

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

ESSEX
(comprising Essex, Southend-on-Sea, Thurrock, London Boroughs of Barking & Dagenham, Havering, Redbridge and Waltham Forest)

Mineral Resource Information in Support of National, Regional and Local Planning
Mineral Resources
Scale 1:100 000

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Project Leader: D.E. Highley.
Digital cartography by N.A. Spencer, British Geological Survey, Published 2002.

This map comprises part of a summary of the Mineral Resources of the East of England Region.
For further information see www.mineralsUK.com

BIBLIOGRAPHIC REFERENCE
Bloodworth, A.J. and others 2002. Mineral Resource Information in Support of National, Regional and Local Planning Essex (comprising Essex, Southend-on-Sea, Thurrock, London Boroughs of Barking & Dagenham, Havering, Redbridge and Waltham Forest). Great Britain Geological Survey Commission Report 02/02/27.

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SAND & GRAVEL

Superficial deposits

- Sub-alluvial: Inferred resources
- Sub-alluvial: Indicated resources (only in area assessed by BGS)
- River Terrace deposits
- River Terrace deposits: Concealed (only in area assessed by BGS)
- Glaciofluvial sand and gravel (including Kesgrave Formation)
- Glaciofluvial sand and gravel: Concealed (only in area assessed by BGS)
- Glacial sand and gravel deposits
- Glacial sand and gravel deposits: Concealed (only in area assessed by BGS)
- Head gravel (only in area assessed by BGS)

Boundary of area assessed for sand and gravel at the indicated resource level

Approximate limit of Anglian ice sheet

Bedrock deposits

- Thames Sand Formation
- Palaeogene (Tertiary)

CHALK

- Chalk: Higher purity (93-98% CaCO₃)
- White Chalk Subgroup

BRICK CLAY

- Brickearth
- Brickearth concealing terrace gravel
- Brick Clay

Quaternary (Southend area only)
Quaternary; interglacial lake clay (Colchester area only)

MINERAL PLANNING PERMISSION
Source: Mineral Planning Authorities

- Surface planning permission (valid and expired)

MINERAL WORKINGS

- Martells Active site
- Temples Farm Inactive (including sites not yet worked), worked-out and/or restored site
- Active wharf
- Active power station

Mineral commodity

Sg	Sand and gravel	Pt	Peat	Sec	Secondary aggregate
SiS	Silica Sand	Ch	Chalk		
Cl	Common clay and shale	Fl	Flint		

ENVIRONMENTAL DESIGNATIONS

- National nature conservation designations (SSSIs and NNRS)
- International nature conservation designations (SACs, SPAs and Ramsar sites)
- Area of Outstanding Natural Beauty (AONB): Dedham Vale (part)
- Scheduled Monument

ADMINISTRATIVE AREAS

- Region
- Mineral Planning Authority
- District

Aims and Limitations

The purpose of the maps in this series is to show the broad distribution of those mineral resources which may be of current or potential economic interest and to raise these to the attention of relevant planning designations. The maps are intended to assist in the consideration and preparation of development plan policies in respect of mineral extraction and the protection of mineral resources against depletion. They bring together a wide range of information, much of which is scattered and not always available in convenient form.

The maps have been produced by collection and interpretation of mineral resource data principally held by the British Geological Survey. Information on the extent of mineral planning permission has been obtained from the relevant Mineral Planning Authority (MPA). Some of these permissions may have lapsed or expired. The status of individual areas can be ascertained from the appropriate MPA. Location information on national planning designations has been obtained from the appropriate statutory body (Countryside Agency, English Nature and English Heritage). For further information see the relevant body's website.

The mineral resource data presented are based on the best available information, but are not comprehensive and their quality is variable. The mineral boundaries shown are, therefore, approximate. Mineral resources defined on the maps delineate areas which are generally considered to be of economic interest, but are not intended as a basis for mineral planning. Economic interest is defined in terms of the potential for mineral extraction. The economic potential of some sites can only be proved by a detailed evaluation programme. Such an investigation is the responsibility of the applicant for mineral extraction. Economic interest is shown as having a mineral resource potential, but is not intended as a basis for mineral extraction. Economic interest is shown as having a mineral resource potential, but is not intended as a basis for mineral extraction. Economic interest is shown as having a mineral resource potential, but is not intended as a basis for mineral extraction.

