	94	0
12 - 15	11	89	0
15 - 18	3	28	69
18 - 21	10	75	15
21 - 24	2	55	43
24 - 27	1	61	38
27 - 30	2	70	28
30 - 33	4	92	4
33 - 36	19	81	0
36 - 39	11	84	5
39 - 42	7	82	11
42 - 45	13	66	21

TG 11 SE 2 1556 1279 Blythe's Wood, Costessey

Surface level (+18.7 m) +61 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
September 1969

Overburden (0.5 m) 1.5 ft
Mineral (3.2 m) 10.5 ft
Waste (2.7 m) 9 ft
Mineral (3.5 m) 11.5 ft
Bedrock (0.9 m+) 3 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.5)	1.5	(0.5)	1.5
Glacial Sand and Gravel	(a)	'Clayey' pebbly sand. Gravel concentrated in lower 3 ft (0.9 m). Gravel: mainly fine with traces of coarse, at base, mainly subangular to subrounded flint with subrounded quartz. Sand: fine with medium, subangular; brown.	(3.2)	10.5	(3.7)	12.0
Norwich Brickearth		Brown sandy clay with traces of gravel.	(2.7)	9	(6.4)	21.0
Glacial Sand and Gravel	(b)	Gravel. 'Clayey' near the top. Gravel: fine and coarse, subangular to subrounded flint with traces of fine rounded quartz. Sand: medium and coarse with fine, subangular; grey.	(3.5)	11.5	(9.9)	32.5
Upper Chalk.		Chalk.	(0.9+)	3+	(10.8)	35.5

		%	mm	%
			+64	0
(a)	Gravel	7	-64+16	1
			-16+4	6
			-4+1	4
	Sand	82	$-1+\frac{1}{4}$	27
			$-\frac{1}{4}+1/16$	51
	Fines	11	-1/16	11
			+64	0
(b)	Gravel	54	-64+16	25
			-16+4	29
			-4+1	15
	Sand	38	$-1+\frac{1}{4}$	15
			$-\frac{1}{4}+1/16$	8
	Fines	8	-1/16	8

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1.5 - 3	13	85	2
3 - 6	15	83	2
6 - 9	7	93	0
9 - 12	11	68	21
21 - 24	8	36	58
24 - 27	13	29	58
27 - 30	4	43	53
30 - 32.5	7	46	47

TG 11 SE 3 1557 1205 Model Farm, Costessey

Surface level (+41.9 m) +137 ft
Water not struck
Wirth B1, 8 inch diam.
November 1969

Overburden (1.2 m) 4 ft
Mineral (23.1 m+) 76 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(1.2)	4	(1.2)	4
Glacial Sand and Gravel	(a)	Sandy gravel. Gravel content decreases towards base. Traces of hard chalk. Gravel: fine to coarse becoming mainly fine at the base, subangular flint with some sub-rounded fine quartz. Sand: medium with fine and coarse, tending to be finer at the top and bottom, mainly subangular, some rounded quartz.	(8.2)	27	(9.4)	31
	(b)	Pebbly sand. 'Clayey' near top and bottom. Traces of hard chalk. Gravel: fine and coarse, subangular flint, with traces of fine rounded quartz. Sand: medium and fine subangular; brown.	(14.9+)	49+	(24.3)	80

		%	mm	%
			+64	: 0
(a)	Gravel	37	-64+16	: 19
			-16+4	: 18
			-4+1	: 11
	Sand	62	-1+$\frac{1}{4}$	: 40
			-$\frac{1}{4}$+1/16	: 11
	Fines	1	-1/16	: 1
			+64	: 0
(b)	Gravel	5	-64+16	: 2
			-16+4	: 3
			-4+1	: 5
	Sand	91	-1+$\frac{1}{4}$	: 47
			-$\frac{1}{4}$+1/16	: 39
	Fines	4	-1/16	: 4

Depth below surface (ft)	Percentage Fines	Sand	Gravel
4 - 7	8	49	43
7 - 10	0	54	46
10 - 13	0	60	40
13 - 16	0	44	66
16 - 19	0	45	55
19 - 22	0	68	32
22 - 25	1	87	12
25 - 28	1	74	25
28 - 31	0	80	20
31 - 34	0	100	0
34 - 37	24	76	0
37 - 40	0	82	18
40 - 43	5	90	5
43 - 46	1	98	1
46 - 49	0	91	9
49 - 52	2	98	0
52 - 55	1	99	0
55 - 58	0	86	14
58 - 61	1	99	0
61 - 64	5	95	0
64 - 67	0	82	18
67 - 70	1	99	0
70 - 73	3	97	0
73 - 76	2	98	0
76 - 80	28	61	11

TG 11 SE 4 1579 1061 Lodge Farm, Costessey

Surface level (+34.9 m) +115 ft
Water not struck
Wirth B1, 8 inch diam.
September 1969

Overburden (0.3 m) 1 ft
Mineral (24.1 m+) 79 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Pebbly sand. Gravel mainly in upper 24 ft (7.3 m). Occasional cobbles in upper 21 ft (6.4 m). Gravel: fine and coarse, mainly subangular flint with fine subrounded quartz, and occasional subrounded flint cobbles. Sand: medium with traces of fine, mainly subangular flaky flint with some rounded quartz; yellow to brown.	(24.1+)	79+	(24.4)	80

