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NATURAL ENVIRONMENT RESEARCH COUNCIL

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

Lincolnshire

British Geological Survey Commissioned Research Report CR/02/128N

D J Harrison, P J Henney, D G Cameron, N A Spencer, E J Steadman, D J Evans, G K Lott and D E Highley

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Mineral Resources Series

Mineral Resource Information for Development Plans: Lincolnshire

D J Harrison, P J Henney, D G Cameron,
N A Spencer, E J Steadman,
D J Evans, G K Lott and D E Highley

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Cover Photograph:
Lincolnshire Limestone, Greetwell Quarry, nr Lincoln.

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British Geological Survey Offices

Keyworth, Nottingham NG12 5GG
☎ 0115–936 3100 Fax 0115–936 3200
e-mail: sales @bgs.ac.uk www.bgs.ac.uk
BGS Internet Shop:
www.british-geological-survey.co.uk

Murchison House, West Mains Road,
Edinburgh EH9 3LA
☎ 0131–667 1000 Fax 0131–668 2683

London Information Office at the Natural History Museum (Earth Galleries),
Exhibition Road, South Kensington,
London SW7 2DE
☎ 020–7589 4090 Fax 020–7584 8270
☎ 020–7942 5344/45

Forde House, Park Five Business Centre,
Harrier Way, Sowton, Exeter, Devon EX2 7HU
☎ 01392–445271 Fax 01392–445371

Geological Survey of Northern Ireland, 20 College Gardens,
Belfast BT9 6BS
☎ 028–9066 6595 Fax 028–9066 2835

Maclean Building, Crowmarsh Gifford, Wallingford,
Oxfordshire OX10 8BB
☎ 01491–838800 Fax 01491–692345

Parent Body
Natural Environment Research Council
Polaris House, North Star Avenue,
Swindon, Wiltshire SN2 1EU
☎ 01793–411500 Fax 01793–411501

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 Lincolnshire 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 two digitally-generated summary maps 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 the East Midlands 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 maps 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, coal, hydrocarbons, building stone, limestone, chalk and ironstone.

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 a mineral reserve 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:

- Lincolnshire Wolds Area of Outstanding Natural Beauty (AONB)
- National nature conservation designations - 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 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, mainly limestone, 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 as constructional fill. Sand and gravel is the most important source of aggregate in Lincolnshire and production was some 2.9 million tonnes in 2001, all of which was land won.

Areas assessed for sand and gravel by BGS are identified on the map and the resources here are taken from these maps. In these areas the possible concealed extent of sand and gravel beneath till (boulder clay) and alluvium is shown. Outside these areas, available data are more limited. Only exposed sand and gravel is defined. There are some differences in the classification of sand and gravel deposits between map sheets.

Sub-alluvial and river terrace deposits

The main source of these materials in Lincolnshire are Quaternary and Recent age deposits in the valleys of the Trent, Slea and Witham, where generally clean, well bedded sand and gravel rest on weathered bedrock. Resources occur in both raised river terrace sequences flanking the modern floodplains and in flood plain terrace deposits associated with, and underlying, present day alluvium. This sequence of deposits is best developed along the River Trent with a succession of terrace deposits formed at heights up to 35 m above OD, representing accumulations of sand and gravel in response to falling sea level in post - glacial times. Thickness varies from between less than 1 m up to maximum values of around 10 m. The gravel content is highly variable and medium-grained sand generally forms at least 50 per cent of the deposits. Individually mapped units include, going from west to east, the Balderton, Fulbeck, Belton and Sleaford sands and gravels. The Balderton deposits are mostly between 5 and 7 m thick and have roughly equal proportions of gravel and sand. The gravel consists mainly of quartz and quartzite pebbles with minor flint whilst the sand is dominantly quartz, akin to the lithologies in the Trent Valley. The Fulbeck and Sleaford deposits are generally much thinner (1 to 3 m), the sand to gravel ratio is more variable and the pebbles consist mainly of shelly and oolitic limestone together with minor amounts of ironstone, sandstone and flint. The Belton deposits are generally sandy with only about 5 per cent gravel, again composed mainly of

limestone fragments. Resource assessment data suggest that the Fulbeck sand and gravel has little mineral potential compared to the Sleaford and Belton deposits which are considered to be more promising. Some of these types of deposits are known as the Fen Gravels. This deposit, up to 5 m thick, consists of pebbly sands and gravels composed of local Jurassic limestone with flint and other lithologies. It forms a discontinuous spread at the edge of the fens and extends up the present day valleys. The sand and gravels were deposited as coalescing fans laid down by streams draining from the uplands to the west and are largely of late Quaternary age. The basal surface dips under younger superficial deposits and, towards the North Sea, they become finer grained, containing less gravel, and pass into deposits containing marine shells.

