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NATURAL ENVIRONMENT RESEARCH COUNCIL

OFFICE OF THE
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Mineral Resource Information in Support of National, Regional and Local Planning

Kent (comprising Kent, Medway and London Boroughs of Bexley and Bromley)

British Geological Survey Commissioned Report CR/02/125N

A J Bloodworth, D G Cameron, S E Wood, E L Bartlett, S F Hobbs, E J Steadman, D J Evans, G K Lott and D E Highley

Keyworth, Nottingham 2002

BRITISH GEOLOGICAL SURVEY
TECHNICAL REPORT CR/02/125N
Mineral Resources Series

Mineral Resource Information for Development Plans: Kent (comprising Kent, Medway and London Boroughs of Bexley and Bromley)

A J Bloodworth, D G Cameron,
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This report accompanies the 1:100 000 scale map: Kent (comprising Kent, Medway and London Boroughs of Bexley and Bromley)

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Front cover photo:
Folkestone Formation sands are worked for silica sand and building sand at Addington pit near Maidstone.

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INTRODUCTION

This report is one of a series prepared by the British Geological Survey for various administrative areas in England for the Office of the Deputy Prime Minister's research project *Mineral Resource Information in Support of National, Regional and Local Planning.*

The accompanying map relates to the county of Kent, together with Medway and the London Boroughs of Bexley and Bromley, and delineates the mineral resources of current, or potential, economic interest in the area and the sites where minerals are or have been worked. It also relates these to national planning designations, which may represent constraints on the extraction of minerals.

Three major elements of information are presented:

- the geological distribution and importance of mineral resources
- the extent of mineral planning permissions and the location of current mineral workings, and
- the extent of selected, nationally-designated planning constraints.

This wide range of information, much of which is scattered and not always available in a consistent and convenient form, is presented on a digitally-generated summary map on the scale of 1:100 000. This scale is convenient for the overall display of the data and allows for a legible topographic base on which to depict the information. However, all the data are held digitally at larger scales using a Geographical Information System (GIS), which allows easy revision, updating and customisation of the information together with its possible integration with other datasets. The information will form part of a *Summary of the Mineral Resources of South East England Region*.

The purpose of the work is to assist all interested parties involved in the preparation and review of development plans, both in relation to the extraction of minerals and the protection of mineral resources from sterilisation. It provides a knowledge base, in a consistent format, on the nature and extent of mineral resources and the environmental constraints, which may affect their extraction. An important objective is to provide baseline data for the long term. The results may also provide a starting point for discussions on specific planning proposals for mineral extraction or on proposals, which may sterilise resources.

It is anticipated that the map and report will also provide valuable background data for a much wider audience, including the different sectors of the minerals industry, other agencies and authorities (e.g. The Planning Inspectorate Agency, the Environment Agency, the Countryside Agency and English Nature), environmental interests and the general public.

Basic mineral resource information is essential to support mineral exploration and development activities, for resource management and land-use planning, and to establish baseline data for environmental impact studies and environmental guidelines. It also enables a more sustainable pattern and standard of development to be achieved by valuing mineral resources as national assets.

The mineral resources covered are sand and gravel, silica sand, limestone and chalk, cement raw materials, building stone, brick clay and brickearth, fuller's earth, coal and hydrocarbons, and subsurface aggregates.

Resources and Reserves

Mineral resources are natural concentrations of minerals, or bodies of rock that are, or may become, of potential economic interest as a basis for the extraction of a commodity. They will exhibit physical and/or chemical properties that make them suitable for specific uses and be present in sufficient quantity to be of intrinsic economic interest. Areas that are of potential economic interest as sources of minerals change with time as new uses are developed, product specifications change, recovery technology is improved or more competitive sources become available.

That part of a mineral resource, which has been fully evaluated and is commercially viable, to work is called a mineral reserve. In the context of land-use planning, the term mineral reserve should strictly be further limited to those minerals for which a valid planning permission for extraction exists (i.e. permitted reserves**).** Without a valid planning consent, no mineral working can take place and consequently the inherent economic value of the mineral resource cannot be released and resulting wealth created. The ultimate fate of mineral reserves is to be either physically worked out or to be made non-viable by changing economic circumstances.