	%
Gravel	15
Sand	84
Fines	1

mm	%
+64	1
-64+16	7
-16+4	7
-4+1	8
-1+$\frac{1}{4}$	62
-$\frac{1}{4}$+1/16	14
-1/16	1

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	7	62	31
4 - 7	0	73	27
7 - 10	1	44	55
10 - 13	0	50	50
13 - 16	0	65	35
16 - 19	0	65	35
19 - 22	1	88	11
22 - 25	0	80	20
25 - 28	1	96	3
28 - 31	0	96	4
31 - 34	1	97	2
34 - 37	0	91	9
37 - 40	1	91	8
40 - 43	0	91	9
43 - 46	1	82	17
46 - 49	0	89	11
49 - 52	0	93	7
52 - 55	1	97	2
55 - 58	1	94	5
58 - 61	0	99	1
61 - 64	1	88	11
64 - 67	0	97	3
67 - 70	2	89	9
70 - 73	0	96	4
73 - 76	1	94	5
76 - 80	19	72	9

TG 11 SE 5 1680 1464 North-east of Taverham

Surface level (+35.1 m) +115 ft
Water not struck
Wirth B1, 8 inch diam.
September 1969

Overburden (0.3 m) 1 ft
Mineral (12.8 m) 42 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Sand. Sand: medium and fine, subangular; brown.	(12.8)	42	(13.1)	43
Upper Chalk	Chalk.	(0.9+)	3+	(14.0)	46

%	mm	%
	+64	: 0
Gravel 0	-64+16	: 0
	-16+4	: 0
	-4+1	: 2
Sand 99	-1+$\frac{1}{4}$	: 52
	-$\frac{1}{4}$+1/16	: 45
Fines 1	-1/16	: 1

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	2	97	1
4 - 7	1	99	0
7 - 10	1	99	0
10 - 13	0	100	0
13 - 16	1	99	0
16 - 19	1	99	0
19 - 22	1	99	0
22 - 25	0	100	0
25 - 28	1	98	1
28 - 31	2	98	0
31 - 34	2	98	0
34 - 37	1	99	0
37 - 40	5	95	0
40 - 43	2	95	3

TG 11 SE 6 1693 1384 East of Taverham

Surface level (+36.3 m) +119 ft
Water not struck
Wirth B1, 8 inch diam.
September 1969

Overburden (1.8 m) 6 ft
Mineral (13.7 m) 45 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil and slightly sandy clay	(1.8)	6	(1.8)	6
Glacial Sand and Gravel	Sand. Gravel concentrated in upper 3 ft (0.9 m). Occasional cobbles at the base. Gravel: fine with some coarse, mainly subangular with subrounded flint with occasional fine rounded flint and occasional subrounded flint cobbles. Sand: medium at the top, becoming medium with fine at the base, subangular to subrounded, sometimes ironstained; orange to brown.	(13.7)	45	(15.5)	51
Upper Chalk	Chalk.	(0.9+)	3+	(16.4)	54

%	mm	%
	+64	0
Gravel 3	-64+16	2
	-16+4	1
	-4+1	3
Sand 96	$-1+\frac{1}{4}$	62
	$-\frac{1}{4}+1/16$	31
Fines 1	-1/16	1

Depth below surface (ft)	Percentage Fines	Sand	Gravel
6 - 9	0	80	20
9 - 12	1	93	6
12 - 15	1	99	0
15 - 18	2	93	5
18 - 21	0	98	2
21 - 24	0	99	1
24 - 27	1	97	2
27 - 30	3	97	0
30 - 33	1	98	1
33 - 36	2	98	0
36 - 39	1	98	1
39 - 42	1	98	1
42 - 45	2	98	0
45 - 48	1	99	0
48 - 51	5	88	7

TG 11 SE 7 1699 1248 Place Farm, Taverham

Surface level (+11.9 m) +39 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
September 1969

Overburden (0.6 m) 2 ft
Mineral (6.2 m) 20.5 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Terrace Gravel	Sandy gravel. 'Clayey' from 8 to 11 ft (2.4 to 3.4 m). Gravel: fine and coarse, with occasional cobbles at base, mainly subangular flint with subrounded quartz. Sand: medium and fine at top becoming mainly medium at the bottom, subangular; brown.	(6.2)	20.5	(6.8)	22.5
Upper Chalk	Chalk.	(0.9+)	3+	(77.7)	25.5

%	mm	%
	+64	0
Gravel 30	-64+16	12
	-16+4	18
	-4+1	5
Sand 63	-1+$\frac{1}{4}$	27
	-$\frac{1}{4}$+1/16	31
Fines 7	-1/16	7

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	9	77	14
5 - 8	20	75	5
8 - 11	3	63	34
11 - 14	6	53	41
14 - 17	7	56	37
17 - 20	5	67	28
20 - 22.5	1	50	49

