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NATURAL ENVIRONMENT RESEARCH COUNCIL



Provision of geological information and updating of Mineral Consultation Areas for Leicestershire County Council

Economic Minerals Programme

Commissioned Report CR/05/054N



BRITISH GEOLOGICAL SURVEY

ECONOMIC MINERALS PROGRAMME

COMMISSIONED REPORT CR/05/054N

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Foreword

This report presents the results of work carried out by the British Geological Survey (BGS) on behalf of Leicestershire County Council. The study involved providing geological information on mineral resources in Leicestershire and updating Mineral Consultation Areas to assist the Council's Minerals Local Plan Review.

Acknowledgements

The BGS would like to thank Steve Marriott, Principal Planning Officer at Leicestershire County Council, for his advice during the study and acknowledge and thank the following companies and the named representatives for their involvement in the consultation process:

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Summary

This report describes work carried out by the British Geological Survey on behalf of Leicestershire County Council to assist in the revision of their Minerals Local Plan. The work involved the provision of maps showing the extent of individual mineral resources in the county and the location of mineral sites where permitted reserves are present. More importantly, it also involved updating Mineral Consultation Areas for each mineral and providing these in digital form for use within a Geographical Information System. This report describes the methodology adopted and presents the various results.

1 Introduction

Leicestershire County Council (LCC) is in the process of reviewing their Minerals Local Plan. This review is in line with *The Planning and Compulsory Purchase Act 2004*, and specifically guidance in *Planning Policy Statement (PPS) 12: Local Development Frameworks* (ODPM, 2004a) which states:

‘The policies set out in this statement should be taken into account by local planning authorities in the preparation of local development frameworks and minerals and waste development frameworks’.

The local development framework comprises local development documents, which include development plan documents. The local development framework, together with the regional spatial strategy, provides the essential framework for planning in a local authority’s area. The key development plan documents are as follows:

- core strategy;
- site specific allocations;
- adopted proposals map;
- area action plans;
- other development plan documents.

Minerals and waste development plan documents will be prepared by county councils.

For minerals, the core strategy ‘should take account of the need to contribute appropriately to national, regional and local requirements at acceptable social, environmental and economic costs’ (ODPM, 2004a).

Local planning authorities must include within the local development framework an adopted proposals map. In relation to minerals and waste development plan documents the following will need to be shown on the adopted proposals map:

- areas of significant mineral resources subject to safeguarding policies and Mineral Consultation Areas (MCAs);
- safeguarding of areas for mineral working, handling and for recycling;
- areas of search and preferred areas for waste management development and mineral working (including allocations of secondary aggregates);
- railheads and wharves safeguarded for bulk transportation (including minerals and waste);
- land allocated for recycling of construction and demolition waste;
- areas safeguarded and subject to groundwater protection;
- consultation areas relating to hazards such as flooding, land instability and contaminated land; and
- areas designated for the protection of the aquatic environment. (ODPM, 2004)

District planning authorities must also include on their adopted proposals map, minerals matters including safeguarding areas, MCAs and any minerals allocations which are adopted in a development plan document by the county council.

LCC commissioned the British Geological Survey (BGS) to carry out a study to assist in the review of its Minerals Local Plan. This report and the associated digital data involved providing broad geological resource information and updated MCAs. The outputs for this study are in paper map form and digital form. Samples of the types of maps provided or that can be generated using the data can be found in Appendix 1.

MCAs are areas identified in order to ensure consultation between the relevant Local Planning Authority and the Mineral Planning Authority before certain non-mineral planning applications made within the area are determined. This consultation is intended to prevent non-mineral development, such as a change of use or the development of land for other purposes, sterilising mineral resources.

2 Project objectives

The objectives of the project are:

- 1) provision of geological resource maps; and
- 2) updating of MCAs.

The project was carried out in two stages, reflecting the project objectives.

3 Provision of geological resource maps

For this part of the study the BGS was required to:

- a) Supply an A3 colour map (and PDF) at 1:250 000 scale depicting mineral resources throughout Leicestershire and Rutland, with Leicester City and Rutland administrative areas masked out. This represents the Mineral Local Plan area.
- b) Supply eight A4 size colour maps (and PDFs) approximate scale 1:450 000 scale (landscape orientation) depicting individual mineral resources within Leicestershire and point detail indicating current sites (in 2004) with permitted reserves. The minerals covered were as follows:
 - sand and gravel;
 - igneous rock;
 - limestone;
 - gypsum;
 - brick clay;
 - fireclay;
 - coal;
 - oil and gas (hydrocarbon licence areas).

Mineral resource data were based on those published by the BGS in the *Mineral Resource Information in Support of National, Regional and Local Planning: Leicestershire* report for the area (Harrison et al., 2002). An A3 colour map at 1:250 000 scale was produced depicting mineral resource information and active sites for the above economic minerals (Figure 1). The location of active mineral operations was plotted as point data. These sites were derived from the BGS Britpits database, which includes information on individual onshore mineral workings in terms of name, location, ownership, basic geology, and economic mineral produced. Eight

individual A4 mineral resource maps were produced depicting the above minerals (Figures 2 to 9).

4 Updating of MCAs

For this part of the study the BGS were required to:

- a) provide a Geographical Information System (GIS) generated map depicting revised MCAs, covering Leicestershire with Leicester City administrative area masked out;
- b) produce revised consultation areas for each mineral, based on mineral resource areas and showing existing mineral operations as point data;
- c) take account of selected settlements;
- d) carry out consultation with the minerals industry on the proposed MCAs;
- e) provide the data in digital form.

4.1 DEFINITION: MCAs

The ODPM *Consultation Paper on Minerals Planning Policy Statement (MPS) 1: Planning and Minerals* (ODPM, 2004b) outlines the considerations for minerals planning, one of which is ‘safeguarding’ of mineral resources. MCAs are the mechanism for safeguarding non-energy minerals from ‘unnecessary sterilisation by surface development’. They are applicable in two-tier planning areas. They ‘provide the mechanism for district councils to consult any county councils before granting permission on any planning applications they receive for developments which fall within the boundary of a MCA, and which would be likely to affect the winning and working of minerals’ and vice versa. When considering the delineation of MCAs, ‘Mineral Planning Authorities should seek advice from the minerals industries operating in their areas’. Also, ‘where non-mineral development is permitted and due to take place in a safeguarded area, it is desirable for minerals to be extracted beforehand where it is economic and environmentally acceptable to do so’. The safeguarding of existing transport facilities and identifying future sites, including wharves and depots, is also deemed important.

4.2 METHODOLOGY

MPS 1 provides the background for safeguarding minerals of potential economic importance by MCAs. However, there appears to be no published methodology or guidance for delineating MCAs other than consultation with the minerals industry. A methodology was, therefore, developed as the project progressed in line with LCC’s requirements. This involved a combination of expert geological opinion and knowledge, consultation with the minerals industry, taking into account existing ‘settlement’ areas and ‘buffering’ of MCAs in the GIS. The methodology adopted involved preparing MCAs for each mineral separately. The methodology varied from mineral to mineral reflecting the more widespread occurrence of some mineral resources, notably sand and gravel and Jurassic limestone, compared with for example igneous rock resources. MCAs for individual minerals may show considerable overlap in places. These are described in more detail below.¹

¹ The BGS has recently been awarded funding by the Sustainable Land Won and Marine Dredged Aggregate Minerals Programme of the Aggregates Levy Sustainability Fund to carry out a study on *Safeguarding aggregates and the environment: Best practice for the definition of Mineral Consultation Areas for aggregates* (SAMP 3.B3).

4.2.1 Separation and attribution of supplied MCA polygons

LCC supplied a digital file containing the linework for their existing MCAs (Figure 10). These areas were not always specific to a particular mineral representing the MCAs. Therefore, the first task was to separate the MCAs according to the resource they represented. Subsequently, each polygon was attributed with the relevant resource information. The original MCAs relating to ironstone were removed and not updated. The Jurassic ironstones in the county are not considered to have any future economic significance as a source of iron. This is not to say that ironstones in the county could not be worked as a source of building stone or low quality aggregate, but it was felt that this did not justify MCAs.

4.2.2 Sand and gravel

The sand and gravel resource areas were taken from the Mineral Resources map of Leicestershire and Rutland, with some additional small areas included to take account of new geological mapping recently carried out by BGS. MCAs were defined around the main tracts of river sand and gravel and the larger areas of exposed glaciofluvial deposits. The latter resources are, however, difficult to interpret as even small areas may mask a much larger ‘concealed’ resource beneath boulder clay. For example, LCC have defined a Preferred Area at North Kilworth near Husbands Bosworth where no exposed sand and gravel has been mapped at the surface. The possible presence of viable concealed sand and gravel deposits outside MCAs cannot therefore be ruled out. A ‘smoothed’ buffer zone of 200 m was adopted around the identified sand and gravel resource areas to ensure an adequate safeguarding margin. Comparable buffer zones were used by LCC previously and similar buffer zones have been adopted elsewhere.