PLANNING PERMISSIONS IN THURROCK

- 1 - Avelley Clayfields (CI)
- 2 - Little Salmons (Sg)
- 3 - Court Farm (Sg)
- 4 - Avelley (Sg)
- 5 - Marleyford (Sg)
- 6 - North Sifford (Sg)
- 7 - North Sifford (Sg)
- 8 - Sifford Quarry (Sg)
- 9 - Kibbles Farm (Sg)

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Positions of Scheduled Monuments at 15th August 2002, as published by English Heritage.
The majority of monuments are plotted using a central NGR symbol. Consequently the actual area and/or length of a monument protected by the legal constraints of scheduling cannot be ascertained from this map. Monuments scheduled since the date are not accounted for. © Copyright English Heritage.

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Countryside Agency, John Dower House, Chiswick Park, Chiswick, Middlesex, GL9 3RA. Tel: 01242 52181. Fax: 01242 54273. Web page: www.countryside.gov.uk

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HYDROCARBON AND SUBSURFACE AGGREGATE POTENTIAL

Conventional oil and gas

Essex lies on the northern margin of the West-Bohemia Massif, across which Mesozoic source and reservoir rocks are thin or absent and have not been subjected to the depths required for the generation of hydrocarbons. The paucity of exploration wells and the absence of a network of seismic reflection surveys illustrates that the county has little or no oil and gas potential. The only oil and gas concession operating in Essex is the Essex-Carborough field, which is operated by BP. This is held and operated by CANAR. Little Chalk 1, drilled in 1966 by BP, remains the only hydrocarbon exploration well in the county of Essex.

Coal Mine Methane, Abandoned Mine Methane and Coalbed Methane (CMM) potential

There is little or no potential for these forms of methane as coal-bearing strata are absent.

Subsurface aggregate potential

Carboniferous limestone is the most extensively used crushed rock aggregate in England. It is generally a high quality material which is used for both concrete aggregate and for longhemp. This production method remains an option for the future. Between the Wash and north London, limestone shows isolated areas of Carboniferous limestone subsiding beneath the Mesozoic unconformity. The search map shows one such area of Carboniferous limestone subsiding which lies in the south-east of Essex. Subsurface information indicates that across Essex, the base Mesozoic surface dips generally southward from depths of 150 to 100 metres to levels around 40 metres to around 40 metres. However, the most favourable areas for possible underground working of aggregates are likely to be in the north west of the county, close to the known subsidence of Carboniferous limestone in Cambridge. However, aggregate potential is low since the limited amount of information available suggests that these limestone are dolomitic and are relatively poor quality aggregate raw materials.

Limestone

The Department of Trade and Industry grants licences for exclusive rights to explore and establish oil and gas (or other) wells. The rights granted by individual licences do not include any rights of access, and the licensee must also obtain any consent under current legislation, including planning permission. Licensees wishing to enter or drill through coal seams for coalbed methane and abandoned mine methane must also seek the permission of the Coal Authority.

CHALK

Chalk is a relatively soft, fine-grained, white limestone, consisting mostly of the debris of planktonic algae. The White Chalk Subgroup (formerly known as the Middle and Upper Chalk) crops out in the north-west and the south-east of the county. Much of the Chalk is concealed by a thick covering of glacial deposits. There is currently only one active chalk quarry in Essex, although a number have been active in the past, including extensive workings in the Gray area for cement manufacture.

The White Chalk Subgroup is some 150 m thick in Essex and comprises higher purity material (93-98% CaCO₃) relative to the rest of the underlying Grey Chalk (formerly Lower Chalk). Flints are common in the White Chalk Subgroup.

SILICA SAND

Silica (industrial) sands are marketed for a wide range of industrial uses rather than for direct application in the construction industry. They are essential raw materials for glassmaking and water treating, as well as a wide range of other uses, such as chemicals, chemicals and water treatment.

The distinction between silica sand and construction sand is based principally on application and mineral specification, rather than a fundamental difference between the two raw materials. Silica sands are valued for their physical and chemical properties on which their industrial applications are based. These include high silica contents in the form of quartz, an absence of deleterious impurities, such as clay and iron oxides, and typically a narrow grain size distribution (generally in the range 0.5 to 0.1 mm). For most applications silica sands have to conform to very closely defined specifications, specific uses demanding different combinations of properties. Different grades of silica sands are, therefore, often not interchangeable in use. Depending on use, silica sand processing is of varying degrees of complexity but often requires a high capital investment in plant. The areas with which impurities, such as iron-bearing impurities and clay, together with the level of losses incurred in removing impurities and undesirable fractions from the sand, has a major bearing on the possible use as silica sand. Silica sand commands a higher price than construction sand, which allows it to serve a wide geographic market.

