



**British  
Geological Survey**  
NATURAL ENVIRONMENT RESEARCH COUNCIL



## **Implications of CAA Birdstrike Safeguard Zones for River Sand and Gravel Resources in the Trent Valley.**

*British Geological Survey Commissioned Report CR/03/152N*

**P J Henney, D G Cameron, J M Mankelow, N A Spencer, D E Highley  
and E J Steadman**



**A Report for the CBI Minerals Committee and the  
Quarry Products Association**

**Keyworth, Nottingham 2003**

***Bibliographical reference:***

HENNEY, P J, CAMERON, D G, MANKELOW, J M, SPENCER, N A, HIGHLEY, D E and STEADMAN, E J. 2003. Implications of CAA Birdstrike Safeguard Zones for River Sand and Gravel Resources in the Trent Valley.

***BGS Commissioned Report CR/03/152N.***

All photographs copyright © NERC

National Watersports Centre Rowing Lake, Holme Pierrepont, West Bridgford, Nottingham. Restoration of a sand & gravel working in the Trent Valley.

BRITISH GEOLOGICAL SURVEY

*British Geological Survey Commissioned  
Report CR/03/152N*

**Implications of CAA Birdstrike  
Safeguard Zones for River Sand and  
Gravel Resources in the Trent  
Valley**

P J Henney, D G Cameron, J M Mankelow,  
N A Spencer, D E Highley and E J  
Steadman

A Report for the CBI Minerals Committee  
and the Quarry Products Association

**Keyworth, Nottingham 2003**

## BRITISH GEOLOGICAL SURVEY

The full range of Survey publications is available from the BGS Sales Desk at the Survey headquarters, Keyworth, Nottingham. The more popular maps and books may be purchased from BGS-approved stockists and agents and over the counter at the Bookshop, Gallery 37, Natural History Museum (Earth Galleries), Cromwell Road, London. Sales desks are also located at the BGS London Information Office, and at Murchison House, Edinburgh. The London Information Office maintains a reference collection of BGS publications including maps for consultation. Some BGS books and reports may also be obtained from the Stationery Office Publications Centre or from the Stationery Office bookshops and agents.

The Survey publishes an annual catalogue of maps, which lists published material and contains index maps for several of the BGS series.

*The British Geological Survey carries out the geological survey of Great Britain and Northern Ireland (the latter as an agency service for the government of Northern Ireland), and of the surrounding continental shelf, as well as its basic research projects. It also undertakes programmes of British technical aid in geology in developing countries as arranged by the Department for International Development and other agencies.*

*The British Geological Survey is a component body of the Natural Environment Research Council.*

### *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](http://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

## **Executive Summary**

The British Geological Survey (BGS) was commissioned by the CBI Minerals Committee and the Quarry Products Association (QPA) to study the impact of Civil Aviation Authority (CAA) safeguard zones upon the river sand and gravel resources of the Trent Valley Gravel Resource Zone. The results indicate that safeguard zones cover nearly 76% of the potentially workable sand and gravel resources in the Trent Valley, with 66% of allocated sites and 42% of sites with planning permission also covered by safeguard zones.

The CAA safeguard zones in the Trent Valley would therefore have a significant impact on sand and gravel operations in this area, with up to three quarters of all sand and gravel resources being potentially sterilised by these zones.

## Contents

<b>1. Introduction</b>	1
<b>2. Background</b>	1
<b>3. Methodology &amp; Results</b>	4
<i>3.1 The extent of the Trent Valley Gravel Resource Zone (TVGRZ).</i>	4
<i>3.1.1 Note about estimates of mineral thickness and tonnage in the TVGRZ.</i>	4
<i>3.2 All airfields within the Resource Zone and the extent of the associated 13 km buffer zone.</i>	4
<i>3.3 Existing mineral extraction operations and forms of restoration taking place.</i>	5
<i>3.4 Extent of reserves with planning permission.</i>	5
<i>3.5 Extent of resources allocated in Mineral Local Plans.</i>	5
<i>3.6 Estimate of the total potentially workable resources within the resource zone.</i>	5
<i>3.7 An estimate of the total quantity of permitted/non permitted resources sterilised by the 13 km buffer zone.</i>	5
<b>4. Conclusions</b>	6
<b>Figure 1.</b> Location of active sand and gravel quarries in England and Wales and relationship to airports	2
<b>Figure 2.</b> Distribution of inferred superficial sand & gravel resources in England & Wales and relationship to airports	3
<b>Appendix 1</b>	
<b>Table 1.</b> Data from the Trent Valley Gravel Resource Zone	6
<b>Figure 3.</b> Study of Trent River Gravel Resources and Airport Safeguard Zones	6

## **1. Introduction**

The CBI Minerals Committee and the Quarry Products Association (QPA) are concerned that the application of the guidance issued by the Civil Aviation Authority (CAA) on Aerodrome Bird Control (CAP 680 part 4) may result in a 13 km buffer zone being applied around all civil and military airfields. The Committee believes that this will result in the extensive sterilisation of mineral resources.