Mineral resources defined on the map delineate areas within which potentially workable mineral may occur. These areas are not of uniform potential and also take no account of planning constraints that may limit their working. The economic potential of individual sites can only be proved by a detailed evaluation programme. Such an investigation is an essential precursor to submitting a planning application for mineral working. Extensive areas are shown as having no mineral resource potential, but some isolated mineral workings may occur in these areas. The presence of these operations generally reflects local or specific situations.

Environmental designations

The map shows the extent of selected, nationally-designated planning constraints as defined for the purposes of this study. These are defined on a common national basis and therefore represent a consistent degree of constraint across the country. No interpretation should be made from the map with regard to the relative importance of the constraints, either in relation to mineral development proposals or in relation to each other. Users should consult policy guidelines issued by the relevant Government department, statutory agency or local authority.

The constraints shown on the map are:

- Kent Downs and High Weald Area of Outstanding Natural Beauty (AONB)
- Dover-Folkestone Heritage Coast
- National nature conservation designations – National Nature Reserves (NNR) and Sites of Special Scientific Interest (SSSI)
- International nature conservation designations – Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites
- Scheduled Monuments

Mineral development may also be constrained by many other factors not shown on the maps, including local landscape designations, considerations relating to the protection of other resources, such as groundwater, and local amenity or environmental concerns, such as noise, traffic and visual impact. These have been excluded because the constraint is not defined on a national basis or the information is not generally available. The extent or degree of relevance

of such constraints can be ascertained from the relevant statutory agency or the appropriate Mineral Planning Authority.

SAND AND GRAVEL

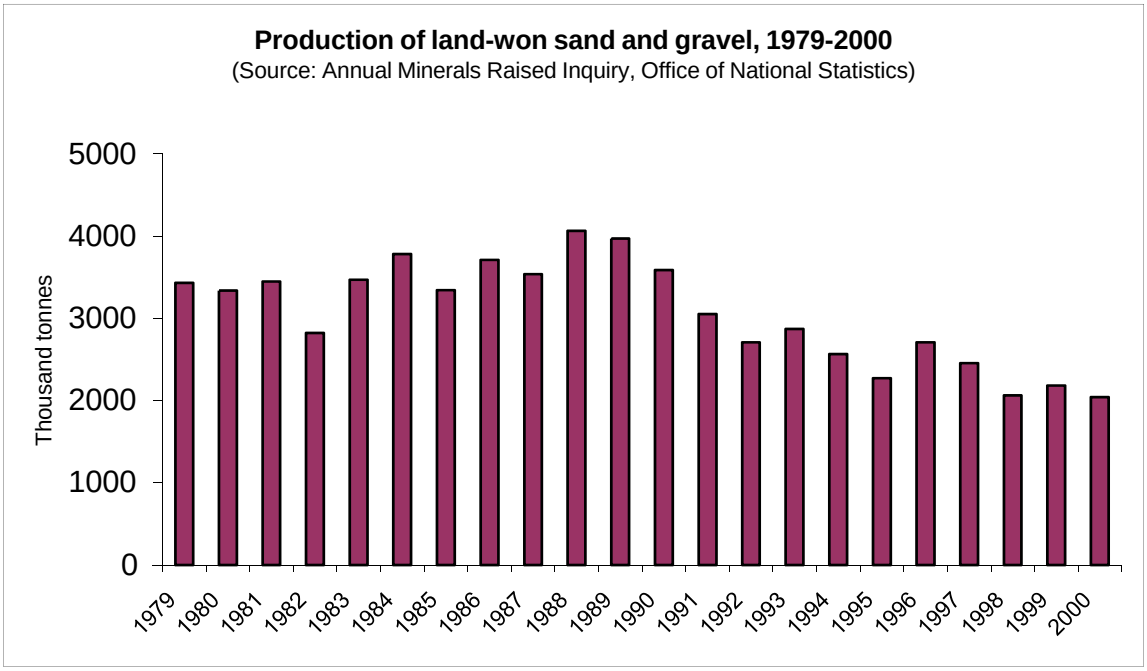
Sand and gravel are defined on the basis of particle size rather than composition. In current usage, the term ‘gravel’ is used for material that is coarser than 5 mm, with a maximum size of 40 mm, and the term sand for the material that is finer, but coarser than 0.075 mm. Most sand and gravel is composed of particles that are rich in silica (quartz, quartzite and flint), but other rock types may occur locally.