4.2.3 Limestone/dolomite

Limestone resources of both Carboniferous and Jurassic age occur in Leicestershire. A buffer zone of 500 m, again smoothed so that it did not rigidly follow outcrop areas, was adopted in line with earlier LCC work. This also ensured that limestone concealed beneath overburden was included. Some of this overburden (the Rutland Formation) is also utilised in the cement making process at Ketton.

4.2.4 Igneous rock

The igneous rock resources of Leicestershire are of considerable economic importance and out of all proportion to their relative small areal extent. These rocks are worked beneath substantial thicknesses of overburden and also have extensive associated infrastructure, including rail links. A buffer of 500 m around the mapped mineral resource would therefore be inappropriate. Consequently the industry was consulted and MCAs have been defined to take account of these factors and clear physical boundaries were used wherever possible.

4.2.5 Opencast coal and fireclay

The MCA for opencast coal is coincident with ‘Shallow Coal’ defined on the Coal Resources Map of Britain. However, it should be noted that significant parts of this resource area have already been worked. MPS1 does not require MCAs for opencast coal. Although outside the terms of this study, it would however, be desirable for more definitive MCAs for opencast coal to be defined nationally. One method that might be considered is to define MCAs around the former Conditional Licences for opencast coal, which formed part of the portfolio of sites distributed at the time of coal privatisation. Conditional Licences expired at the end of 2004. However, these areas represent sites where coal has been essentially proved with some confidence and warrant safeguarding. There are two such sites in Leicestershire (Coalfield West and Swepstone Lane). Both fall within the MCA proposed for opencast coal. Fireclay resources are

coincident with opencast coal resources, although some parts of the coal resource have more abundant fireclays than others.

4.2.6 Brick clay

The Triassic Mercia Mudstone is the principal brick clay resource in Leicestershire. Large parts of the county are underlain by the Mercia Mudstone, although some parts of the outcrop will be more suitable for brick manufacture than others. The resource is nevertheless extensive and it was felt that there was no justification for safeguarding large areas of the outcrop. In consultation with the brick clay producers, therefore, MCAs were drawn around existing sites taking account of the resource and existing infrastructure and using clear physical boundaries wherever possible. In addition to the Mercia Mudstone, mudstones within the Triassic Bromsgrove Sandstone Formation are also extracted at Measham. An MCA was constructed around this site in a comparable way.

4.2.7 Gypsum

A dual approach was adopted for gypsum. At the existing Barrow Mine the MCA was drawn, following consultation with British Gypsum, around the existing planning permission but with a small extension in the south. The company confirmed that this did define the viable deposit and outside this area the bed thickness/grade declined or there were difficult geological conditions, which would preclude mining. However, workable reserves at the Barrow Mine are only some 20 years at current rates of output. To the south of the Barrow Mine the outcrop of the mined horizon (Tutbury Gypsum) has been inferred based on recent mapping. Very limited borehole evidence indicates that the down dip extension of the Tutbury Gypsum has potential for gypsum mining. As gypsum is formed by the hydration of anhydrite where it approaches the surface, anhydrite will become the dominant mineral as the Tutbury Gypsum is traced down dip to the east. The MCA, which is clearly drawn here with much less confidence than the one around the Barrow Mine, has been defined at the inferred crop of the Tutbury Gypsum in the west and a conjectured eastern boundary assuming that anhydrite will become more abundant in this direction.

4.2.8 Hydrocarbons

No attempt was made to define MCAs for hydrocarbons as prospects can only be identified after extensive exploration activity.

4.2.9 ‘Settlement’ areas

In order to update the MCAs the extent of existing settlements needed to be considered. For the purposes of this study the Ordnance Survey ‘Strategi urban regions’ (2002) were used to depict settlements. This is a standard dataset available through Ordnance Survey Licence. A map (Figure 11) was produced showing the following range of urban areas in Leicestershire:

- 0 - 49 hectares
- 49 – 100 hectares
- 100 – 199 hectares
- 200 – 299 hectares
- 300 – 399 hectares
- 400 – 499 hectares
- 500 – 599 hectares
- >1000 hectares

(NB there were no settlements between 599 and 1000 hectares)

It was not possible in the project time constraints to take into account every urban region. Therefore, it was decided, in consultation with LCC, that only settlements over 200 hectares would be used (Figure 12). Where an MCA overlapped a settlement of 200 hectares or more the proposed MCA was removed and taken to be the edge of the settlement.

4.3 UPDATED MCAs

Revised MCAs (Figure 13) were supplied to LCC in digital format. Each mineral resource was supplied as a separate digital file. Figure 14 provides a summary of the information that was used in this study. MCAs for different minerals often overlap.

5 Data delivery

Paper maps and Adobe pdf documents were provided to LCC for objective 1 (the provision of geological information). For objective 2 (the updating of MCAs), ESRI GIS shapefiles of the following individual mineral resource MCAs were supplied to LCC:

- sand and gravel;
- igneous rock;
- limestone;
- gypsum;
- brick clay; and
- coal (at or near surface).

As the outputs for this study are a combination of paper maps (derived from digital data) and digital data, some samples of the types of maps that can be generated using the digital data are provided in Appendix 1.

6 Conclusions

This study has provided up-to-date geological information on the extent of mineral resources in Leicestershire, together with the location of permitted sites. Based on this information, updated MCAs have been provided to LCC to assist in the review of their Minerals Local Plan. A particular disadvantage in defining MCAs is that there is no set methodology and no Government guidance. The methodology adopted involved a combination of expert geological opinion and knowledge on the extent of mineral resources, consultation with the minerals industry, taking into account settlement areas and buffering of MCAs using a GIS. It was found that a different approach had to be adopted for each mineral, reflecting not only their different geology but also associated infrastructure. It is likely that other MPAs will adopt different approaches to the delineation of MCAs. The size of ‘settlements’ used is also likely to vary greatly from MPA to MPA. However, the approach developed and used here provides a basis for other MPAs wishing to update their MCAs.

The BGS has recently been awarded funding by the Sustainable Land Won and Marine Dredged Aggregate Minerals Programme of the Aggregates Levy Sustainability Fund to carry out a study on *Safeguarding aggregates and the environment: Best practice for the definition of Mineral Consultation Areas for aggregates* (SAMP 3.B3). The aim of this project is to identify an objective and consistent method for the definition of MCAs for aggregates and to provide good

practice at the local level for the delineation of areas of aggregate resources warranting safeguarding from other forms of development.

References

Most of the references listed below are held in the Library of the British Geological Survey at Keyworth, Nottingham. Copies of the references may be purchased from the Library subject to the current copyright legislation.

Harrison, D. J., Henney, P. J., Cameron, D. G., Spencer, N. A., Evans, D. J., Lott, G. K., Linley, K. A., and Highley, D. E., 2002, *Mineral Resource Information in Support of National, Regional and Local Planning: Leicestershire and Rutland (comprising City of Leicester, Leicestershire and Rutland)*, British Geological Survey. Commissioned Research Report CR/02/24N.

Leicestershire County Council (1995). Leicestershire Minerals Local Plan Review.

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Office of the Deputy Prime Minister (2004b) *Consultation Paper on Minerals Policy Statement 1: Planning and Minerals*. London, HMSO.

Ordnance Survey (2002) Strategi urban regions digital dataset.

Appendix 1 Example map outputs

The outputs for this study are a combination of paper maps (derived from digital data) and digital data. Samples of the types of maps that can be generated using the digital data are provided at the back of the report as follows:

Figure 1 Mineral resources of Leicestershire and Rutland (A3)

Figure 2 Sand and gravel resources of Leicestershire with permitted sites (A4)

Figure 3 Igneous resources of Leicestershire with permitted sites (A4)

Figure 4 Limestone resources of Leicestershire with permitted sites (A4)

Figure 5 Brick clay resources of Leicestershire with permitted sites (A4)

Figure 6 Fireclay resources of Leicestershire with permitted sites (A4)

Figure 7 Coal resources of Leicestershire with permitted sites (A4)

Figure 8 Oil and gas licence areas of Leicestershire with permitted sites (A4)

Figure 9 Gypsum resources of Leicestershire with permitted sites (A4)

Figure 10 Original MCAs of Leicestershire and Rutland (A3)

Figure 11 Urban regions over 200 hectares of Leicestershire and Rutland (A3)

Figure 12 Urban regions of Leicestershire and Rutland (A3)

Figure 13 Updated MCAs of Leicestershire and Rutland (A3)

Figure 14 Summary of MCAs and mineral resources information of Leicestershire and Rutland (A3)