TG 11 SE 8 1648 1116 Costessey Hall, Costessey

Surface level (+23.5 m) +77 ft
Water not struck
Wirth B1, 8 inch diam.
September 1969

Overburden (2.1 m) 7 ft
Mineral (3.7 m) 12 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
Boulder Clay	Soil and brown stony clay.	(2.1)	7	(2.1)	7
Glacial Sand and Gravel	Pebbly sand. Gravel: fine and coarse, mainly subangular flint. Sand: medium with fine, subangular, traces of chalk at the top; brown.	(3.7)	12	(5.8)	19
Upper Chalk.	Chalk.	(0.9+)	3+	(6.7)	22

%	mm	%
	+64	0
Gravel 8	-64+16	3
	-16+4	5
	-4+1	4
Sand 86	-1+$\frac{1}{4}$	56
	-$\frac{1}{4}$+1/16	26
Fines 6	-1/16	6

Depth below surface (ft)	Percentage Fines	Sand	Gravel
7 - 10	9	86	5
10 - 13	8	84	8
13 - 16	2	89	9
16 - 19	5	85	10

TG 11 SE 9 1673 1030 The Roundhouse, Costessey

Surface level (+34.5 m) +113 ft
Water not struck
Wirth B1, 8 inch diam.
September 1969

Overburden (0.6 m) 2 ft
Mineral (11.0 m) 36 ft
Waste (7.9 m) 26 ft
Mineral (4.9 m+) 16 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	Pebbly sand. Gravel absent at base. Occasional cobbles between 8 and 11 ft (2.4 to 3.4 m). Gravel: fine and coarse to cobble, subangular and subrounded flint with traces of fine rounded quartz. Sand: medium and fine, becoming mainly medium at depth, subrounded quartz and subangular flint; grey and brown.	(11.0)	36	(11.6)	38
Boulder Clay		Brown slightly sandy clay.	(2.7)	9	(14.3)	47
		Brown chalky clay.	(3.7)	12	(18.0)	59
		Brown clay with occasional green laminations.	(1.5)	5	(19.5)	64
Glacial Sand and Gravel	(b)	Sand. Gravel concentrated in lower 6 ft (1.8 m). Gravel: mainly fine flint. Sand: medium with traces of fine, subrounded quartz with subangular flint; brown.	(4.9+)	16+	(24.4)	80

	%	mm	%
(a)		+64	: 0
	Gravel 10	-64+16	: 4
		-16+4	: 6
		-4+1	: 7
	Sand 88	-1+$\frac{1}{4}$	: 68
		-$\frac{1}{4}$+1/16	: 13
	Fines 2	-1/16	: 2
(b)		+64	: 0
	Gravel 1	-64+16	: 0
		-16+4	: 1
		-4+1	: 3
	Sand 98	-1+$\frac{1}{4}$	: 80
		-$\frac{1}{4}$+1/16	: 15
	Fines 1	-1/16	: 1

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	4	82	14
5 - 8	3	86	11
8 - 11	2	83	15
11 - 14	4	82	14
14 - 17	1	80	19
17 - 20	8	83	9
20 - 23	1	87	12
23 - 26	0	96	4
26 - 29	1	85	14
29 - 32	0	95	5
32 - 35	1	98	1
35 - 38	1	99	0
64 - 67	2	98	0
67 - 70	1	99	0
70 - 73	1	99	0
73 - 76	0	97	3
76 - 80	0	98	2

TG 11 SE 10 1778 1453 South of Brickfield Farm, Drayton

Surface level (+34.4 m) +113 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (0.6 m) 2 ft
Mineral (12.8 m) 42 ft
Waste (3.7 m) 12 ft
Mineral (2.7 m) 9 ft
Bedrock (0.9 m+) 3 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	Pebbly sand. Gravel: mainly fine subangular flint and quartz. Sand: medium and coarse with fine, subangular; brown.	(4.6)	15	(5.2)	17
	(b)	'Very clayey' pebbly sand. Gravel: fine and coarse subangular flint. Sand: medium and fine, subangular; brown to grey.	(8.2)	27	(13.4)	44
Boulder Clay		Brown chalky clay.	(3.1)	10	(16.5)	54
		Grey and brown sandy clay	(0.6)	2	(17.1)	56
? Norwich Crag	(c)	'Clayey' sandy gravel. Gravel: fine to coarse, subangular flint with traces of subrounded quartz. Sand: medium with fine and coarse, subangular flint with subrounded quartz; brown to grey.	(2.7)	9	(19.8)	65
Upper Chalk		Chalk.	(0.9+)	3+	(20.7)	68

		%	mm	%
			+64	0
(a)	Gravel	6	-64+16	2
			-16+4	4
			-4+1	32
	Sand	93	-1+¼	44
			-¼+1/16	17
	Fines	1	-1/16	1
			+64	0
(b)	Gravel	9	-64+16	7
			-16+4	2
			-4+1	2
	Sand	63	-1+¼	21
			-¼+1/16	40
	Fines	28	-1/16	28
			+64	0
(c)	Gravel	26	-64+16	12
			-64+4	14
			-4+1	10
	Sand	54	-1+¼	29
			-¼+1/16	15
	Fines	20	-1/16	20