The principal uses of sand are as fine 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 Kent, these resources fall into two broad categories:

- superficial sand and gravel or ‘drift’ deposits, subdivided into river and storm and beach sand and gravel;
- bedrock sand, or ‘solid’ deposits represented by the Folkestone Formation and the Thanet Sand Formation.

Substantial quantities of marine-dredged sand and gravel are landed in the county (3.8 million tonnes in 2000), along with a considerable tonnage of crushed rock. In 2000, 4.3 million tonnes of crushed rock was landed at marine wharves in Kent. This was obtained from Scotland, Norway, France, Holland, Northern Ireland and North Wales.



Superficial deposits

River sand and gravel (sub-alluvial and river terrace)

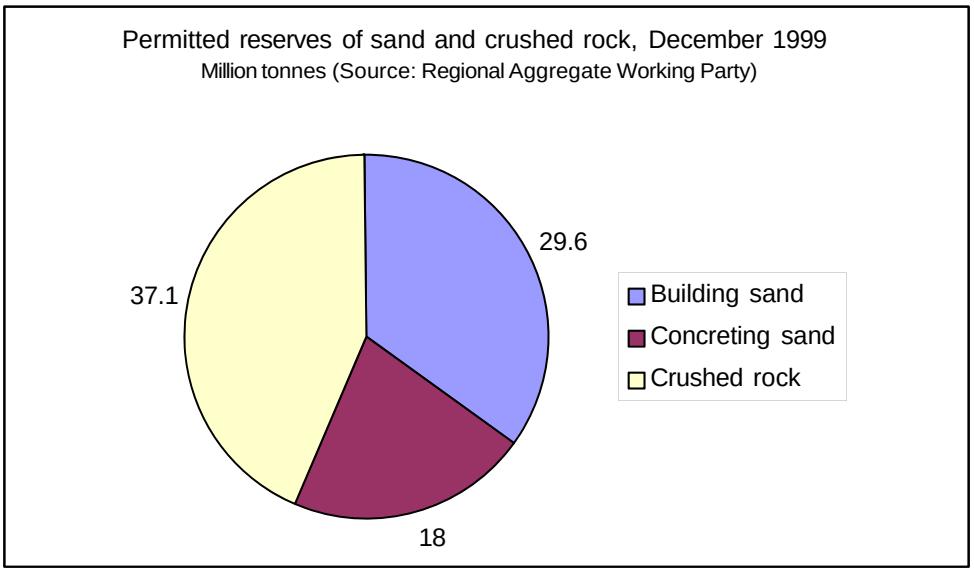
In Kent, Quaternary and Recent age deposits of sand and gravel are associated with the following rivers: River Medway, east of Tonbridge: River Darent, south of Dartford close to

M25: River Stour between Ashford and Canterbury on the rivers Great Stour and Little Stour: River Swale, north of Faversham. The deposits occur in both raised river terrace sequences and as inferred flood plain terrace deposits associated with, and underlying present-day alluvium. Many of these deposits have seen extensive working in the past and are now close to exhaustion.

The lower terrace gravel deposits of the Thames have been worked extensively on the Hoo Peninsula and the Isle of Grain. Up to 7 m of sand and gravel occur in the first and second terrace of the Thames in this area, higher terraces tend to be much thinner.

Storm beach gravel

Storm beach gravels occur extensively in the Dungeness peninsula and around Hythe. These deposits consist almost entirely of flint, with a low proportion of sand. Although they have been extensively exploited in the past, there are policy objections regarding the vulnerability of habitats and groundwater to further storm beach gravel extraction in the Dungeness area. There are currently three active sites working these gravels near Lydd.



Bedrock resources

Folkestone Formation

The Folkestone Formation is an important source of building sand, commonly called ‘soft’ sand, which is generally finer than concreting or ‘sharp’ sand. This material is worked in the Maidstone and Ashford area. Sand from the Folkestone Formation is also used in the production of concrete roof tiles, blocks and pavers, and as fine aggregate for use in asphalt. It is also an important source of silica sand (see text for Silica Sand).