Glaciofluvial sand and gravel

These are deposits mapped as the products of deposition by glacial meltwaters and are nowadays commonly labelled on BGS maps as glaciofluvial deposits, a more accurate description of their origin. The sequence of these deposits is complex with mappable units commonly exhibiting intricate relationships. Bodies of sand and gravel may occur as sheet- or delta-like layers above till deposits or as elongate, irregular lenses within the till sequence. Areas of wholly concealed, and thus unknown, bodies of sand and gravel may occur under spreads of till and other drift deposits. These deposits include the individually mapped Eagle Moor sand and gravel which caps hilltops and high plateau land north – north-east of Newark and which can reach thicknesses of up to 5 m. Borehole logs show that this deposit comprises about 60 per cent gravel, consisting of fine to medium-grained, sub-rounded to well-rounded quartz and quartzite with 30 per cent sand of similar composition and 10 per cent fines. The gravel component also includes mudstone fragments, sub-angular flints and chert.

Blown sand

These deposits are generally composed of fine- to medium-grained sand with a mean fines (<0.075 mm) content of around 8 per cent. The sand comprises sub-rounded to well rounded quartz grains. These deposits are believed to be largely of late Quaternary age resulting from aeolian reworking of fluvial and glaciofluvial sands. The most favourable sites for blown sand accumulation are along the lower slopes of major west-facing escarpments. Deposits are generally thin (mostly less than 2 m but locally up to 5 m thick) and occur as both recognisable dunes and as thin linear spreads of sand, mainly in northern and eastern Lincolnshire. These deposits are important as a source of mortar and construction sand.

Figure 1 A deposit of blown sand being worked for construction use, North Kelsey.

Beach sand and gravel

Included in this category are deposits marked on BGS maps as 'Shoreface and Beach Deposits', 'Storm Beach Deposits' and a variety of raised beach deposits. Typically these occur as accumulations of sand and gravel restricted to the modern coast and a relatively narrow belt of country adjacent to it. Areally extensive deposits of this type are found mainly to the south of Grimsby and between Boston and Skegness.

CRUSHED ROCK AGGREGATES

A variety of hard rocks are, when crushed, suitable for use as aggregates. Their technical suitability for different applications depends on their physical characteristics, such as crushing strength and resistance to impact and abrasion. Higher quality aggregates are required for coating with bitumen for road surfacing, or for mixing with cement to produce concrete. For applications, such as constructional fill and drainage media, with less demanding specifications, lower quality materials are acceptable. Lincolnshire has limited resources of rock suitable for use as crushed rock aggregate (see text for Limestone and Chalk).