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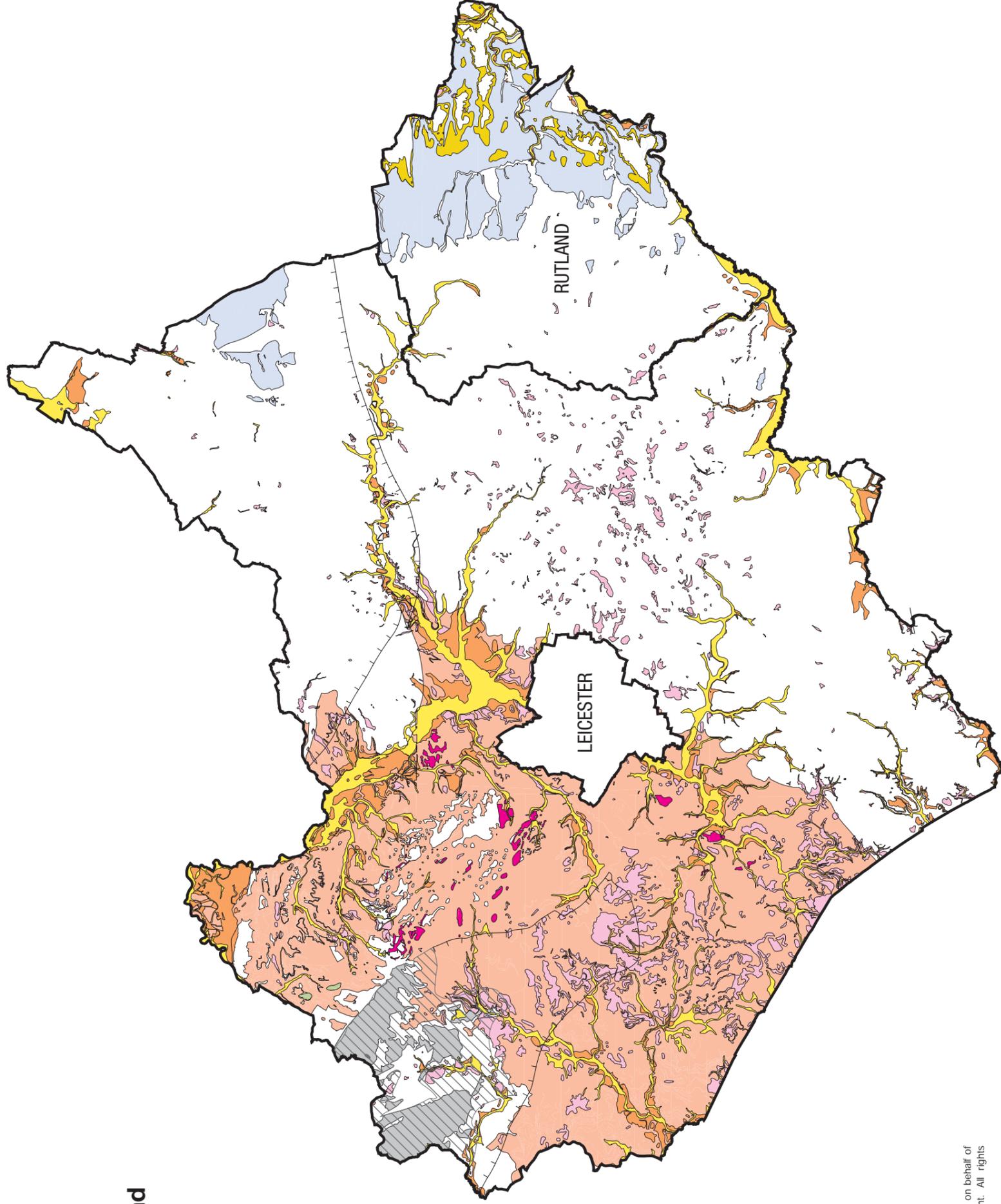
FIGURE 1

Mineral Resources of Leicestershire and Rutland

SCALE 1:300 000

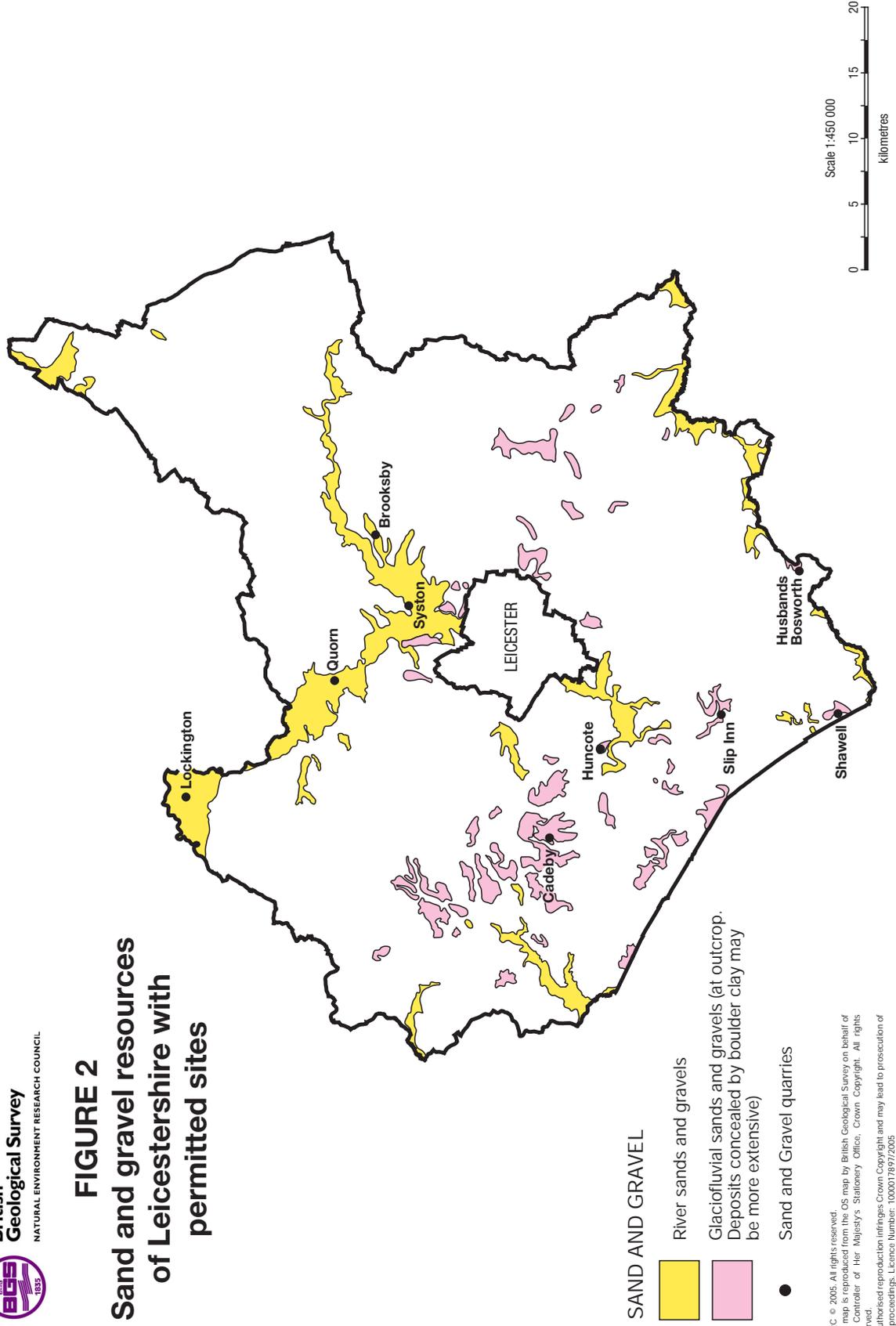
MINERAL RESOURCES

-  Sub-alluvial sand and gravel
-  River Terrace sand & gravel
-  Glacial/Glaciofluvial sand & gravel
-  Dolomite and dolomitic limestone
-  Limestone
-  Brick Clay
-  Rutland Formation (Siliceous clay)
-  Igneous rock
-  Fireclay (Mainly coincident with areas of shallow coal)
-  Coal-bearing strata at or near surface
-  Coal-bearing strata at depth