Thanet Sand Formation

The Thanet Sand Formation, and occasionally the overlying Woolwich Formation and Oldhaven Beds, have been extensively worked for building sand in the area north-east of Canterbury. These sands are fine-grained and of generally poorer quality than those obtained from the Folkestone Formation. However, these Palaeogene (‘Tertiary’) age sands are an acceptable substitute for Folkestone Formation material in lower value applications such as fill.

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 foundry casting, as well as a wide range of other products, such as ceramics, chemicals and water filtration.

The distinction between silica sand and construction sand is based principally on application and market specification, rather than a fundamental difference between the two raw materials. Silica sands are valued for their physical and/or 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 sand are, therefore, often not interchangeable in use. Depending on end use, silica sand processing is of varying degrees of complexity but often requires a high capital investment in plant. The ease with which impurities, such as iron minerals and clay, together with the level of losses incurred in removing oversize and undersize fractions from the sand, has a major bearing on its possible use as silica sand. Silica sand commands a higher price than construction sand, which allows it to serve a wider geographical market.

The Folkestone Formation of Kent, which forms the uppermost division of the Lower Greensand, consists of weakly consolidated, clean and well-sorted sands. The formation is primarily a source of construction sand. However, between Borough Green and Maidstone, selected horizons are worked as a source of foundry sand, coloured glass sand, and for other industrial uses. All the operations produce silica sand in association with construction sand.

LIMESTONE AND CHALK

Hythe Formation

Hard, sandy limestones, known as ‘Kentish Rag’ (or ‘ragstone’) form part of the Lower Cretaceous Hythe Formation in Kent and extend from east of Sevenoaks to the coast at Hythe. The ragstone beds, usually between 0.15 and 1.0 m thick, are interbedded with a loosely cemented sandstone known locally as ‘hassock’. The Hythe Formation varies in thickness between 30 m in the Maidstone area to 10 m in east Kent, with ragstone varying between 50 and 20 per cent of the rock. Ragstone is worked at a number of sites in the Maidstone area for roadstone and concreting aggregate. This limestone is the only significant local source of primary crushed rock aggregate in South East England. It is suitable for Type 1 roadstone, although not for wearing-course material. Production costs are relatively high because of the need to separate the limestone from the ‘hassock’ sand. The latter is sometimes sold as low grade fill and/or ‘hoggin’.

CHALK

The Chalk Group is divided into the Grey and White Chalk subgroups and is some 250 m thick in Kent. The upper part of the White Chalk Subgroup (equivalent to the traditional ‘Upper Chalk’) is the most extensive, with the lower part of the White Chalk Subgroup (‘Middle Chalk’) and the Grey Chalk Subgroup (‘Lower Chalk’) forming a narrow outcrop on the south facing scarp and where the Chalk Downs have been cut into by rivers and dry valleys. The Grey Chalk Subgroup is characterised by a high clay content, particularly towards the base and is shown separately on the map. The overlying White Chalk Subgroup is

of higher purity. Flints are common in the highest White Chalk Subgroup. This is worked on the Hoo Peninsula for white pigment ('whiting') and at Northfleet for cement manufacture (see text for Cement Raw Materials), as well as elsewhere for agricultural lime and constructional fill. The Chalk also forms a major aquifer and is one of the principal sources of groundwater in Kent.

CEMENT RAW MATERIALS

Kent has traditionally been an important location for cement production and the UK industry had its origins in the area in the mid-19th century based on chalk as the primary feedstock. With the closure of the cement works at Halling in the Medway valley in 2000, cement is currently only produced at the Northfleet works in north Kent located on the south bank of the Thames. This works produces about 900 000 tonnes of cement per annum, most of which is consumed in South East England, although a considerable tonnage is exported. However, chalk reserves at Northfleet will be exhausted by 2008. Planning permission for a new state-of-the-art cement plant at Holborough, near Snodland was granted in 2001 and will replace Northfleet. The new works is planned to have a capacity of 1.4 Mt/y and has consented mineral reserves in the adjacent quarry for 35 years. The quarry will provide 95% of the required raw materials, consisting of dry dug chalk and wet dug Grey Chalk extracted, via bucket chain excavator from below the water table.