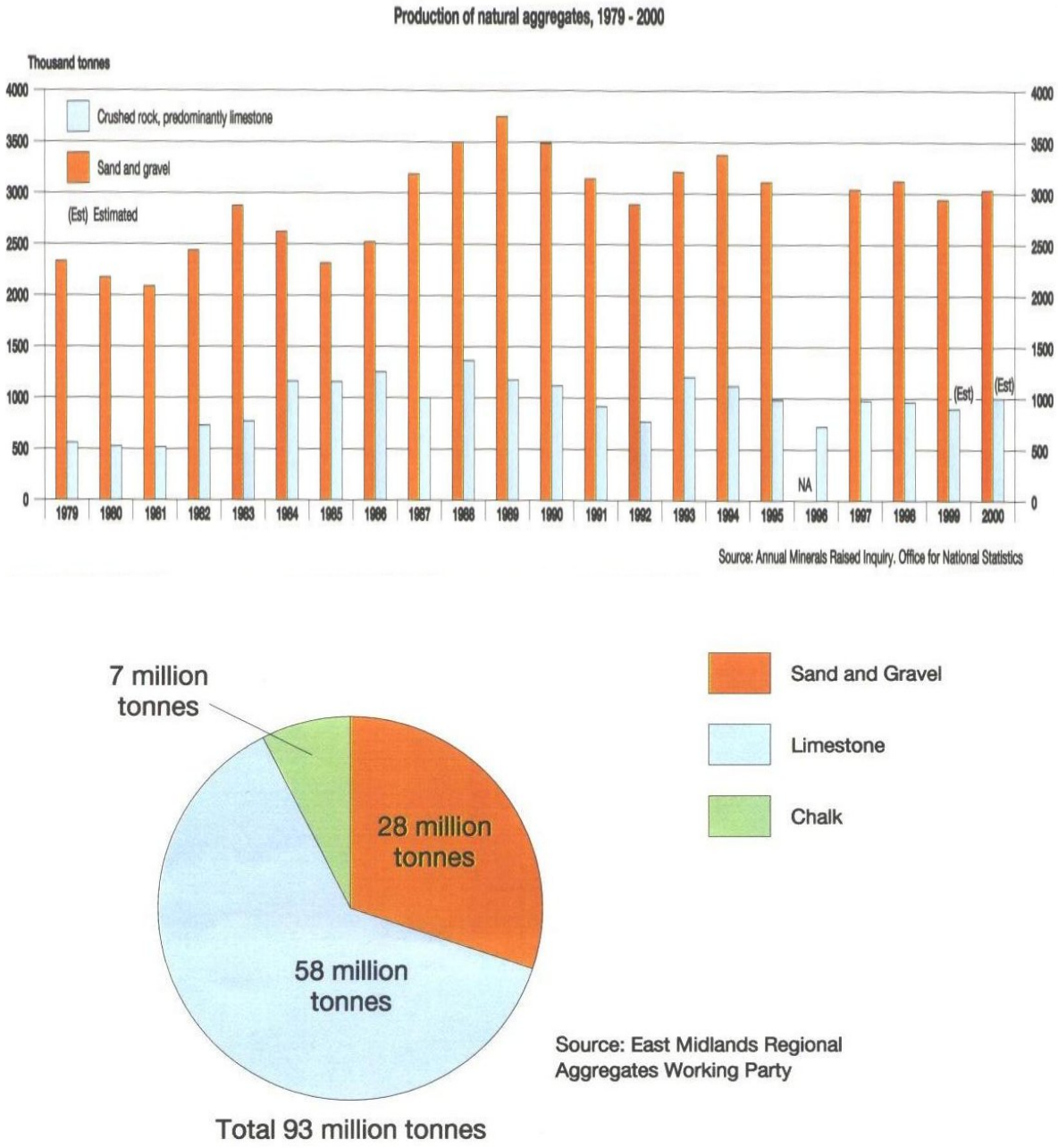

Figure 2 Production and permitted Reserves (2000) of natural aggregate in Lincolnshire.

COAL

A major part of the county is underlain by Lower and Middle Coal Measures strata entirely concealed by a thick Permian and Mesozoic cover. The Coal Measures have never been worked but a deep mine coal resource has been identified by UK Coal on the Nottinghamshire/Lincolnshire border, the so-called Witham Prospect Area. However, a deep mine licence has been withdrawn.

PEAT

Peat is an unconsolidated deposit of plant remains in a water saturated environment such as a bog or fen. Bogs occur in areas where they are dependent on rainfall for supply of water and the vegetation is characterised by acid tolerant plant communities of which the genus *Sphagnum* is dominant. The two main types of bog are (i) raised bogs, characterisitic of flat underlying topography and found on low plains and broad valley floors and (ii) blanket bogs which occur mainly in upland areas where conditions are suitably cool and wet. Many lowland raised bogs have been designated as sites of international and national conservation areas. Some 98 per cent of the peat extracted in the UK is used as growing media by amateur and professional gardeners. There is no extraction of peat in Lincolnshire but resources occur in the north of the county.

HYDROCARBONS

Conventional oil and gas

The significant number of exploration wells and the existence of a dense network of seismic reflection surveys, illustrates that in some areas, Lincolnshire has been intensively explored for oil and gas since before the Second World War. This has led to many discovery wells and the development of a number of producing oilfields in the county. To date, 17 oilfields and a major gas condensate field have been developed, with 11 oilfields known to be still producing. The total production for each field is shown in the Table 1.