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	5	82	13
5 - 8	1	93	6
8 - 11	0	95	5
11 - 14	1	96	3
14 - 17	0	98	2
17 - 20	23	69	8
20 - 23	39	59	2
23 - 26	2	44	54
26 - 29	41	55	4
29 - 32	41	57	2
32 - 35	41	58	1
35 - 38	13	83	4
38 - 41	41	58	1
41 - 44	13	85	2
56 - 59	33	48	19
59 - 62	10	54	36
62 - 65	17	61	22

TG 11 SE 11 1762 1359 Taverham Road, Drayton

Surface level (+23.6 m) +77 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (0.6 m) 2 ft
Mineral (3.7 m) 12 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Sandy gravel. 'Clayey' in upper 3 ft (0.9 m). Traces of soft chalk at base. Gravel: fine with coarse, subangular to subrounded flint, with traces of subrounded quartz and quartzite. Sand: medium with coarse subangular to rounded; brown.	(3.7)	12	(4.3)	14
Upper Chalk	Chalk.	(0.9+)	3+	(5.2)	17

%	mm	%
	+64	0
Gravel 46	-64+16	18
	-16+4	28
	-4+1	19
Sand 48	-1+$\frac{1}{4}$	26
	-$\frac{1}{4}$+1/16	3
Fines 6	-1/16	6

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	12	66	22
5 - 8	4	47	49
8 - 11	2	43	55
11 - 14	4	38	58

TG 11 SE 12 1760 1267 Costessey Mill, Costessey

Surface level (+4.9 m) +16 ft
Water struck at (+4.3 m) +14 ft
Shell and auger, 8 inch diam.
September 1969

Overburden (2.1 m) 7 ft
Mineral (1.5 m) 5 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil and made ground.	(0.8)	2.5	(0.8)	2.5
Alluvium	Grey-black silty clay.	(1.3)	4.5	(2.1)	7
Suballuvium Gravel	Gravel. Traces of soft chalk at base. Gravel: fine to coarse with rare cobbles, subangular to subrounded, flint, Sand: medium and coarse, subangular; grey.	(1.5)	5	(3.6)	12
Upper Chalk	Chalk.	(0.9+)	3+	(4.5)	15

%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
	+64	0	7 - 10	1	40	59
Gravel 64	-64+16	27	10 - 12	7	21	72
	-16+4	37				
	-4+1	14				
Sand 33	-1+$\frac{1}{4}$	16				
	-$\frac{1}{4}$+1/16	3				
Fines 3	-1/16	3				

TG 11 SE 13 1876 1461 Reepham Road, Drayton

Surface level (+31.6 m) +104 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
October 1969

Overburden (0.6 m) 2 ft
Mineral (3.7 m) 12 ft
Waste (4.5 m) 15 ft
Mineral (4.6. m) 15 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a) Pebbly sand. 'Clayey' in upper 3 ft (0.9 m). Gravel: mainly fine subangular flint. Sand: medium with fine, subangular; brown.	(3.7)	12	(4.3)	14
	'Very clayey' pebbly sand.	(2.7)	9	(7.0)	23
?Norwich Brickearth	Brown and blue chalky clay.	(1.8)	6	(8.8)	29
Norwich Crag	(b) Sandy gravel. Gravel: fine to coarse, subangular to subrounded flint, with occasional fine rounded quartz. Sand: medium and coarse, subangular to subrounded; dark brown.	(4.6)	15	(13.4)	44
Upper Chalk	Chalk.	(0.9+)	3+	(14.3)	47

		%	mm	%
(a)	Gravel	6	+64	0
			-64+16	2
			-16+4	4
	Sand	88	-4+1	4
			-1+¼	56
			-¼+1/16	28
	Fines	6	-1/16	6
(b)	Gravel	47	+64	0
			-64+16	17
			-16+4	30
	Sand	51	-4+1	21
			-1+¼	23
			-¼+1/16	7
	Fines	2	-1/16	2

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	20	76	4
5 - 8	4	89	7
8 - 11	1	87	12
11 - 14	0	99	1
29 - 32	4	54	42
32 - 35	2	71	27
35 - 38	1	51	48
38 - 41	1	34	65
41 - 44	4	43	53

TG 11 SE 14 1885 1383 Wood Farm, Drayton

Surface level (+22.0 m) +72 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
October 1969

Overburden (0.6 m) 2 ft
Mineral (0.9 m) 3 ft
Waste (10.0 m) 33 ft
Mineral (4.9 m) 16 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a) 'Very clayey' pebbly sand. Gravel: coarse subangular flint. Sand: fine and medium, subangular; brown. Clay: slightly silty with traces of chalk; brown.	(0.9)	3	(1.5)	5
Norwich Brickearth	Sandy brown clay with traces of gravel and occasional chalk pebbles.	(6.4)	21	(7.9)	26
	Grey sandy and chalky clay.	(2.7)	9	(10.6)	35
	Sandy brown clay with traces of gravel.	(0.9)	3	(11.5)	38
Norwich Crag	(b) Sandy gravel. 'Very clayey' in upper 3 ft (0.9 m). Traces of chalk. Gravel: fine and coarse, subangular flint, with occasional flint cobbles and fine subrounded quartz and quartzite at the base. Sand: medium with coarse and traces of fine, subangular to subrounded; light brown.	(4.9)	16	(16.4)	54
Upper Chalk	Chalk.	(0.9+)	3+	(17.3)	57