Silica sand has been produced in Essex in modest quantities since before the Second World War. Output has been almost entirely from Martells Quarry at Arange, north-west of Colchester. Here, washed sand and over-sized silica sands are produced from Kesgrave Formation material as co-products with sand and gravel. The silica sands have a wide range of applications, the most important being for water treatment. Sands for this application require close control, but coarse, size distributions, 1.0 to 0.5 mm being a common size range, much coarser than most other uses of silica sand. Such closely-defined size distributions can only be obtained by processing large volumes of sand. Water treatment sands are a specialised product that commands a high unit value. They are produced at only a few locations in Essex. Outside of the Kesgrave Formation are given in the sand and gravel text box.

PLANNING PERMISSIONS FOR MINERAL EXTRACTION

The extent of known extent and on-going planning permission for the extraction of minerals is shown on the map. Information of East of England Planning Authorities. The program was either applied as digital files by Essex County Council or digitised by BGS from Planning Sheets and other documents supplied by Essex County Council, Thurrock Borough Council, Thurrock Borough Council and the London Boroughs of Barking & Dagenham, Havering, Redbridge and Waltham Forest and any queries regarding the sites shown should be directed to these authorities at the addresses shown below. The polygons cover active, former and restored mineral workings, and occasionally, unworked deposits.

Planning Permissions represent areas where a commercial decision to work mineral has been made, a successful application has been made through the provisions of the Town and Country Planning legislation and the general reserve may have been designated to a greater or lesser extent. Current planning status is not qualified on the map but is available in the underlying database.

Contact address: Essex County Council, Environmental Services Directorate, E1 6 Brock, Chalk Hill, Chelmsford, CM1 1QH, Tel: 01245 49231. Fax: 01245 49244. Website: www.essex.gov.uk

Southend-on-Sea Borough Council, Technical Services Department, PO Box 65, Civic Centre, Victoria Avenue, Southend-on-Sea, SS2 6ER. Tel: 01702 21000. Fax: 01702 23000. Website: www.southend.gov.uk

Thurrock Borough Council, Town Planning Department, Civic Offices, New Road, Grays, RM17 6SL. Tel: 01703 85252. Fax: 01703 62787. Website: www.thurrock.com

Barking and Dagenham London Borough, Development and Technical Services Department, Municipal Offices, 127 Roper Lane, Barking, SS11 1PS. Tel: 0208 582 600. Website: www.barking-dagenham.gov.uk

Havering London Borough, Environment and Planning Department, Mercury House, Mercury Gardens, Romford, RM1 3SL. Tel: 01708 42348. Fax: 01708 727696. Website: www.havering.gov.uk

Redbridge London Borough, Planning Services Department, Town Hall, PO Box 2, 128-142 High Street, Hornet, B1 10D. Tel: 020 8478 2020. Fax: 020 8478 0172. Website: www.redbridge.gov.uk

Waltham Forest London Borough, Planning & Economic Development Department, Chingford Municipal Office, 16 The Ridgeway, Chingford, London E4 6PS. Tel: 0208 527 544. Fax: 0208 524 896. Website: www.wbf.gov.uk