Name of field	Field Type (oil or gas)	Operator at time of discovery	Current operator	Discovery date	Production started	Production ceased	Total production (tonnes) – up to 2000
Beckering	Oil	British Gas	Star Energy	1990	No details available		No details available
Beckingham (extends into Notts)	Oil	BP	Pentex	1959	1964		Total production to end 1981 was 293,369
Cold Hanworth	Oil	Candecca	Star Energy	Sep-97	Sep-98	Still producing	5,000
Corringham	Oil	BP	Pentex	1958	1959	?ceased	Total production to end 1981 was 46,997
Crosby Warren	Oil	Edin. Oil & Gas	Edin. Oil & Gas	May-86	Oct-87	Still producing	78,000
East Glentworth	Oil	Pentex	Pentex	Mar-87	Feb-93	Still producing	10,000
Fiskerton Airfield	Oil	Cirque	Cirque	Nov-97	Aug-98	Still producing	43,000
Gainsborough	Oil	BP	Pentex	1959	1959		Total production to end 1981 was 452,689

Glentworth	Oil	BP	Pentex	1961	1961		Total production to end 1981 was 26,418
Keddington	Oil	Candecca	ROC Oil (UK) Ltd	Jan-98	Sep-98	Still producing	10,000
Nettleham	Oil	BP	Star Energy	Mar-83	Oct-85	Still producing	191,000
Newton-on-Trent	Oil	Transworld	AltaQuest	Apr-98	Sep-98	Suspended	3,000
Saltfleetby	Gas	Candecca	ROC Oil (UK) Ltd	Oct-97	Dec-99	Still producing	c. 0.5 bcm
Scampton	Oil	BP	ROC Oil (UK) Ltd	Nov-85	Aug-96	Still producing	4,000
Scampton North	Oil	BP	Star Energy	Oct-85	Feb-89	?Still producing	175,000
Stainton	Oil	BP	Star Energy	Jun-84	Jun-87	Still producing	23,000
Torksey	Oil	BP		1962	1963	Ceased production	Total production to end 1981 was 6,577
Welton	Oil	BP	Star Energy	Feb-81	Nov-84	Still producing	1,881,000
West Firsby	Oil	Tullow	Tullow	Jan-88	Aug-91	Still producing	146,000
Whisby	Oil	East Midlands Oil & Gas	Blackland Park	Jan-85	May-90	Still producing	32,000
Total							**3,427,050**

Table 1 Summary of major oil and gas shows in Lincolnshire.

Exploration to date indicates that the best potential for the discovery of oil lies in central parts of the county. In recent years exploration in the East Midlands has been dominated by operators such as ROC Oil (UK) Ltd (formerly Candecca), who developed a large acreage position in the county that has led to large tracts of the county being currently licensed for oil and gas exploration. They have enjoyed significant success with the identification of many small satellite accumulations around the larger fields such as Welton. However, the major gas condensate discovery by ROC Oil (UK) Ltd at Saltfleetby has diverted attention to the north and north-east of the county and it is likely that there will be further small oil and gas discoveries in these areas in the future. There appears to be limited oil and gas prospectivity in the south and south-eastern parts of the county.

A major part of the county of Lincolnshire is underlain by Lower to Middle Coal Measures strata entirely concealed beneath a thick Permian to Mesozoic cover that dips eastwards towards the coast. Generally NNE-dipping and locally folded, the Coal Measures strata are unmined, but are east of and continuous with those strata mined in the Yorkshire and Nottinghamshire coalfields. Coal thicknesses are poorly known and few data are available on coal rank or gas content. More is known of the unworked Coal Measures underlying the west of the county in the vales of Till and Witham, where they lie at depths between 300 and 1400 m. Their rank is high volatile

bituminous and where measured, seam gas content ranges between 1.5 and 5.9 m^3 methane/tonne.