	%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
		+64	0	2 - 5	24	67	8
(a)	Gravel 9	-64+16	8				
		-16+4	1				
		-4+1	2				
	Sand 67	-1+¼	29				
		-¼+1/16	36				
	Fines 24	-1/16	24				
		+64	0	38 - 41	31	68	1
(b)	Gravel 34	-64+16	19	41 - 44	6	54	40
		-16+4	15	44 - 47	6	59	35
				47 - 50	2	44	54
		-4+1	11	50 - 54	3	59	38
	Sand 57	-1+¼	34				
		-¼+1/16	12				
	Fines 9	-1/16	9				

TG 11 SE 15 1888 1330 The Recreation Ground, Drayton

Surface level (+31.9 m) +105 ft
Water not struck
Wirth B1, 8 inch diam.
September 1969

Overburden (0.9 m) 3 ft
Mineral (4.6 m) 15 ft
Waste (2.1 m) 7 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil and firm brown clay.	(0.9)	3	(0.9)	3
Glacial Sand and Gravel	Sand. Sand: medium and fine subrounded, occasionally iron stained; brown.	(4.6)	15	(5.5)	18
Norwich Brickearth	Dark brown clay.	(2.1)	7	(7.6)	25
Upper Chalk	Chalk.	(0.9+)	3+	(8.5)	28

%	mm	%
	+64	: 0
Gravel 0	-64+16	: 0
	-16+4	: 0
	-4+1	: 1
Sand 99	-1+¼	: 53
	-¼+1/16	: 45
Fines 1	-1/16	: 1

Depth below surface (ft)	Percentage Fines	Sand	Gravel
3 - 6	1	99	0
6 - 9	1	99	0
9 - 12	0	100	0
12 - 15	1	97	2
15 - 18	1	99	0

TG 11 SE 16 1851 1229 Wensum Valley, Costessey

Surface level (+7.3 m) +24 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
September 1969

Overburden (0.6 m) 2 ft
Mineral (4.9 m) 16 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Terrace Gravel	'Clayey' gravel. Clayey in upper 6 ft (1.8 m). Gravel: fine and coarse predominantly fine at the top, mainly subangular flint with traces of fine rounded quartz. Sand: medium with fine and coarse, subangular, traces of chalk; brown to grey.	(4.9)	16	(5.5)	18
Upper Chalk	Chalk.	(0.9+)	3+	(6.4)	21

%	mm	%
	+64	: 0
Gravel 46	-64+16	: 21
	-16+4	: 25
	-4+1	: 9
Sand 41	-1+$\frac{1}{4}$	: 21
	-$\frac{1}{4}$+1/16	: 11
Fines 13	-1/16	: 13

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	29	69	2
5 - 8	17	43	40
8 - 11	6	28	66
11 - 14	5	33	62
14 - 18	0	41	59

TG 11 SE 17 1840 1177 Carr Hills, Costessey

Surface level (+30.5 m) +100 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
November 1969

Overburden (0.3 m) 1 ft
Mineral (1.8 m) 6 ft
Waste (0.9 m) 3 ft
Mineral (2.7 m) 9 ft
Waste (1.9 m) 5.5 ft
Bedrock (0.9 m+) 3 ft+

			Thickness (m)	ft	Depth (m)	ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	'Very clayey' pebbly sand. Gravel: mainly fine, subangular flint with subrounded quartz. Sand: medium and fine, subangular; brown.	(1.8)	6	(2.1)	7
Boulder Clay		Brown clay with grey laminations and traces of sand and gravel.	(0.9)	3	(3.0)	10
Glacial Sand and Gravel	(b)	'Clayey' pebbly sand. Gravel: fine with occasional cobbles and traces of coarse subangular to subrounded flint, with traces of fine subrounded quartz. Sand: medium with coarse, subangular; brown.	(2.7)	9	(5.7)	19
Boulder Clay		Brown chalky clay.	(1.1)	3.5	(6.8)	22.5
Norwich Crag	(c)	'Clayey' gravel. Traces of chalk towards base. Gravel: coarse with fine, subangular to subrounded flint. Sand: fine to coarse, subangular; brown.	(0.8)	2.5	(7.6)	25
Upper Chalk		Chalk.	(0.9+)	3+	(8.5)	28