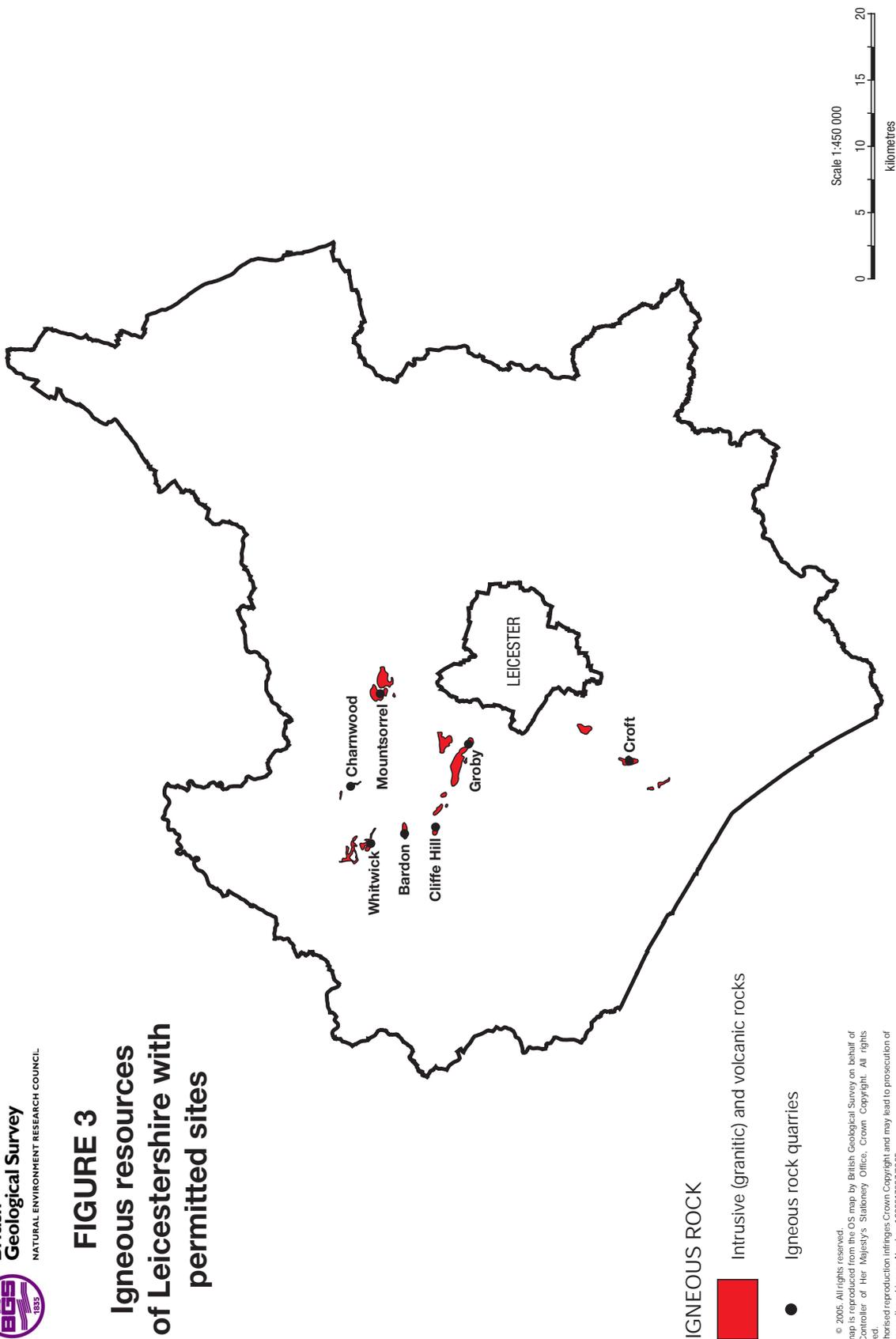
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FIGURE 2
Sand and gravel resources of Leicestershire with permitted sites



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FIGURE 3 Igneous resources of Leicestershire with permitted sites



- IGNEOUS ROCK**
-  Intrusive (granitic) and volcanic rocks
 -  Igneous rock quarries

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FIGURE 4

Limestone resources of Leicestershire with permitted sites

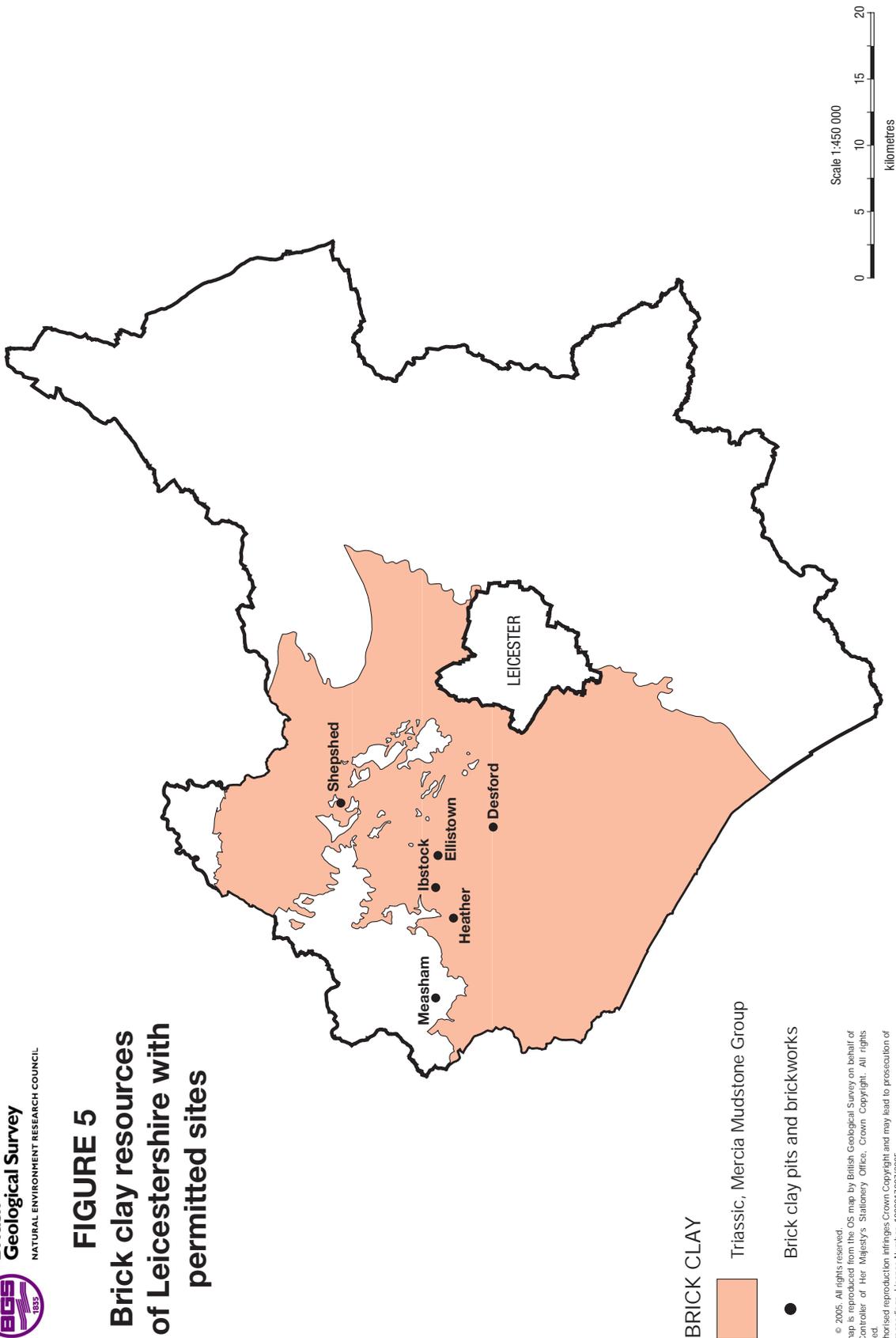


- LIMESTONE**
- Jurassic, Lincolnshire Limestone
 - Carboniferous, dolomite/dolomitic limestone
 - Limestone quarries