Coalbed Methane

The term coalbed methane is used here to refer to the extraction of methane via boreholes from coal seams other than in abandoned or active coal mines. Thus it includes the extraction from unmined areas, or coal seams above or below abandoned or working mines. The levels of coalbed methane in the coal seams of Lincolnshire are relatively low (1.5-5.9 m^3 methane/tonne), with average measurements in the vales of Till and Witham of 5.19 and 1.71 m^3 methane/tonne respectively. In the USA, most coalbed methane production is from coals containing 7 or more m^3 methane/tonne. Thus coalbed methane development from virgin coal seams in Lincolnshire are not economic at the moment, a point illustrated by the fact that no coalbed methane wells have been drilled in the county to date. Future coalbed methane potential will depend upon favourable changes in the economic situation. In such circumstances the Coal Measures beneath the Vale of Till might provide the best prospects. Future potential might exist in the north of the county if the coals are present at depth. The concealed Coal Measures of the Vale of Witham prospect and those in the east of the county probably represent poor potential.

BUILDING STONE

Historically the county of Lincolnshire has produced and used a wide range of indigenous stones for building purposes. Former sources of building stone in the county include the Lower Jurassic (Lias limestones and Marlstone Rock Formation sandy ironstones), the Middle Jurassic (Lincolnshire Limestone Formation), the Lower Cretaceous (Spilsby Sandstone, Claxby Ironstone) and the Upper Cretaceous (Ferriby Chalk). However, only the limestones of the Lincolnshire Limestone Formation, quarried since Roman times, were generally exported outside the county. The limestones of the Lincolnshire Limestone Formation now form the only building stone resource still exploited in the county.

The oolitic and shelly limestones of the Lincolnshire Limestone are currently quarried in the county. In the city of Lincoln a single quarry, known as the Cathedral or Dean & Chapter Quarry, supplies stone principally for conservation work at the cathedral. In the Ancaster-Wilsford area three quarries are in operation, Glebe (Gregory's), Ancaster (Thompson's) and Castle. The quarries produce block stone from beds in the upper part of the formation - the Weatherbed, the Hard White and the Ancaster Freestone. At Leadenham, the quarries exploit a sandy limestone unit from the lower part of the formation for paving stone. In the Stamford area of south Lincolnshire, block stone is produced at Creeton. The well-known Clipsham Stone (Holwell Quarry) is also still produced in a number of quarries that span the Lincolnshire/Rutland border.

LIMESTONE

The Lincolnshire Limestone Formation of Middle Jurassic age (Inferior Oolite) is the major limestone unit in Lincolnshire. Its outcrop runs north to south through Grantham and Lincoln, forming the prominent escarpment of Lincoln Edge. It has

long been a source of building stone, but is also a valuable resource of crushed rock aggregates. It is currently worked for aggregates at ten small to medium-sized quarries, mostly between Stamford and Lincoln. Several also produce agricultural lime and small amounts of building stone. Crushed Lincolnshire Limestone provides aggregates, which are of relatively low strength and with poor resistance to frost damage (they have moderate to high values of water absorption). They are, therefore, generally only suitable for use as constructional fill or sub-base roadstone material.

Figure 3 Lincolnshire Limestone, Greetwell Quarry, near Lincoln.

The Lincolnshire Limestone Formation is about 30 m thick and is commonly divided into two parts, the Lower and Upper Lincolnshire Limestones. The formation is dominated by limestones of variable lithology, thickness and distribution, with some silty, sandy or muddy beds. The Lower Lincolnshire Limestone is dominated by fine-grained limestones, bioclastic limestones and oolitic limestones and the Upper Lincolnshire Limestone by cross-bedded, oolitic limestones. The variable lithology results in varying chemical properties and the limestones do not form a high purity limestone resource. Even the purest limestone beds are likely to contain less than 97 per cent $CaCO_3$.

CHALK

Chalk is a relatively soft, fine-grained, white limestone, consisting mostly of the debris from planktonic algae. The Chalk is of Upper Cretaceous age and occurs extensively in eastern and southern England where it forms an important resource of 'limestone raw materials'. In Lincolnshire, the Chalk is harder and contains less moisture than the Chalk in southern England and hence it is of value as aggregate, but

only for less demanding applications, such as fill and sub-base roadstone. Chalk is currently extracted from five quarries in the county, for industrial purposes, including iron making, lime production for steel manufacture and industrial fillers, for constructional purposes and agricultural use. The Lincolnshire Wolds are marked by numerous small disused chalk quarries where the Chalk has been dug for local use as agricultural lime and hard core. Over much of Lincolnshire and particularly east of Louth, the Chalk is overlain by extensive drift deposits which thicken towards the east of the county.