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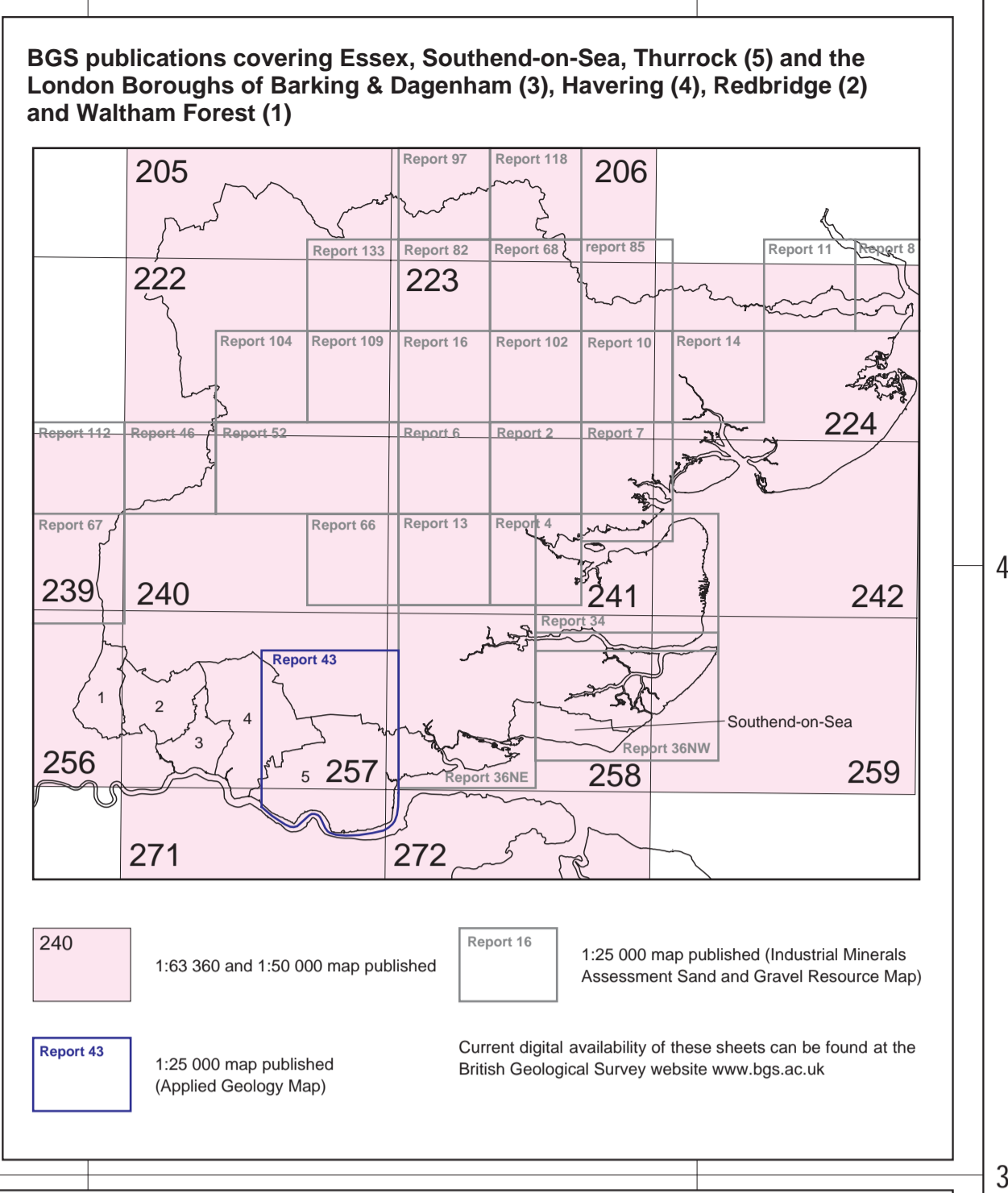
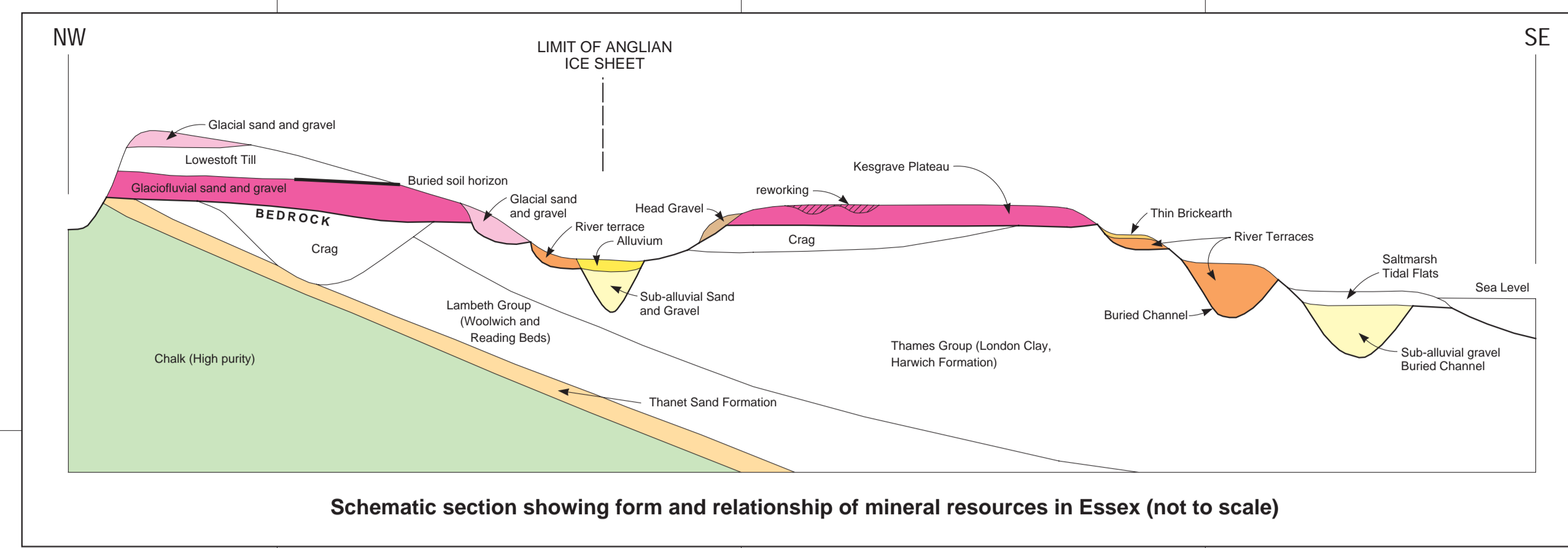