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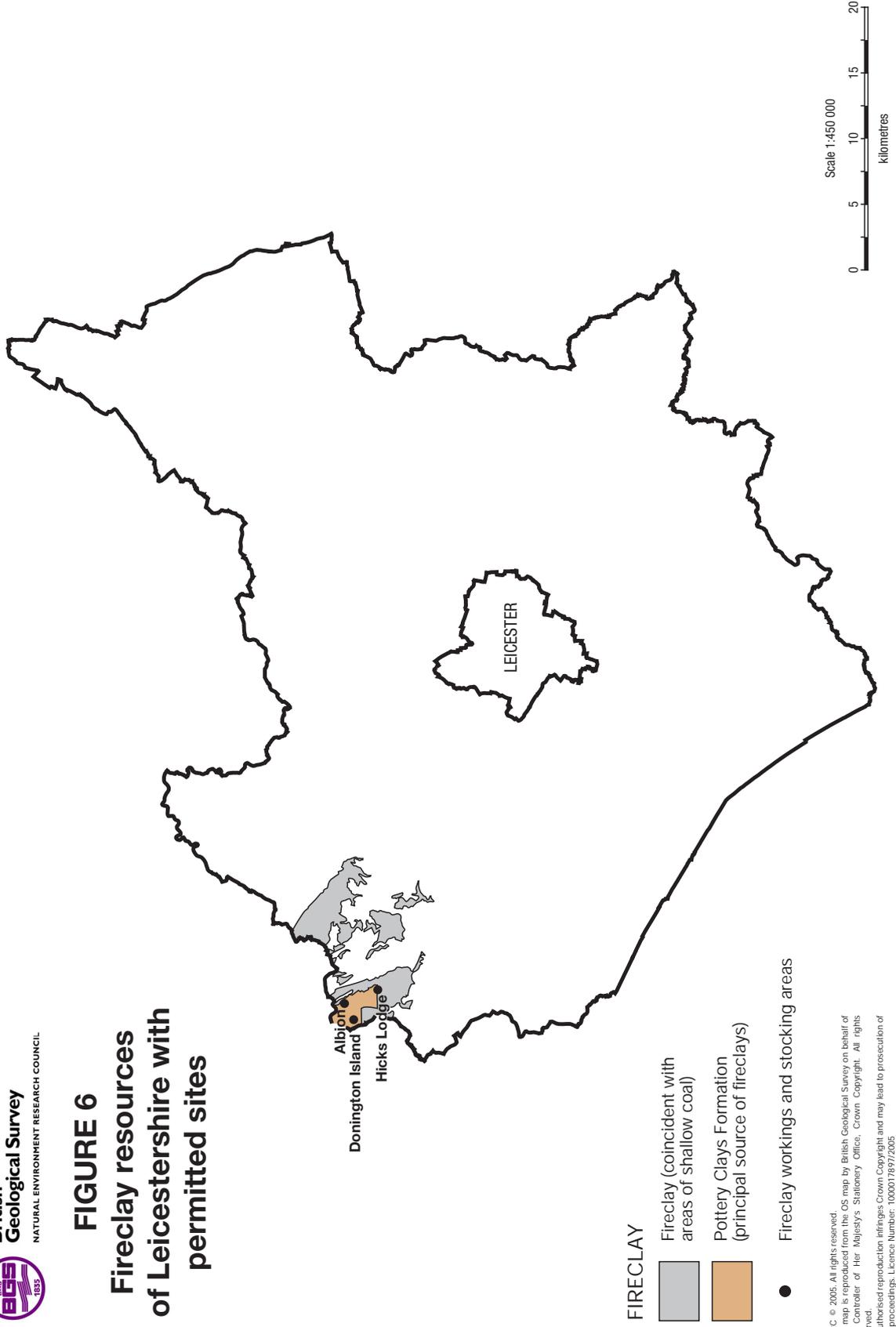
FIGURE 5 Brick clay resources with permitted sites



- BRICK CLAY**
- Triassic, Mercia Mudstone Group
 - Brick clay pits and brickworks

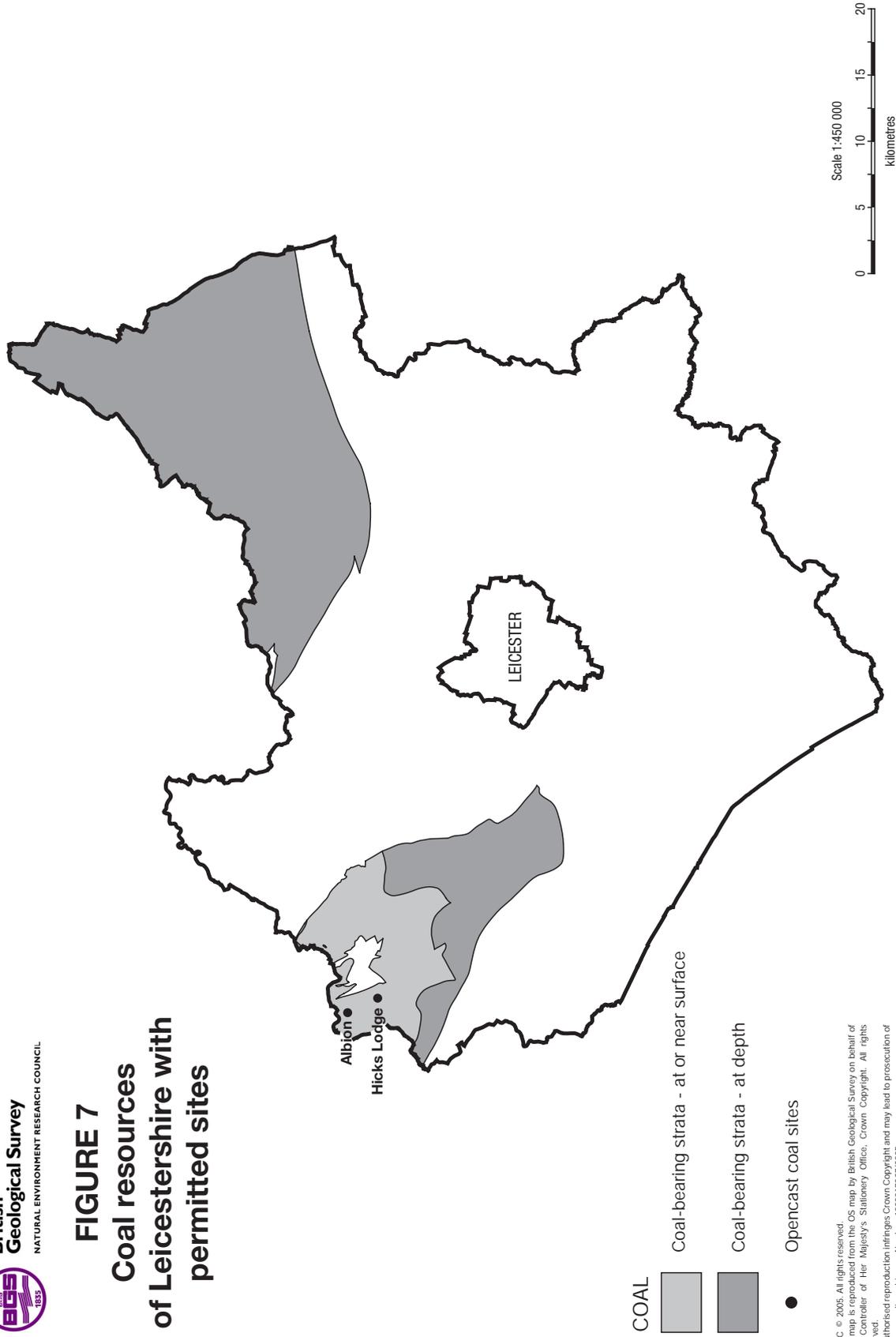
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FIGURE 6 Fireclay resources with permitted sites



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FIGURE 7 Coal resources of Leicestershire with permitted sites