Figure 4 Quarry in Chalk, Mansgate Hill, near Caistor.

The Chalk in Lincolnshire is divided into five distinct formations; the Ferriby Chalk, with a red-coloured chalk at the base - the Hunstanton Formation, or Red Chalk; the Welton Chalk; the Burnham Chalk; and the Flamborough Chalk. The most obvious differences between the formations is in the occurrence of flint. The Ferriby and Flamborough chalks are flint-free, while the Welton Chalk and the Burnham Chalk are characterised by flint nodules and bands. Much of the Chalk contains numerous partings and bands of calcareous mudstone (marl), although there are fewer and more widespread mudstones in the Burnham and Welton chalks. Consequently, this part of the sequence is thought to be of higher purity (generally >97 per cent $CaCO_3$) than the overlying Flamborough Chalk and the underlying Ferriby Chalk which are expected to be mainly of medium purity (>93 per cent $CaCO_3$) due to the numerous mudstone bands. The silica content is, however, variable depending on the flint content. The Burnham and Flamborough chalks are concealed beneath drift which thickens towards the coast.

IRONSTONE

The Jurassic Marlstone Rock Formation consists principally of an iron-rich, fossiliferous limestone which weathers to a deep brown colour. It is relatively resistant to erosion and in areas where the formation has a high iron content it has been worked as a source of ironstone. It has also been worked on a small scale for building stone and lime. Relatively large scale iron ore extraction took place from around 1870 to about 1950. The ironstone bed is about 2-3 m in thickness, of variable quality with a relatively low iron content (around 25 per cent).

A second iron-bearing horizon is the Middle Jurassic Northampton Sand Formation. This was formerly extensively worked for ironstone further south in Northamptonshire. In Lincolnshire the formation is only about 2 m thick with an average grade of 20 to 30 per cent iron. This is far below the 30 to 50 per cent typical of the workable ironstone in other parts of the Midlands.

Other notable ironstones occur in the north-west of the county. These are the Frodingham Ironstone of Lower Jurassic age and the Claxby Ironstone of Lower Cretaceous age. The former has been extensively extracted in the Scunthorpe area on the northern boundary of the county, and the latter on a much smaller scale near Caistor. Both are of extremely low grade (between 20 to 30 per cent iron). Production from the Frodingham Ironstone only ceased in 1988, but the Claxby ironstone was last worked in 1969.

Technological and economic changes within the UK iron and steel industry has led to the demise of sedimentary ironstones as a source of iron ore and it is unlikely that the ironstones of Linclonshire will have any future commercial value for this purpose. For this reason they are not shown as a resource on the map. However, there remain planning permissions granted for the extraction of ironstone and overlying minerals within the county. They give an indication of the maximum extent of working.

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 PERMISSION FOR THE EXTRACTION OF MINERALS

The extent of all known extant, and former, planning permissions for the extraction of minerals is shown on the map, irrespective of their current planning or operational status. The polygons were either supplied digitally by Lincolnshire County Council or were digitised by BGS from Plotting Sheets and other documents supplied by Lincolnshire County Council. Any queries regarding the sites shown should be directed to the 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 dealt with through the provisions of the Town and Country Planning legislation and the permitted reserve may have been depleted to a greater or lesser extent. Current planning status is not qualified on the map but is available in the underlying database.