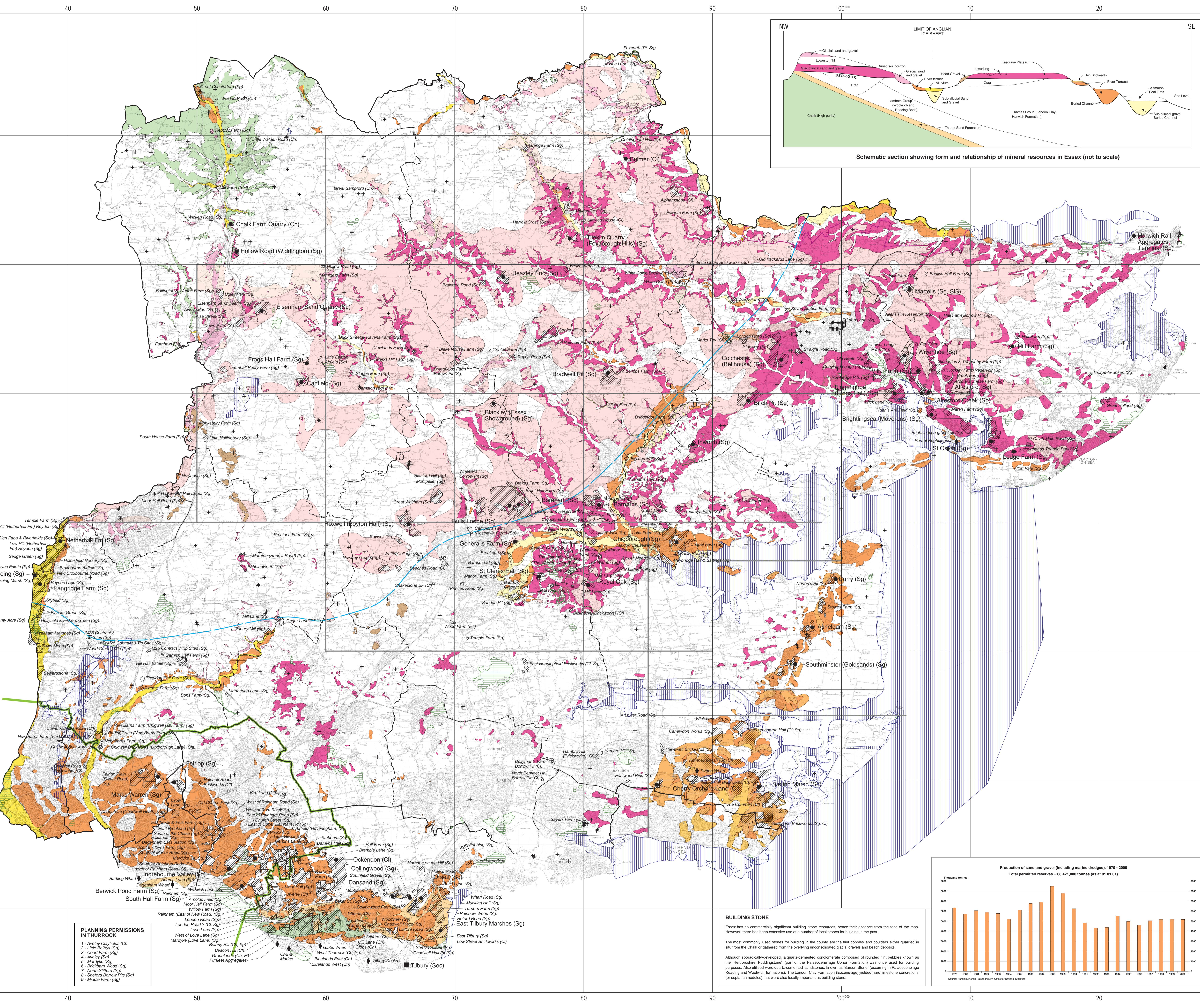
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COMMON CLAY (including BRICK CLAY and BRICKEARTH)