		%	mm	%	Depth below surface (ft)	Percentage Fines	Sand	Gravel
			+64	: 0	1 - 4	19	80	1
(a)	Gravel	5	-64+16	: 1	4 - 7	35	58	7
			-16+4	: 4				
			-4+1	: 3				
	Sand	68	-1+¼	: 33				
			-¼+1/16	: 32				
	Fines	27	-1/16	: 27				
			+64	: 0	10 - 13	33	58	9
(b)	Gravel	17	-64+16	: 4	13 - 16	4	75	21
			-16+4	: 13	16 - 19	4	75	21
			-4+1	: 14				
	Sand	69	-1+¼	: 47				
			-¼+1/16	: 8				
	Fines	14	-1/16	: 14				
			+64	: 0	22.5 - 25	18	18	64
(c)	Gravel	64	-64+16	: 39				
			-16+4	: 25				
			-4+1	: 5				
	Sand	18	-1+¼	: 8				
			-¼+1/16	: 5				
	Fines	18	-1/16	: 18				

TG 11 SE 18 1953 1453 Near Bugg's Grove, Drayton

Surface level (+35.3 m) +116 ft
Water not struck
Wirth B1, 8 inch diam.
September 1969

Overburden (0.6 m) 2 ft
Mineral (13.7 m) 45 ft
Waste (8.2 m) 27 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
	Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Sand. Gravel mainly in the top 12 and bottom 9 ft (3.7 and 2.7 m). Gravel: fine subangular to subrounded flint. Sand: medium with fine becoming mainly fine towards the base, subangular, with iron staining in the lower 9 ft (2.7 m); brown.	(13.7)	45	(14.3)	47
Norwich Brickearth	Slightly sandy brown clay with traces of gravel.	(6.4)	21	(20.7)	68
	Dark brown mottled clay with occasional cobbles.	(1.8)	6	(22.5)	74
Upper Chalk	Chalk.	(0.9+)	3+	(23.4)	77

%	mm	%
	+64	0
Gravel 5	-64+16	1
	-16+4	4
	-4+1	3
Sand 91	-1+$\frac{1}{4}$	32
	-$\frac{1}{4}$+1/16	56
Fines 4	-1/16	4

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	2	78	20
5 - 8	1	89	10
8 - 11	0	85	15
11 - 14	10	87	3
14 - 17	2	97	1
17 - 20	4	95	1
20 - 23	2	98	0
23 - 26	1	97	2
26 - 29	10	89	1
29 - 32	7	93	0
32 - 35	3	95	2
35 - 38	2	97	1
38 - 41	1	94	5
41 - 44	5	91	4
44 - 47	4	92	4

TG 11 SE 19 1948 1335 North of Drayton

Surface level (+34.8 m) +114 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
October 1969

Overburden (0.3 m) 1 ft
Mineral (7.3 m) 24 ft
Waste (4.6 m) 15 ft
Mineral (3.7 m) 12 ft
Bedrock (0.9 m+) 3 ft+

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Sand. 'Clayey' at the base. Gravel: fine with coarse, subangular flint with traces of fine subrounded quartz. Sand: fine and medium, coarsening slightly towards the base, subangular; brown.	(7.3)	24	(7.6)	25
Boulder Clay		Brown sandy clay.	(3.4)	11	(11.0)	36
		Grey silty clay.	(1.2)	4	(12.2)	40
Glacial Sand and Gravel	(b)	Sandy gravel. Gravel: mainly fine, coarsening towards the base, subangular to subrounded flint with traces of fine rounded quartz, occasional flint cobbles at the base. Sand: medium with fine and coarse, mainly subangular; brown.	(3.7)	12	(15.9)	52
Upper Chalk		Chalk.	(0.9+)	3+	(16.8)	55

		%	mm	%
(a)	Gravel	3	+64	0
			-64+16	1
			-16+4	2
	Sand	92	-4+1	3
			-1+¼	40
			-¼+1/16	49
	Fines	5	-1/16	5
(b)	Gravel	35	+64	0
			-64+16	15
			-16+4	20
	Sand	62	-4+1	14
			-1+¼	34
			-¼+1/16	14
	Fines	3	-1/16	3

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	5	91	4
4 - 7	4	96	0
7 - 10	3	96	1
10 - 13	0	98	2
13 - 16	1	97	2
16 - 19	2	91	7
19 - 22	2	94	4
22 - 25	25	71	4
40 - 43	3	76	21
43 - 46	7	51	42
46 - 49	1	61	38
49 - 52	1	58	41

TG 11 SE 20 1959 1245 Drayton Road, Hellesdon

Surface level (+26.2 m) +86 ft
Water not struck
Wirth B1, 8 inch diam.
September 1969

Overburden (2.7 m) 9 ft
Mineral (9.2 m) 30 ft
Waste (1.2 m) 4 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
	Brown sandy and 'earthy' clay	(2.1)	7	(2.7)	9
Glacial Sand and Gravel	Pebbly sand. Low gravel content at top and bottom. Occasional cobbles between 30 and 33 ft (9.1 and 10.1 m). Gravel: fine and coarse, mainly subrounded flint, with traces of fine rounded quartz and occasional flint cobbles. Sand: medium with fine, subangular, slightly chalky at the base; brown.	(9.2)	30	(11.9)	39
Boulder Clay	Dark brown mottled clay.	(1.2)	4	(13.1)	43
Upper Chalk	Chalk.	(0.9+)	3+	(14.0)	46