Portland cement clinker is manufactured by heating an intimately homogenised and controlled mixture of calcareous and clayey raw materials to partial fusion (typically at 1400-1500ºC). Small amounts of iron oxide and sand (silica) may be added to optimise the mix. These raw materials supply the lime, silica, alumina and iron oxide necessary for the formation of the calcium silicates and smaller quantities of calcium aluminates that constitute cement clinker. The clinker is cooled and then finely ground, typically with 5 per cent gypsum/anhydrite, to form the final cement. Gypsum/anhydrite is introduced to control the initial rate of reaction with water and to allow concrete to be placed and compacted before hardening commences. Limestone, or chalk, provides lime for the production of cement clinker and typically accounts for 80-90 per cent of the raw mix. Clay or shale accounts for some 10-15 per cent and provides most of the silica, alumina and iron oxide. Cement making is highly capital intensive and cement plants are normally located in close proximity to the main raw material, i.e. limestone/ chalk.

The Northfleet works is supplied with chalk from the higher part of the White Chalk Subgroup ('Upper Chalk') from Eastern Quarry at Bean, which is just inland from the plant. Following crushing, the chalk is blended with clay slurry which is fed by pipeline from a quarry at South Ockenden in Essex. The blended slurry is then fed to the cement works via another pipeline.

BUILDING STONE

Limestone

The most important source of building stone in the county is the limestone of the Lower Cretaceous Hythe Formation. These limestone beds, more commonly known as 'Kentish Ragstone', contain a significant proportion of quartz sand grains making them durable but difficult to work. They were extensively quarried for building stone along the outcrop between Maidstone and Hythe. This stone was in great demand both locally and in London. Today, only two quarries which produce building stone from the Hythe Formation are still active in Kent. These are at Barming and West Malling.

Thin fossiliferous limestone beds within the Lower Cretaceous Weald Clay Formation, known variously as small and large ‘Paludina’ limestones or ‘Bethersden’ and ‘Sussex marbles’, were once the basis of an important decorative stone/paving industry, but are no longer quarried.

The Upper Cretaceous Chalk was used in the past as a local source of building stone. In the Palaeogene London Clay Formation of the Isle of Sheppey and adjacent coastal areas, large limestones nodules known as septaria were once the basis of an important cement-making industry and were occasionally used in buildings.

Sandstone

There are no sandstones currently quarried in Kent for building purposes. In the past, however, hard sandstone beds within the Lower Cretaceous Tunbridge Wells Sand Formation were widely used for local building purposes. Hard sandstone concretions in the Palaeogene Thanet Sand Formation cropping out in the cliffs between Herne Bay and Reculver were also once quarried for vernacular building purposes.

Flint

Flint nodules derived from the chalk were locally used for building material, but were once more important as raw material for the local gunflint industry.

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 constructional fill and for lining and sealing of landfill sites. 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 red brick, such as strength and frost resistance and, importantly, its architectural appearance.

Most facing bricks, engineering bricks and related clay-based building products are manufactured in large automated factories. These represent a high capital investment and are increasingly dependent, therefore, on raw materials with predictable and consistent firing characteristics in order to achieve high yields of saleable products. Blending different clays to achieve improved durability and to provide a range of fired colours and textures is an increasingly common feature of the brick industry. Continuity of supply of consistent raw materials is of paramount importance.

There are several brick manufacturing sites in Kent which use a variety of clay raw materials. Brick clay resources shown on the map are confined to the Cretaceous-age Weald and Wadhurst clays and to Quaternary-age ‘brickearth’.

The Weald and Wadhurst clays occur in relatively thick sequences across the central part of the county. They both comprise grey, silty mudstones which are often interbedded with sandstones and thin limestones. Brick makers tend to avoid these horizons. The clays consist predominantly of kaolinite and illite, a combination which is ideal for the manufacture of facing bricks. The Weald and Wadhurst clays are also important brick clay resources in the adjacent counties of Sussex and Surrey, where they form the basis for a number of large-scale brick making sites which are of regional importance. Weald Clay from Pluckley near Ashford is transported to the brickworks on the site of the former colliery at Tilmanstone near Dover.