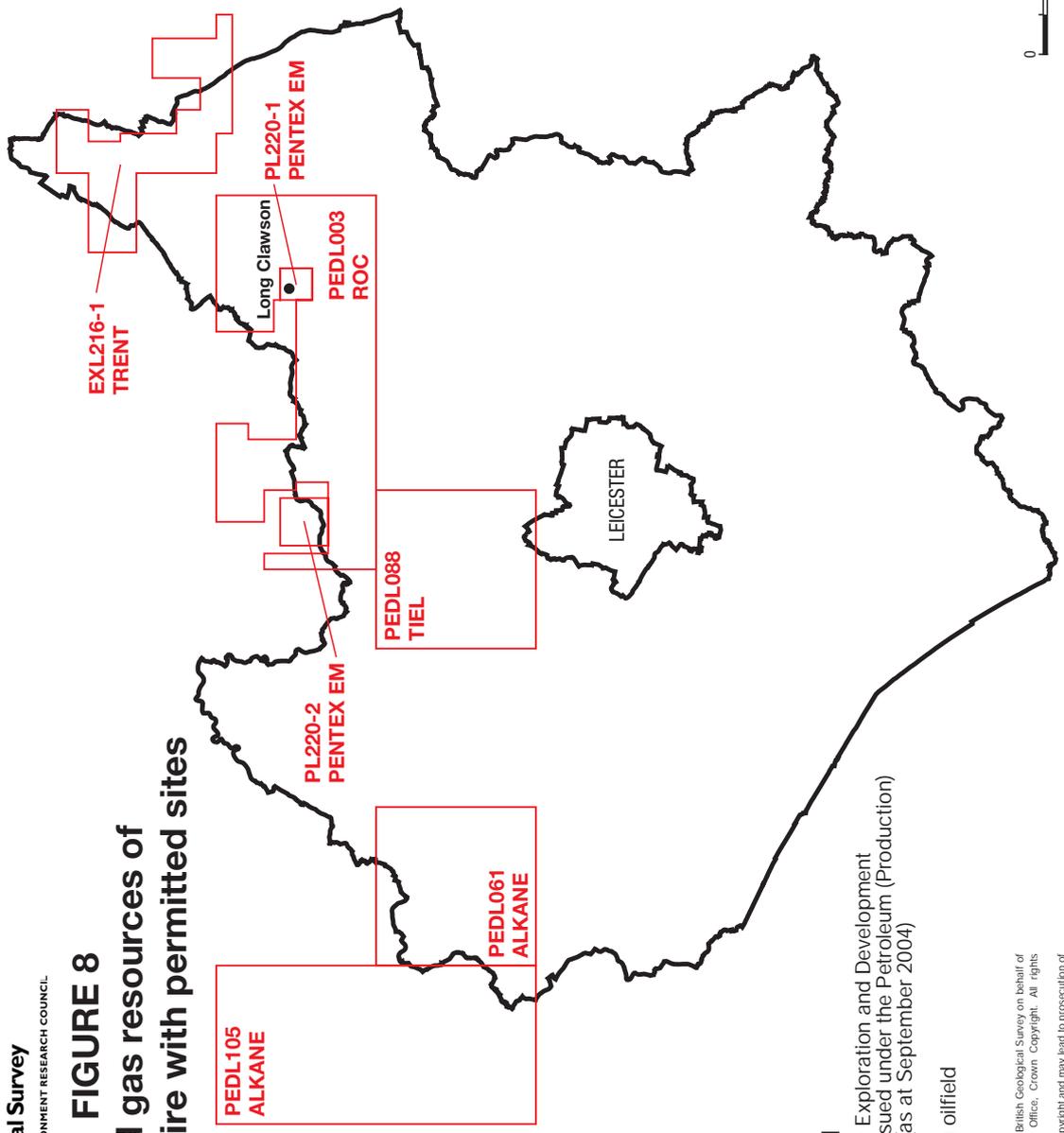


- COAL**
-  Coal-bearing strata - at or near surface
 -  Coal-bearing strata - at depth
 -  Opencast coal sites

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FIGURE 8
Oil and gas resources of
Leicestershire with permitted sites



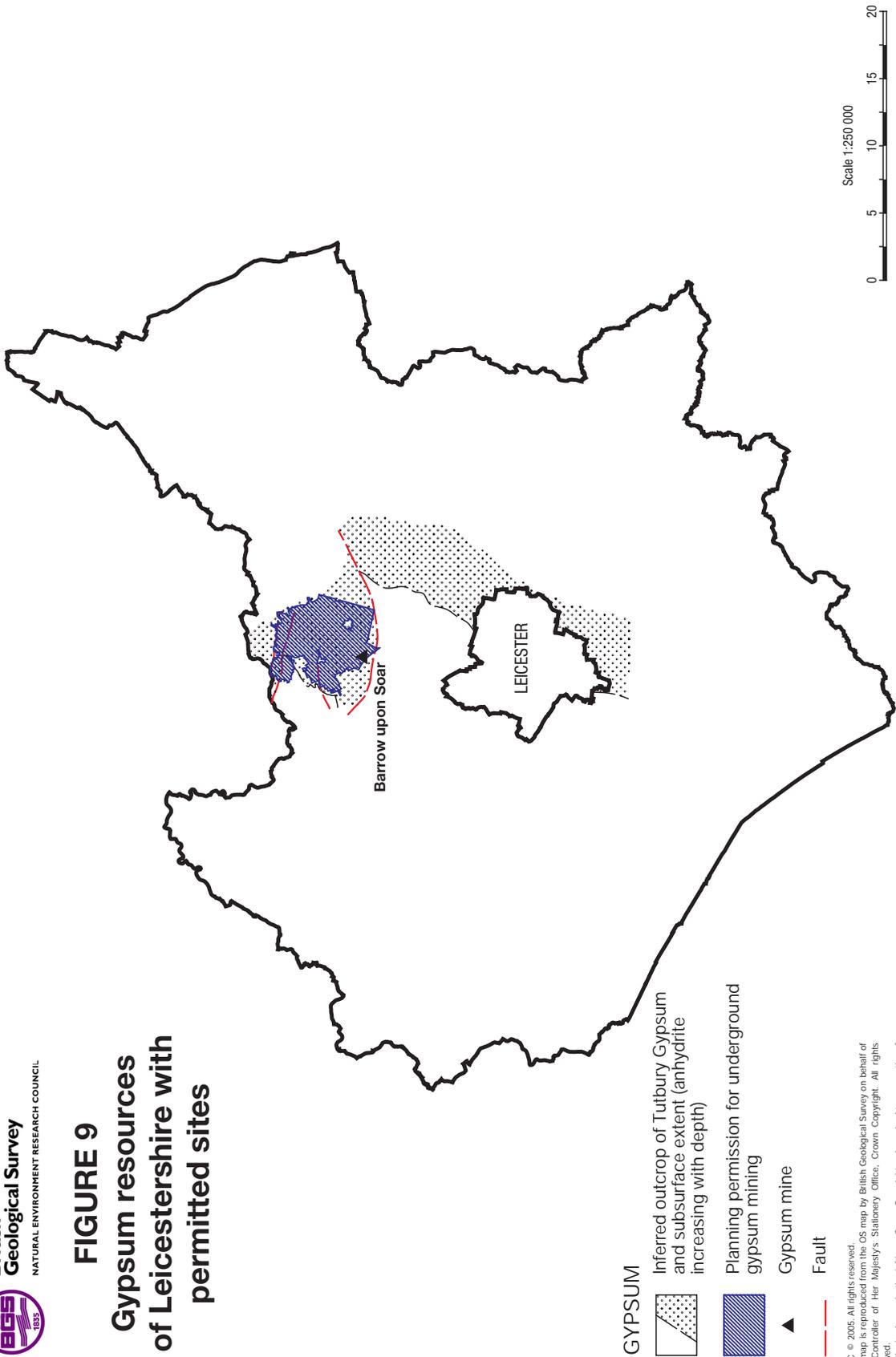
HYDROCARBON

- Petroleum Exploration and Development Licence issued under the Petroleum (Production) Act 1934 (as at September 2004)
- Producing oilfield

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FIGURE 9

Gypsum resources of Leicestershire with permitted sites



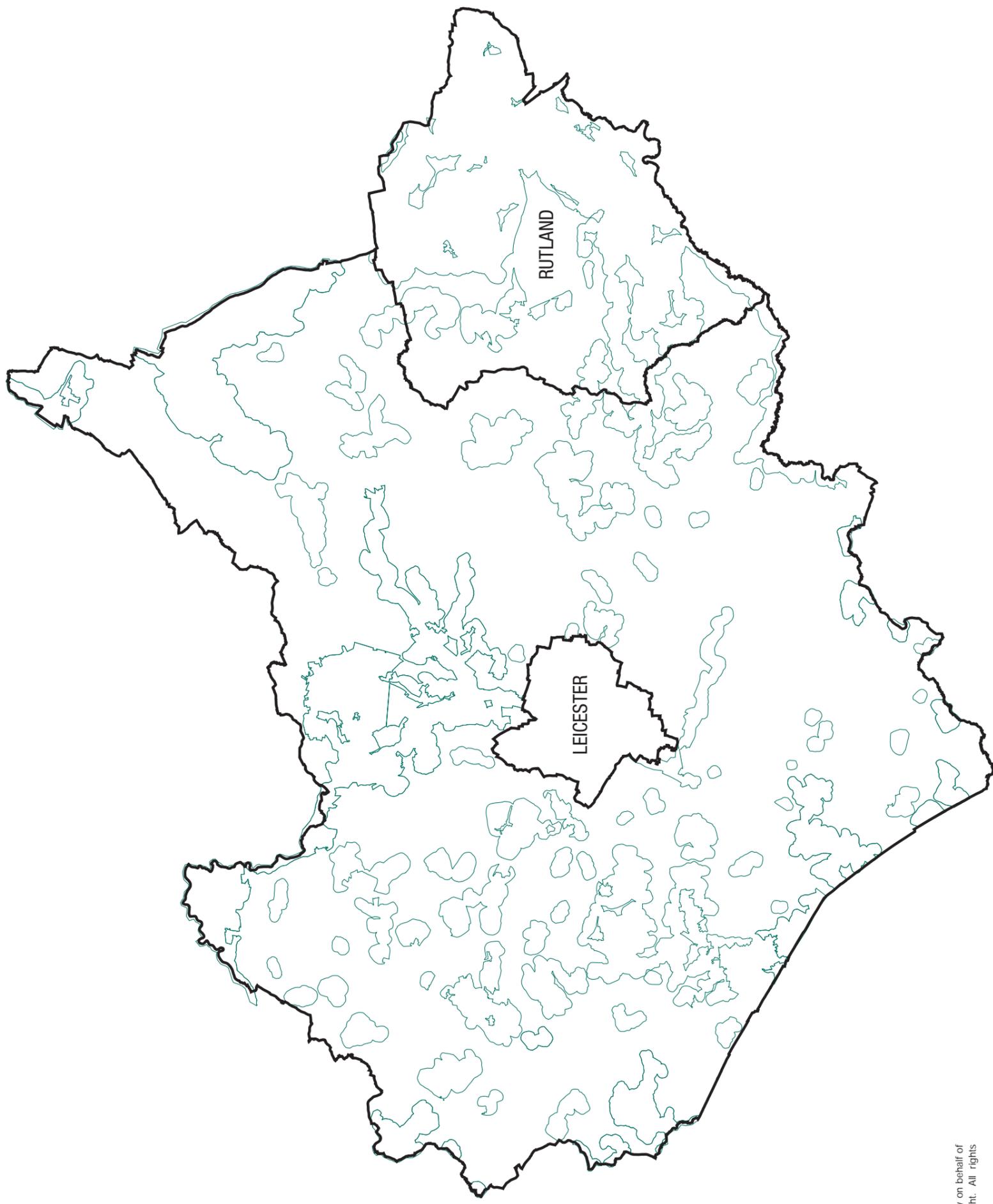
- GYPSSUM**
-  Inferred outcrop of Tutbury Gypsum and subsurface extent (anhydrite increasing with depth)
 -  Planning permission for underground gypsum mining
 -  Gypsum mine
 -  Fault