%	mm	%
	+64	: 0
Gravel 16	-64+16	: 8
	-16+4	: 8
	-4+1	: 4
Sand 83	-1+$\frac{1}{4}$	: 61
	-$\frac{1}{4}$+1/16	: 18
Fines 1	-1/16	: 1

Depth below surface (ft)	Percentage Fines	Sand	Gravel
9 - 12	3	94	3
12 - 15	2	94	4
15 - 18	0	76	24
18 - 21	2	74	24
21 - 24	0	75	25
24 - 27	1	78	21
27 - 30	0	78	22
30 - 33	0	79	21
33 - 36	3	93	4
36 - 39	0	91	9

TG 11 SE 21 1940 1201 Wensum Mount Farm, Hellesdon

Surface level (+15.3 m) +50 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
October 1969

Waste (3.6 m) 12 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Boulder Clay	Brown sandy clay with traces of gravel.	(0.9)	3	(1.5)	5
	Brown clay with traces of sand and gravel. Gravel: medium with fine and coarse, sub-angular flint. Sand: medium and fine.	(0.9)	3	(2.4)	8
	Very clayey and chalky grey sand with some chalk gravel.	(1.2)	4	(3.6)	12
Upper Chalk	Chalk.	(0.9+)	3+	(4.5)	15

TG 11 SE 22 1931 1122 Red Bridge Lane, Costessey

Surface level (+6.0 m) +20 ft
Groundwater conditions not recorded
Shell and auger, 8 inch diam.
October 1969

Overburden (0.6 m) 2 ft
Mineral (6.4 m) 21 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Terrace Gravel	Gravel. 'Clayey' between 5 and 11 ft (1.5 and 3.4 m). Gravel: fine to coarse, subangular to subrounded flint with some fine rounded quartz and occasional subrounded flint cobbles. Sand: medium with fine and traces of coarse, subangular; grey to brown.	(6.4)	21	(7.0)	23
Upper Chalk	Chalk.	(0.9+)	3+	(7.9)	26

	%	mm	%
		+64	0
Gravel	49	-64+16	22
		-16+4	27
		-4+1	9
Sand	44	-1+$\frac{1}{4}$	22
		-$\frac{1}{4}$+1/16	13
Fines	7	-1/16	7

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	4	29	67
5 - 8	20	36	44
8 - 11	20	21	59
11 - 14	2	55	43
14 - 17	1	40	59
17 - 20	2	63	35
20 - 23	1	66	33

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INSTITUTE OF GEOLOGICAL SCIENCES

MINERAL ASSESSMENT UNIT

THE SAND & GRAVEL RESOURCES of SHEET TG11 (ATTLEBRIDGE, NORFOLK)