Here, the Weald Clay is blended with colliery spoil to produce red stock bricks. Weald Clay is also utilised by a small brickworks at Bore Place near Sevenoaks. A small brickworks at Eastry near Sandwich uses the clayey basal beds of the predominantly sandy Thanet Formation. The Tilmanstone works also produces yellow stock bricks by blending the same colliery spoil with Gault Formation. The latter clay originates from a site at Aylesford near Maidstone where it is removed as overburden from the Folkestone Formation sand deposit. This brickworks is the only major operation in the country which utilises clay from the Gault Formation. Despite its use at this site, Gault Formation is not generally considered to be an important source of brick making material and hence is not shown as a resource on the map.

The brickworks on the site of the former colliery at Tilmanstone near Dover uses Gault clay, Weald Clay and coal mine waste to produce a range of facing bricks.

In contrast, ‘brickearths’ are silty loams which are usually found in association with river gravels in the area around the Thames Estuary. Deposits are generally thin (less than 2 m), but can be persistent, particularly where associated with extensive river terrace and flood plain sediments. In the Sittingbourne area, brickearth formed the basis for a large number of brickworks manufacturing distinctive golden yellow ‘London Stock’ bricks. Today, only two brickworks remain, although this traditional brick is now much in demand, particularly for restoration and conservation work in London. The map shows the distribution of brickearth in the Sittingbourne area only.

FULLER’S EARTH

A number of clays have been referred to as ‘fuller’s earth’ in the past. In Britain, the term is now used to describe clays composed essentially of the clay mineral Ca-smectite. These clays exhibit a unique combination of properties which form the basis of their industrial applications.

Fuller’s earth occurs as a single bed up to 2 m thick in the Sandgate Formation of Maidstone area where it has been worked intermittently since Roman times. In more recent years, the clay was quarried at two sites on the eastern outskirts of Maidstone, but production ceased in 1983. Any remaining resources will have been sterilised by urban development. Thin beds of fuller’s earth have been identified at a number of locations in eastern Kent, but none are of

workable thickness. There is no evidence for any remaining fuller's earth resources in the county.

A clay described as 'fuller's earth' was formally worked from the Atherfield Clay to the north of Leeds. This clay does not consist of smectite and is not a true fuller's earth.

COAL AND HYDROCARBONS

Coal

Coal-bearing strata of Carboniferous (Westphalian) age are preserved in a south easterly plunging syncline forming the Kent Coalfield. This is the most southerly coalfield in England and extends eastwards under the English Channel. Concealed entirely beneath a cover of Mesozoic and Palaeogene ('Tertiary') rocks at depths between 600 and 1500 m, the coal is of medium to high rank. All working in this coalfield has now ceased, although coal was mined from collieries at Tilmanstone (closed 1986), Betteshanger (closed 1989), Snowdown (closed 1988), Chislet (closed 1969) and Shakespeare Cliff (closed 1915).

Conventional oil and gas

Oil shows have been found in the Wealden (Lower Cretaceous) rocks exposed in Kent, with important hydrocarbon discoveries made just to the south and west of the Kent county boundary at Bletchingley in Surrey (gas) and Palmers Wood in East Sussex (oil). Hydrocarbon exploration in Kent has been neither widespread, nor successful with all wells thus far proving dry. The location of exploration wells and current exploration licences held in the south and west of the county reflect the main prospective areas close to existing discoveries in Sussex.

The main hydrocarbon potential is, therefore, probably confined to the south and west of the county, reflecting a number of factors. Most importantly, that the majority of the county lies over the southern limits of the London Brabant Massif, across the main bounding fault to the Weald Basin. It is thus some way north of the main centre of deposition, as well as the main area of source rock maturity. Potential oil/gas traps or plays away from the basin thus require longer and more complex migration pathways. Mesozoic sequences are also thinner and are less affected by Alpine movements that generated the traps within the basin sequences.

Coalbed methane (CBM) and abandoned mine methane (AMM)

The Kent coalfield shows generally very low methane yields. Values of 2.3 m^3/tonne obtained from the Kent No.6 Coal Seam at Tilmanstone Colliery are lower than theoretical calculations.