Brick clay is the term used to describe clay and shale used predominantly in the manufacture of bricks and to a lesser extent, roof tiles and clay pipes. These clays may sometimes be used in cement making, as a source of calcareous fill for brick and roofing levels. The suitability of a clay for the manufacture of bricks depends principally on its behaviour during shaping, drying and firing. This will dictate the properties of the fired brick such as strength and load resistance and, importantly, its architectural appearance.

Most facing bricks, engineering bricks and related clay-based building products are manufactured in large subvertical factories. These represent a high capital investment and are increasingly dependent, therefore, on raw materials with predictable and consistent physical characteristics in order to achieve high yields of suitable products. Besides other factors to achieve improved durability and to provide a range of face colors and textures is an increasingly common feature of the brick-making industry, the use of processed raw materials is of paramount importance.

A brick manufacturing site at Martells, just west of Colchester, uses Quaternary-age marginal lake clay blended with clays imported from outside the county to produce facing bricks.

In the Southend area, brickearth formed the basis for a number of brickworks manufacturing distinctive golden yellow London Stock bricks. Brickearth is only found where it is usually found in association with the gravel in the area around the Thames Estuary. Deposits are generally the finest that 2 m, but can be produced, particularly where associated with extensive river terrace and flood plain sediments. Today, only one brickworks remains, although the brickworks brick is now made in Dorset, particularly for restoration and conservation work in London. The map shows the distribution of brickearth in the Southend area only.

Although the outcrop area of the Palaeogene (Tertiary) Age London Clay is extensive in Essex, this clay is not shown as a resource because of its subsurface location. This clay is a majorly important aggregate resource in the brick-making industry. The high levels of the clay mineral membranes. However, the London Clay is used for brickmaking at a small operation at either in the north of the county and was formerly used as a raw material for the manufacture of a high-purity expanded clay aggregate in the Orger area. London Clay is also worked as a cement raw material in South Essex. The clay is used to make brick from which bricks are being used in the North Essex area. The clay is used to make brick from which bricks are being used in the North Essex area. The clay is used to make brick from which bricks are being used in the North Essex area.

SAND AND GRAVEL

Sand and gravel are defined on the basis of particle size rather than composition. In current usage, the term 'gravel' is used for material that is coarser than 5 mm, with a maximum size of 60 mm, and the term sand for material that is finer, but coarser than 0.075 mm. Most sand and gravel is composed of particles that are rich in silica quartz, quartzite and other minerals, but other rocks may also be present, particularly in the form of clasts of other rocks.

The principal uses of sand are as the aggregate in concrete, mortar and asphalt. The main use of gravel is as coarse aggregate in concrete. Substantial quantities of sand and gravel may also be used for construction fill.

Sand and gravel resources occur in a variety of geological environments. In Essex, these resources fall into two categories:

- superficial or 'off' deposits, subdivided into glaciofluvial sand and gravel, glacial sand and gravel, river terrace deposits, and bedrock deposits and head gravels;
- bedrock, or 'in-situ' deposits represented by the Thames Sand Formation and Gings.

Superficial deposits

The areas assessed for sand and gravel by BGS resource surveys are identified on the map. Resources shown here are taken from these maps where available. In these areas, the possible extent of sand and gravel concealed beneath till and other marginal deposits. These resources are generally the finest that 2 m, but can be produced, particularly where associated with extensive river terrace and flood plain sediments. Today, only one brickworks remains, although the brickworks brick is now made in Dorset, particularly for restoration and conservation work in London. The map shows the distribution of brickearth in the Southend area only.