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FIGURE 10
Original MCAs
SCALE 1:300 000



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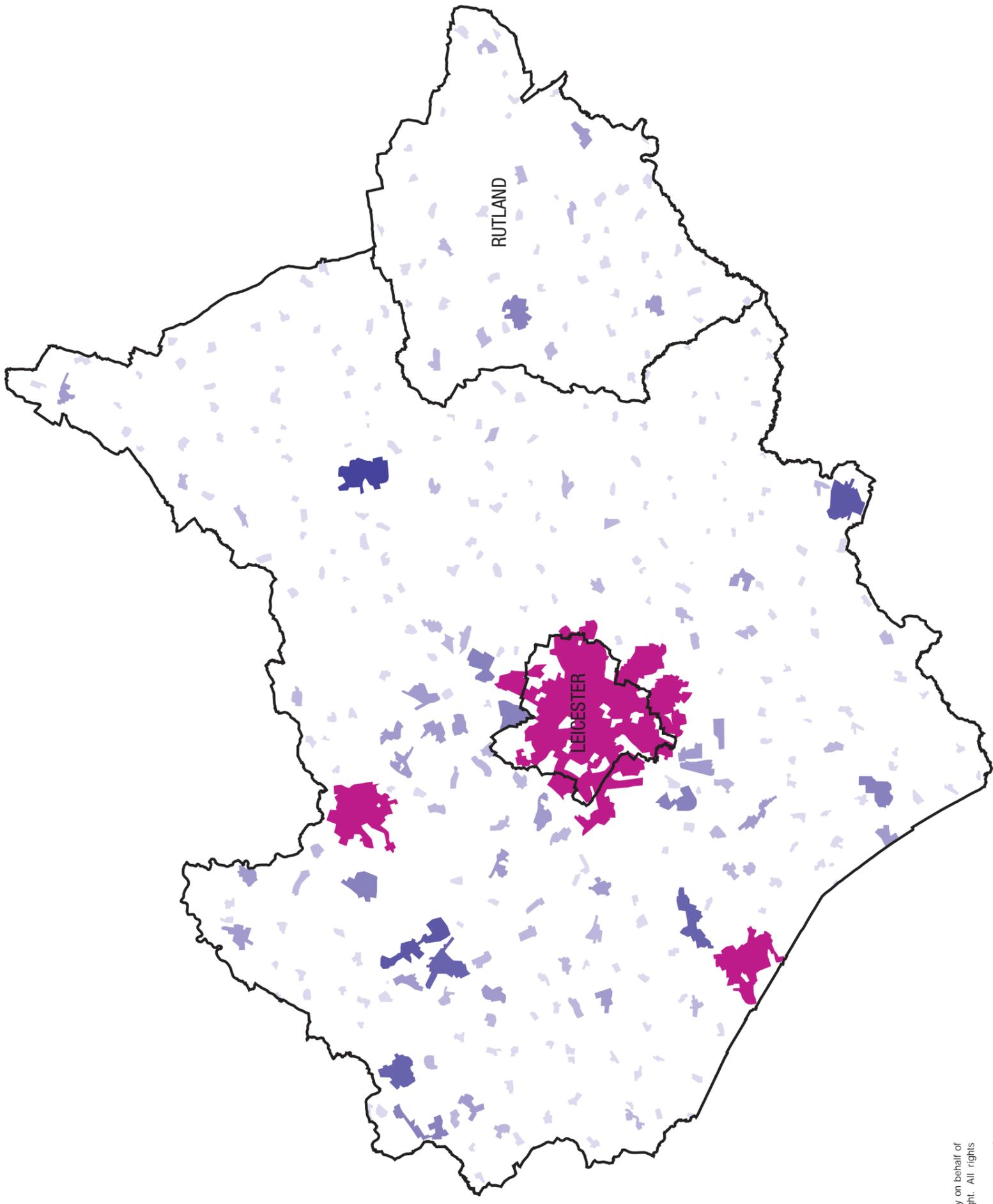


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FIGURE 11 Urban regions

SCALE 1:300 000

- Urban area (0 - 49 hectares)
- Urban area (50 - 99 hectares)
- Urban area (100 - 199 hectares)
- Urban area (200 - 299 hectares)
- Urban area (300 - 399 hectares)
- Urban area (400 - 499 hectares)
- Urban area (500 - 599 hectares)
- Urban area (> 1000 hectares)



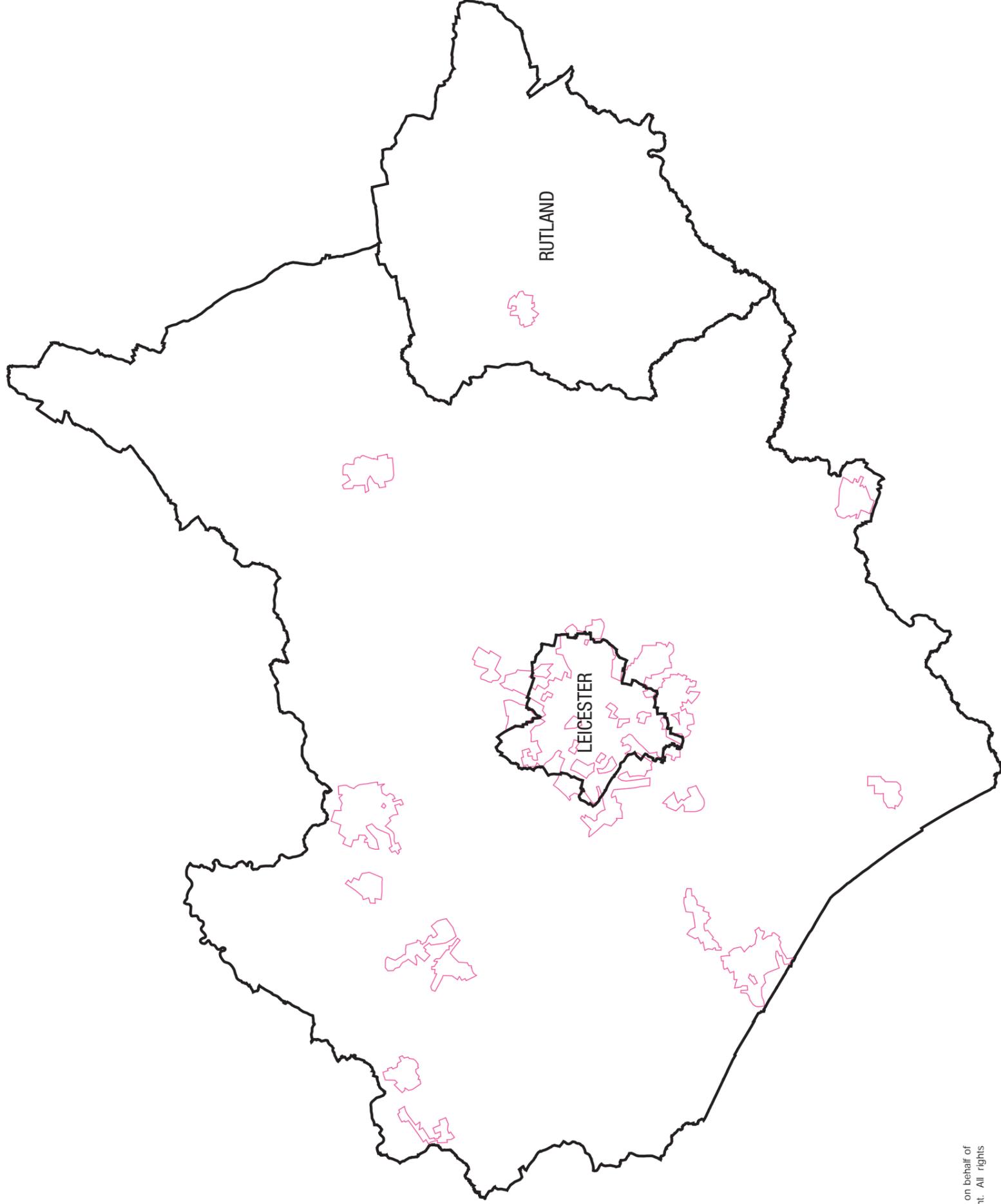
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FIGURE 12
Urban regions over
200 hectares
SCALE 1:300 000