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

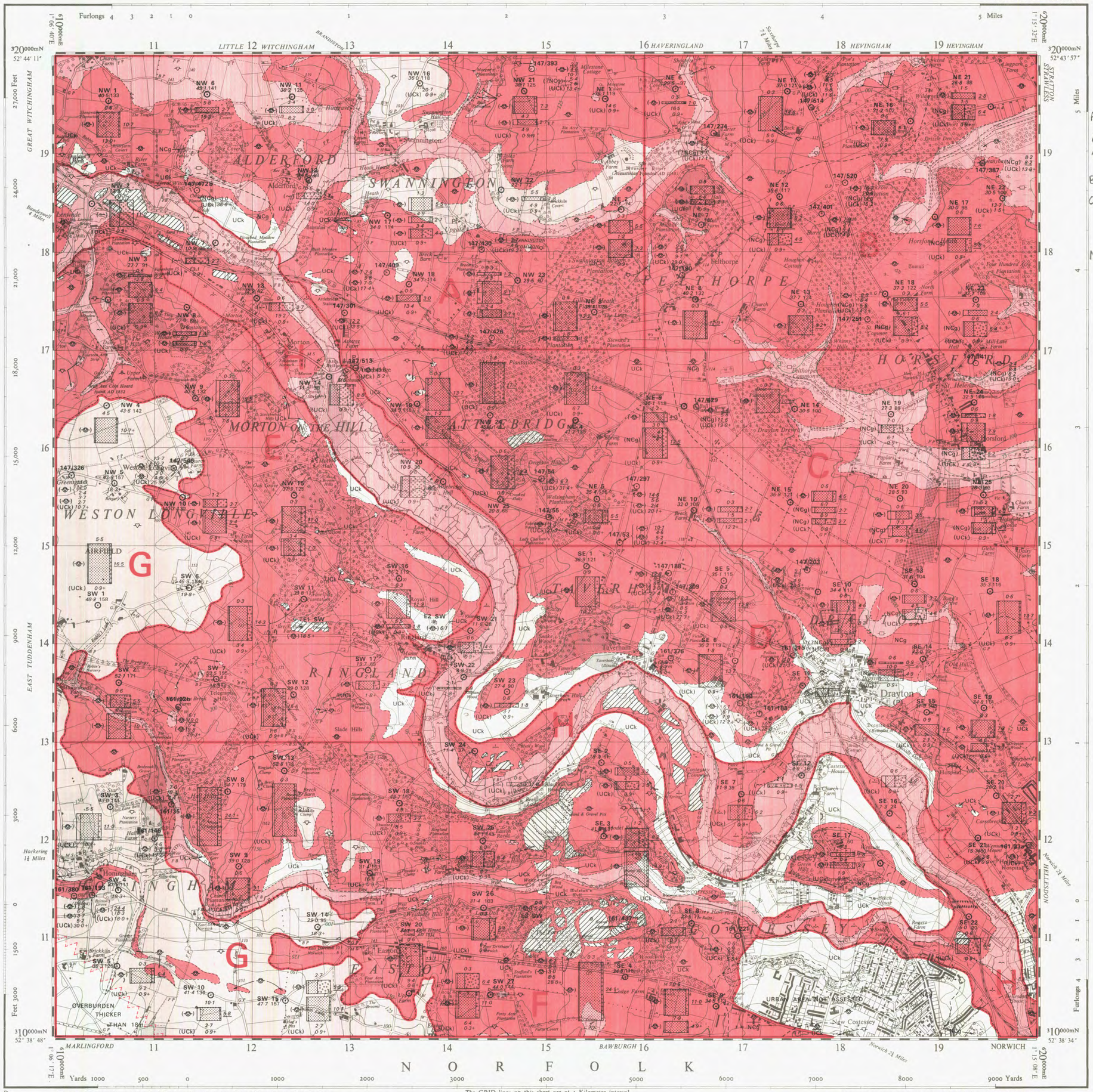
ORDNANCE SURVEY

SHEET TG 11

PROVISIONAL EDITION

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

9



EXPLANATION OF SYMBOLS AND ABBREVIATIONS

DRIFT

AF-1		**Alluvial Fan** -fine sandy hill-wash.
A-11		**Alluvium** -fine sands, clay and peat, often overlying sand and gravel.
1T-3		**1st Terrace River Gravels** -slightly clayey, medium flint gravels, chalk free.
Bc-4		**Boulder Clay** -stiff blue clay with pebbles of chalk and flint.
CS-2		**Glacial Sand and Gravel** -clean, ill-sorted sands and gravels, with some chalk.
		Norwich Brickearth -brown sandy clay and silt with occassional pebbles of flint.

SOLID

NC-2	NCg	**Norwich Crag** -sands and gravels with thin beds of clay. Sands occassionally shelly near base.
	UCk	**Upper Chalk** -white, soft limestone containing black nodular flints with white patina.
		Made Ground
		Worked out Sand and Gravel

RECENT AND PLEISTOCENE — CRETACEOUS

BOUNDARY LINES

- Geological boundary, Drift.
- Geological boundary, Solid. Broken lines denote uncertainty.
- Inferred boundary between categories of deposits recognised.
- Resource Block boundary.
- Buried (drift-filled) channel.

BOREHOLE DATA

SITE LOCATIONS

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

M.A.U. BOREHOLES

Borehole Registration Number → SW 12
Borehole site → 39·0 128 ← Surface in metres and feet above O.D. (Newlyn)
0·3 ← Overburden
15·6 ← Mineral (sand and gravel)
Grading Diagram → 1·8 ← Waste
Geological Classification → (UCk) 0·9+ ← Bedrock

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

Borehole Registration Number

Each M.A.U. borehole is identified by a registration Number, e.g. **SW 12** The letters refer to the quarter sheet and the figures to the I.G.S. serial number for that quarter. The unique designation for borehole **SW 12** is **TG 11 SW 12**

Grading Diagrams

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

Sand (+1/16–4mm)
Fines (–1/16mm) Gravel (+4mm)

The height of the diagram is proportional to the mineral thickness

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

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 **161/35a** signifies Hydrogeological Department borehole **35a** on New Series One-Inch Geological Sheet 161.

EXPOSURE RECORDS

Information from the inspection of exposures is shown in the same way as for boreholes, but they are located by an asterisk, thus ✳. Reference number and details of thickness are shown.

CATEGORIES OF DEPOSITS

- **Exposed mineral, assessed.** CAT-E2
- **Continuous or almost continuous spreads of mineral beneath overburden.** CAT-C1
- **Discontinuous spreads of mineral beneath overburden.** CAT-D1
- **Sand and gravel either not potentially workable (see Report) or absent.** CAT-A2

RESOURCE BLOCKS

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

Detailed records may be consulted, on application to the 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 by F. C. Cox and E. F. P. Nickless in 1968-70. S. C. A. Holmes, District Geologist. Included in One-Inch Geological Sheets 147 and 161.

Sand and Gravel Survey by E. F. P. Nickless and A. R. Clayton in 1969-70. R. G. Thurrell, Head, Mineral Assessment Unit.

1:25 000 Sand and Gravel Resource Sheet published 1973.
Sir Kingsley Dunham, 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.*

2050/73

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 1905-27. Other partial systematic revision 1938-53 has been incorporated.

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.

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

	TG 02	TG 12	TG 22	
147	TG 01	TG 11	TG 21	
161	TG 00	TG 10	TG 20	

Diagram showing the relationship of the National Grid 1:25,000 sheets with the One-Inch Geological Sheets 147 and 161.

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