The deposits from a semi-continuous sheet across the county comprising 5-15 m of clean pale coloured sands and pebbly sands with subordinate gravels. The clasts present are rounded quartz, quartzite and well-sorted flint in varying proportions together with small amounts of angular nodular flint and volcanic tuffaceous. The sand fraction is sharp, predominantly medium angular to sub-angular quartz with flint although locally the incorporation of significant quantities of sand from the underlying more mature marine Crag deposits increases the content of rounded and coarse sand grains.

The detailed blue line shown on the map divides two distinct areas in which the unit occurs. To the north-west the deposits are covered by substantial thicknesses (up to 20 m average) of Anglian glacial deposits. Inside these areas have the Kesgrave Formation forms a ribbon-like outcrop along the sides of the valleys that cut through these glacial deposits along the valley sides. The Crag deposits are the Colton, Brook, and Broom and.

South-east of the dashed line the Kesgrave deposits are largely replaced at the surface by a thin 1-2 m overburden of till with a loess component. The upper part of the Kesgrave Formation generally lies above the overburden till and the deposits may be saturated especially where they rest directly on impermeable Palaeogene (Tertiary) sands.

Official sand and gravel

This category comprises washed sands and gravels deposited in close proximity to the Anglian ice-sheet which was the most extensive of the Quaternary glaciations in East Angles and covered most of the northern half of Essex. Its fine-boddy composition is detailed in the map. In Suffolk, these deposits have been termed the Barton Sands and Gravels.

These deposits mainly occur on top of the sheet of till (boulder clay) and on the shoulders of the existing valleys. The deposits tend to form discrete patches and channel fills, they are best developed in the north-west of the county especially where chalk outcrop is present. The deposits are generally the finest that 2 m, but can be produced, particularly where associated with extensive river terrace and flood plain sediments. Today, only one brickworks remains, although the brickworks brick is now made in Dorset, particularly for restoration and conservation work in London. The map shows the distribution of brickearth in the Southend area only.

The deposits are commonly very variable in grain size, poorly sorted and contain contents of gravel and pebbles. An abundance of oxidized clay leads to congested coloration to most deposits. The clasts are predominantly angular nodular flint and tuffaceous.

River Terrace deposits

River terrace deposits occur at several levels in most of the major valleys in the county flanking the present floodplain. The most extensive deposits are along the northern side of the Thames valley and on the Dange Peninsula, other important tracts occur in the St. Chelmer, Blackwater and Stour valleys.

Terrence deposits are commonly dry in their upper parts and saturated to the base. They post-date the Anglian glaciation, although they were mostly deposited under cold periglacial climatic conditions.

The deposits commonly comprise sequences of sands and gravels commonly 3-6 m in thickness with a shaly till component. The upper part of the terrace deposits is generally poorly sorted and contains contents of gravel and pebbles. An abundance of oxidized clay leads to congested coloration to most deposits. The clasts are predominantly angular nodular flint and tuffaceous.

Sub-alluvial gravel

Sub-alluvial gravels are encountered beneath the alluvium of the major valleys throughout the county and are compositionally similar to the River Terrace Deposits. They were mostly laid down during periods of deep incision during the last major glaciation. Devonian sandstone levels lie at least 100 m below the present level. The subsequent till is generally well-sorted and contains contents of gravel and pebbles. An abundance of oxidized clay leads to congested coloration to most deposits. The clasts are predominantly angular nodular flint and tuffaceous.

The deposits rest on an irregularly eroded surface and are of very variable thickness, and 10-15 m of deposits are commonly present. These deposits are generally saturated and require wet working.

Head gravel

These comprise loam or fine shaly 3-4 m thick gravelly deposits that have been involved in mass movement processes. Such movement commonly takes place under cold climatic conditions when vegetation is deep incision during the last major glaciation. Devonian sandstone levels lie at least 100 m below the present level. The subsequent till is generally well-sorted and contains contents of gravel and pebbles. An abundance of oxidized clay leads to congested coloration to most deposits. The clasts are predominantly angular nodular flint and tuffaceous.