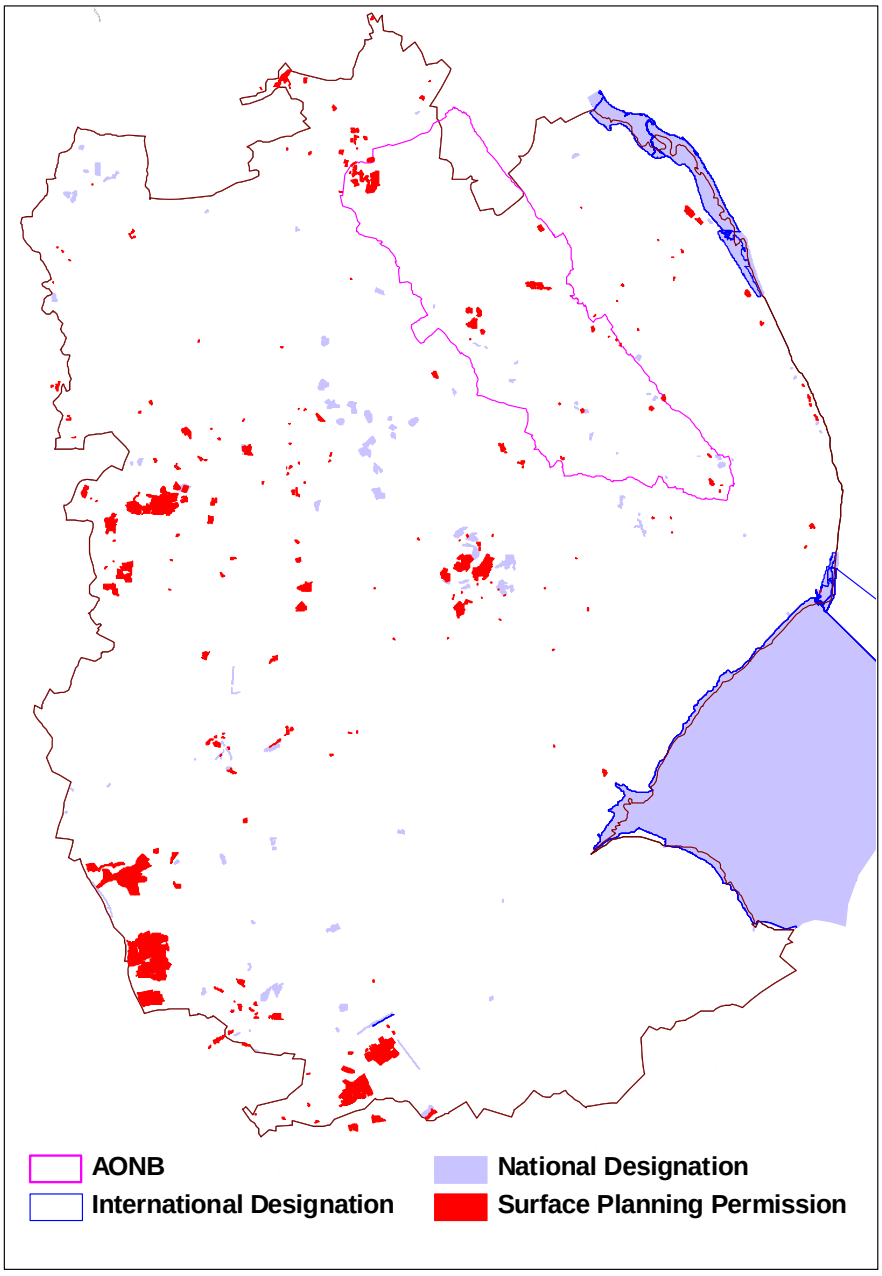

Figure 5 Surface mineral planning permissions and landscape and nature –conservation designations in Lincolnshire.

Details of all planning permissions are held on the Planning Registers which are kept by the District Councils. International designations include SPA, SAC and Ramsar whilst National designations include SSSI and NNR.

Contact addresses

Boston Borough Council, Municipal Buildings, Boston PE21 8QR, Tel: 01205 314200,
Fax: 01205 364604.

East Lindsey District Council, Tedder Hall, Manby LN11 8UP, Tel: 01507 601111, Fax: 01507 600206.

Lincoln City Council, City Hall, Beaumont Fee, Lincoln LN1 1DN, Tel: 01522 881188.

North Kesteven District Council, PO Box 3, Kesteven Street, Sleaford NG34 7EF, Tel: 01529 414155, Fax: 01529 413956.

South Holland District Council, Priory Road, Spalding PE11 2XE, Tel: 01775 761161,
Fax: 01775 711253.

South Kesteven District Council, St Peter's Hill, Grantham NG31 6PZ, Tel: 01476 406080.

West Lindsey District Council, 26 Spittal Terrace, Gainsborough DN21 2HG, Tel: 01427 615411, Fax: 01427 810623.

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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 2002.

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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