 Urban area > 200 hectares



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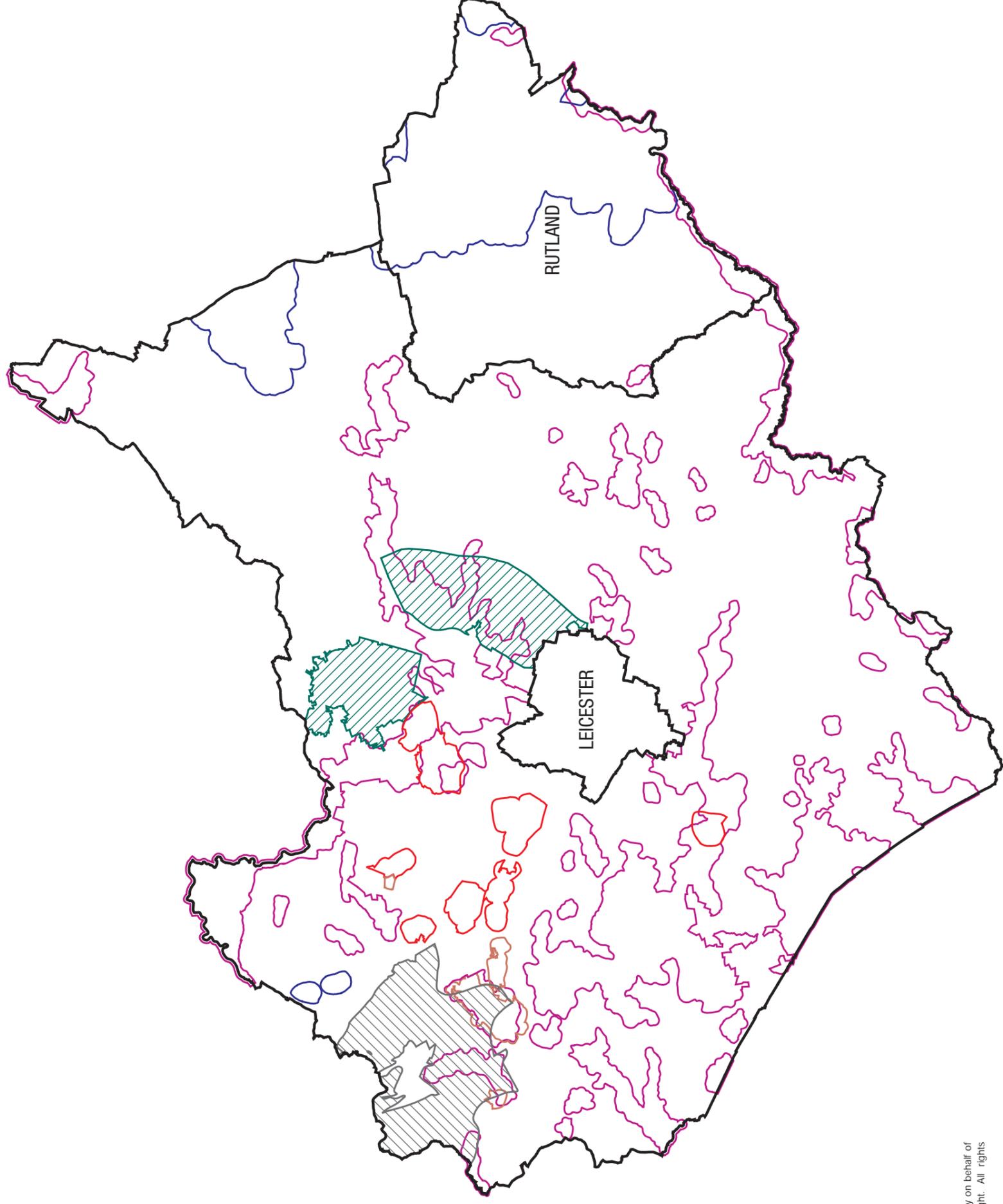
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FIGURE 13 Updated MCAs

SCALE 1:300 000

MINERAL CONSULTATION AREAS

-  Sand and gravel
-  Limestone
-  Igneous rock
-  Brick clay
-  Coal (at or near surface)
-  Gypsum



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FIGURE 14
Summary of MCAs and mineral resources information

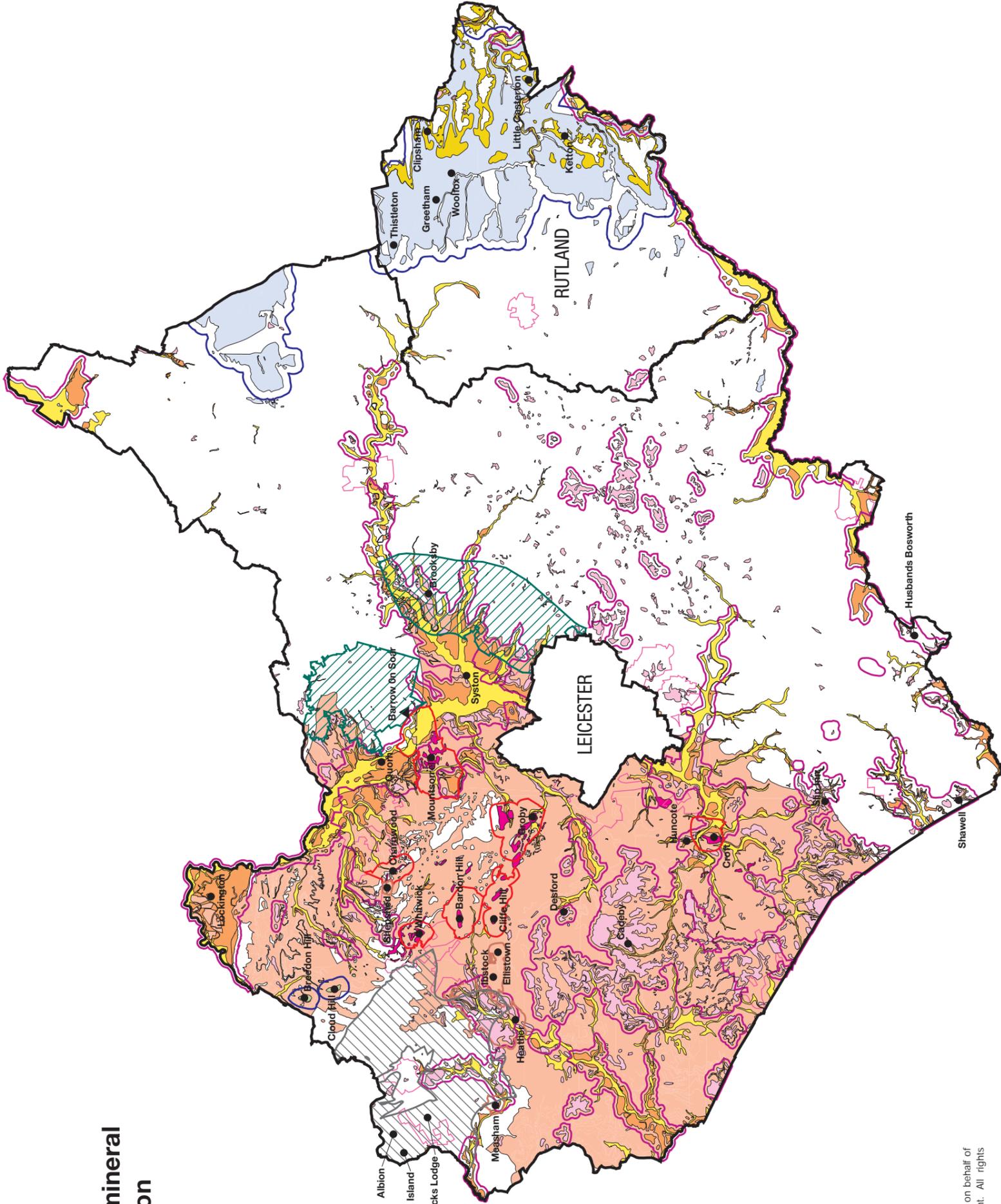
SCALE 1:300 000

MINERAL CONSULTATION AREAS

- Sand and gravel
- Limestone
- Igneous rock
- Brick clay
- Coal (at or near surface)
- Gypsum
- Quarry
- Underground mine

MINERAL RESOURCES

- Sub-alluvial sand and gravel
- River Terrace sand & gravel
- Glacial/Glaciofluvial sand & gravel
- Dolomite and dolomitic limestone
- Limestone
- Brick Clay
- Rutland Formation (siliceous clay)
- Igneous rock
- Coal (at or near surface)
- Urban areas > 200 hectares



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