Eastern Pegasus / Alkane Energy currently hold Exploration Licence EXL260 covering much of the concealed coalfield area (Tilmanstone, Snowdown and Betteshanger collieries). This licence gives Alkane exclusive rights to CMM, CBM and conventional oil and gas resources within its boundaries. CBM and AMM prospects are considered only moderate to poor. The best prospect is probably limited to the Chislet area which is north of EXL260, with other potential to be found in narrow strips adjacent to the south and west boundaries of the EXL260 licence block.

Licensing

The Department of Trade and Industry grants licences for exclusive rights to explore for and exploit oil and gas onshore within Great Britain. The rights granted by landward licences do not include any rights of access, and the licensees must also obtain any consent under current legislation, including planning permissions. 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.

SUBSURFACE AGGREGATE

Carboniferous limestone is the most extensively used crushed rock aggregate in England. It is a high quality material which is used for both concreting aggregate and roadstone. Carboniferous limestone occurs beneath the concealed Kent Coalfield, rising to the north to form an east west subcrop which is concealed beneath overlying Chalk and Lower Cretaceous rocks. The map shows the extent of the Carboniferous limestone subcrop in east Kent, along with contours showing depth from the surface to the top of this unit. The contours are at 100 m intervals. 500 m is considered the maximum 'mineable' depth of this material, with the top of the limestone rising to within 300 m of the surface in the Richborough area. Although there are currently no operations in the UK which extract aggregate from underground and no immediate plans to work Carboniferous limestone in Kent, this production method remains an option for the future. Deep-mined Carboniferous limestone from this area may provide an alternative source of high quality crushed rock aggregate for South East England.

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 relate these to selected nationally-recognised 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 important mineral resources against sterilisation. They bring together a wide range of information, much of which is scattered and not always available in a convenient form.

The maps have been produced by collation and interpretation of mineral resource data principally held by the British Geological Survey. Information on the extent of mineral planning permissions 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 the relevant body should be contacted.

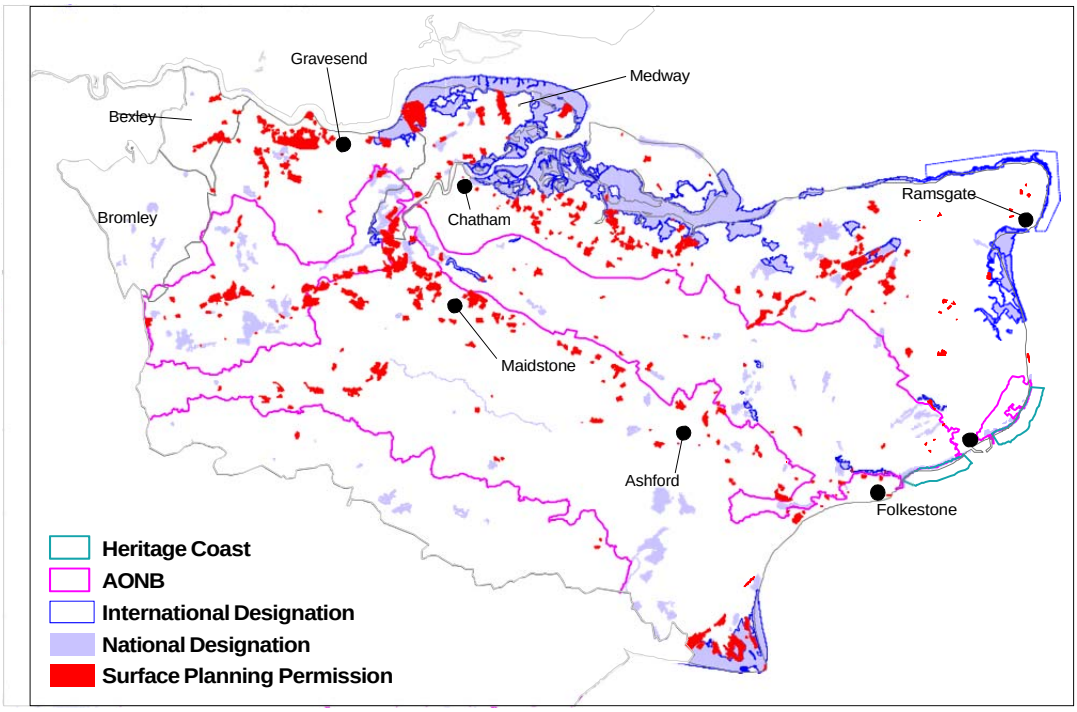
The mineral resource data presented are based on the best available information, but are not comprehensive and their quality is variable. The inferred boundaries shown are, therefore, approximate. Mineral resources defined on the map delineate areas within which potentially workable minerals may occur. These areas are not of uniform potential and also take no account of planning constraints that may limit their working. The economic potential of specific sites can only be proved by a detailed evaluation programme. Such an investigation is an essential precursor to submitting a planning application for mineral working. Extensive areas are shown as having no mineral resource potential, but some isolated mineral workings may occur in these areas. The presence of these operations generally reflect very local or specific situations.