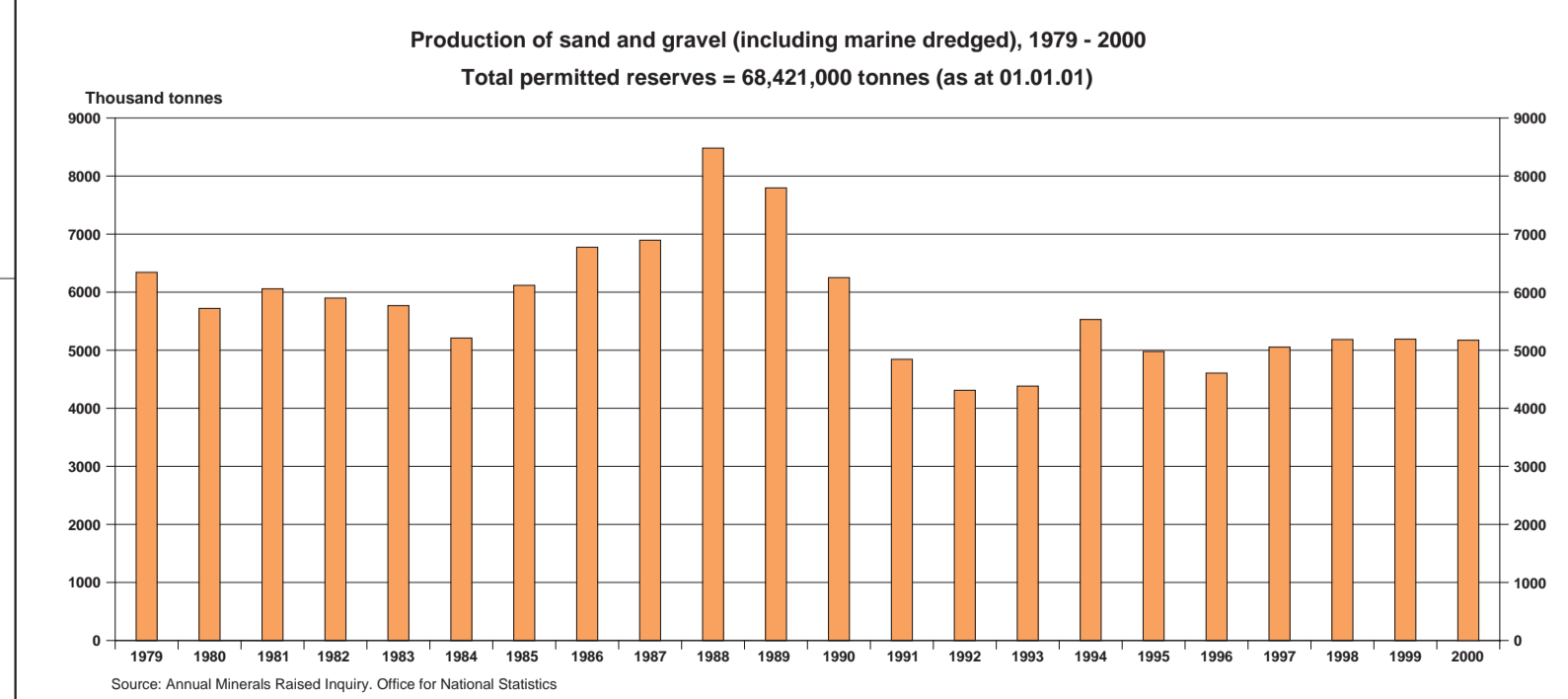
The deposits are commonly very variable in grain size, poorly sorted and contain contents of gravel and pebbles. An abundance of oxidized clay leads to congested coloration to most deposits. The clasts are predominantly angular nodular flint and tuffaceous.

Thames Sand Formation

The Thames Sand Formation is unconformably on the eroded Chalk surface and comprises fine- to medium-grained sandy units with fine and minor clay. The bedrock deposits (20) are confined to the county (approximately along the north bank of the Thames where they have been exposed for use as fill). These sand units include superficial deposits in the northern part of the county.

Crag

Exposed to the equivalent to the Chalkland Sand of the Norwich Crag Formation are exposed at Ebbw Vale (north of Severn) and.



BUILDING STONE

Essex has no commercially significant building stone resources, hence their absence from the face of the map. However, there has been extensive use of a number of local stones for building in the past.

The most commonly used stones for building in the county are the flint cobble and boulder either quarried in situ from the Chalk or gathered from the overlying unconformable glacial gravels and beach deposits.

Although sporadically developed, a quartz-cemented conglomerate composed of rounded flint pebbles known as the 'Hardfordite Puddingstone' (part of the Palaeogene age Upton Formation) was once used for building purposes. Also utilized were quartz-cemented sandstones, known as 'Sarnon Stone' (occurring in Palaeogene age Reading and Woodstock Formations). The London Clay Formation (Eocene age) yielded hard limestone concretions (or septarian nodules) that were also locally important as building stone.