The maps are intended for general consideration of mineral issues and not as a source of detailed information on specific sites. The maps should not be used to determine individual planning applications or in taking other decisions on the acquisition or use of a particular piece of land, although they may give useful background information which sets a specific proposal within context.

PLANNING PERMISSIONS FOR THE EXTRACTION OF MINERALS

The extent of all known extant and non-extant planning permissions for the extraction of minerals is shown on the map irrespective of current planning or operational status. They cover active (identified separately), former and restored mineral workings, and occasionally, unworked deposits. They represent areas where a commercial decision to work mineral has been made, an application has been dealt with through the provisions of the Town and County Planning legislation and the permitted reserve will have been depleted to a greater or lesser extent. The current status of a permission is not qualified on the map but is available in the underlying database.

In the case of Kent, Medway, Bexley and Bromley, these have been captured in a number of ways. For Kent, information has been provided digitally for the currently active operational sites. For non-extant sites, information was abstracted from the microfiched planning documents held by Kent, plotted on 1:25000 or 1:10000 scale topographical maps and digitised. Some Medway sites were captured in this way, others were supplied on maps and photocopies at 1:10000 or 1:12500 by Medway Council. Bromley and Bexley also supplied photocopies at various scales for digitising.



Kent surface planning permissions with Area of Outstanding Natural Beauty (AONB), and other National (Site of Special Scientific Interest [SSSI] and National Nature Reserve [NNR]) and International (Special Area of Conservation [SAC] Special Protection Area [SPA] and Ramsar) designations.

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Bromley LB, Environmental Services Dept, Planning Division, Civic Centre, Stockwell Close, BROMLEY, BR1 3UH, Tel: 0208 464 3333, Fax: 0208 313 0095, Web Page: www.bromley.gov.uk/.

Bexley LB, Strategy and Regeneration, Wyncham House, 207 Longlands Road, SIDCUP, DA15 7JH, Tel: Ian Bailey 0208 303 7777, Fax: 0208 308 4988, Web Page: www.bexley.gov.uk/.

TOPOGRAPHIC BASE

Constraint information published on the accompanying map has been provided from the various agencies listed below, any enquiries on this information should be addressed to the relevant agency:

English Nature - Digital SSSI and NNR boundaries © English Nature 2000.

Contact address: English Nature, Northminster House, Northminster, Peterborough, PE1 1UA, Tel: 01733 455000, Fax: 01733 455103, Web page: www.english-nature.org.uk/.

English Heritage - Positions of Scheduled Monuments at 15th August 2001.

The majority of monuments are plotted using a centred NGR symbol. Consequently the actual area and/or length of a monument protected by the legal constraints of scheduling cannot be represented here. Monuments scheduled since that date are not accounted for. © Copyright English Heritage.

Contact address: English Heritage, 23 Savile Row, London, WS1 2ET, Tel: 020 7973 3132, Web page: www.english-heritage.org.uk/.

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Contact address: Countryside Agency, John Dower House, Crescent Place, Cheltenham, Gloucestershire, GL50 3RA, Tel: 01242 521381, Fax: 01242 584270, Web page: www.countryside.gov.uk/.

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