The British Geological Survey (BGS) has therefore been commissioned by the CBI and the QPA to investigate the potential impact of CAA birdstrike safeguard zones on the river sand and gravel resources in the Trent Valley Resource Zone. Specifically:

*“To undertake an assessment of the gravel reserves within the Trent Valley resource zone which would be sterilised by the application of a 13 km buffer around all civil and military aerodromes located within the area.”*

The tender specification requires the identification of the following key components:

- i) The extent of the Trent Valley Gravel Resource Zone (TVGRZ).
- ii) All aerodromes within the Resource Zone and the extent of the associated 13 km buffer zone.
- iii) Existing mineral extraction operations and forms of restoration taking place (e.g. water/non-inert fill/inert landfill/agricultural land).
- iv) The extent of reserves with planning permission.
- v) The extent of resources allocated in Mineral Local Plans.
- vi) An estimate of total potentially workable resources within the resource zone.
- vii) An estimate of the total quantity of permitted/non permitted resources sterilised by the 13 km buffer zone.

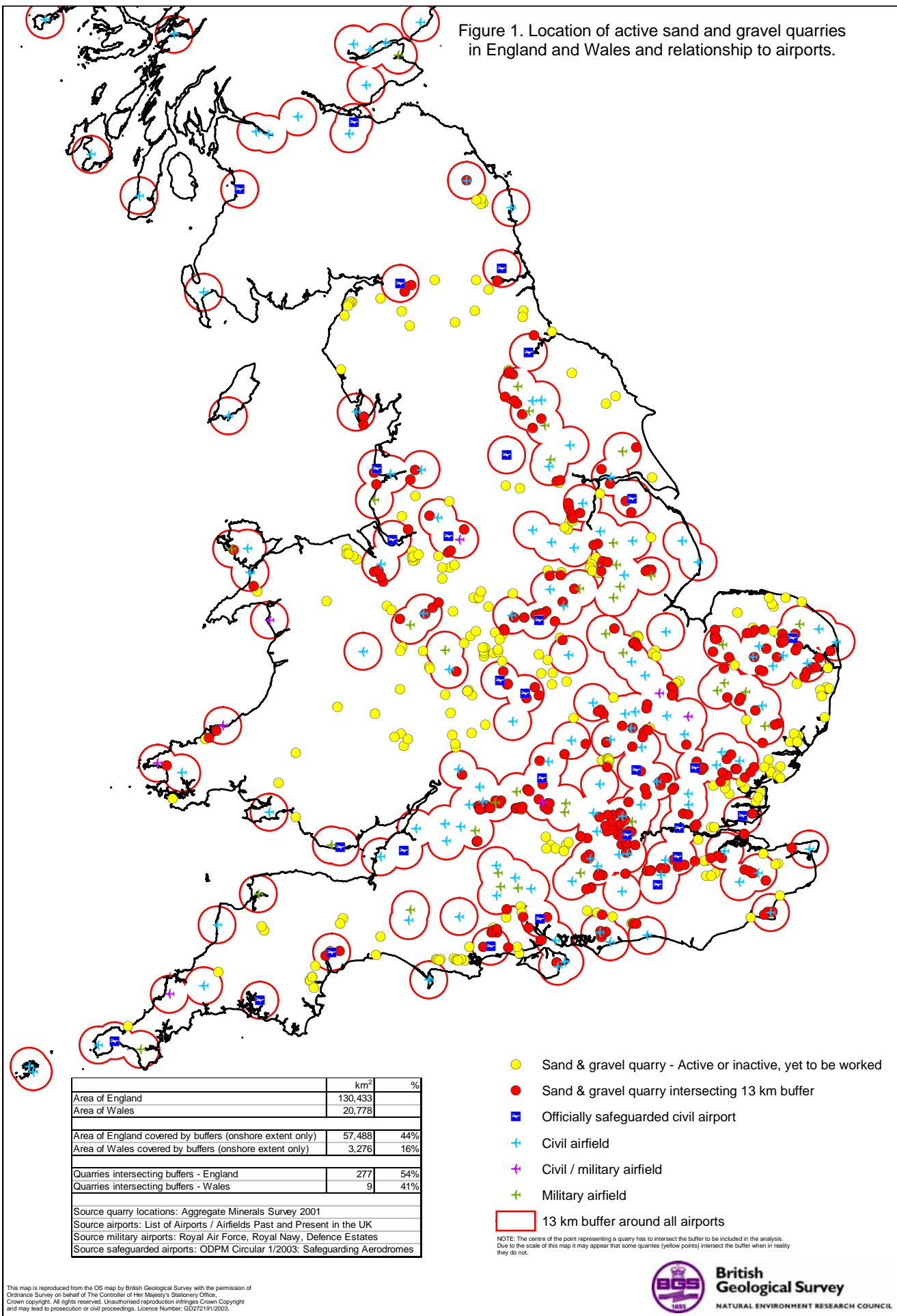
These are discussed in further detail.

## **2. Background**

Although this study is confined to the Trent Valley, Figure 1 shows the overall impact of safeguarding zones on sand and gravel working in England and Wales. Some 44% of the land area of England falls within buffer zones around all airfields and over 50% of sand and gravel workings either occur within or are intersected by these buffers.

Figure 2 shows the generalised distribution of inferred superficial sand & gravel resources in England and Wales, together with the same 13 km buffer around all airfields. Of the total area of inferred superficial of sand & gravel resources, some 53% in England and 26% in Wales lie within the buffer zones. The proportion may be somewhat exaggerated as sub-alluvial sands and gravels may not occur under all the areas classified as alluvium on the BGS 1:625 000 geological map used as the information source.

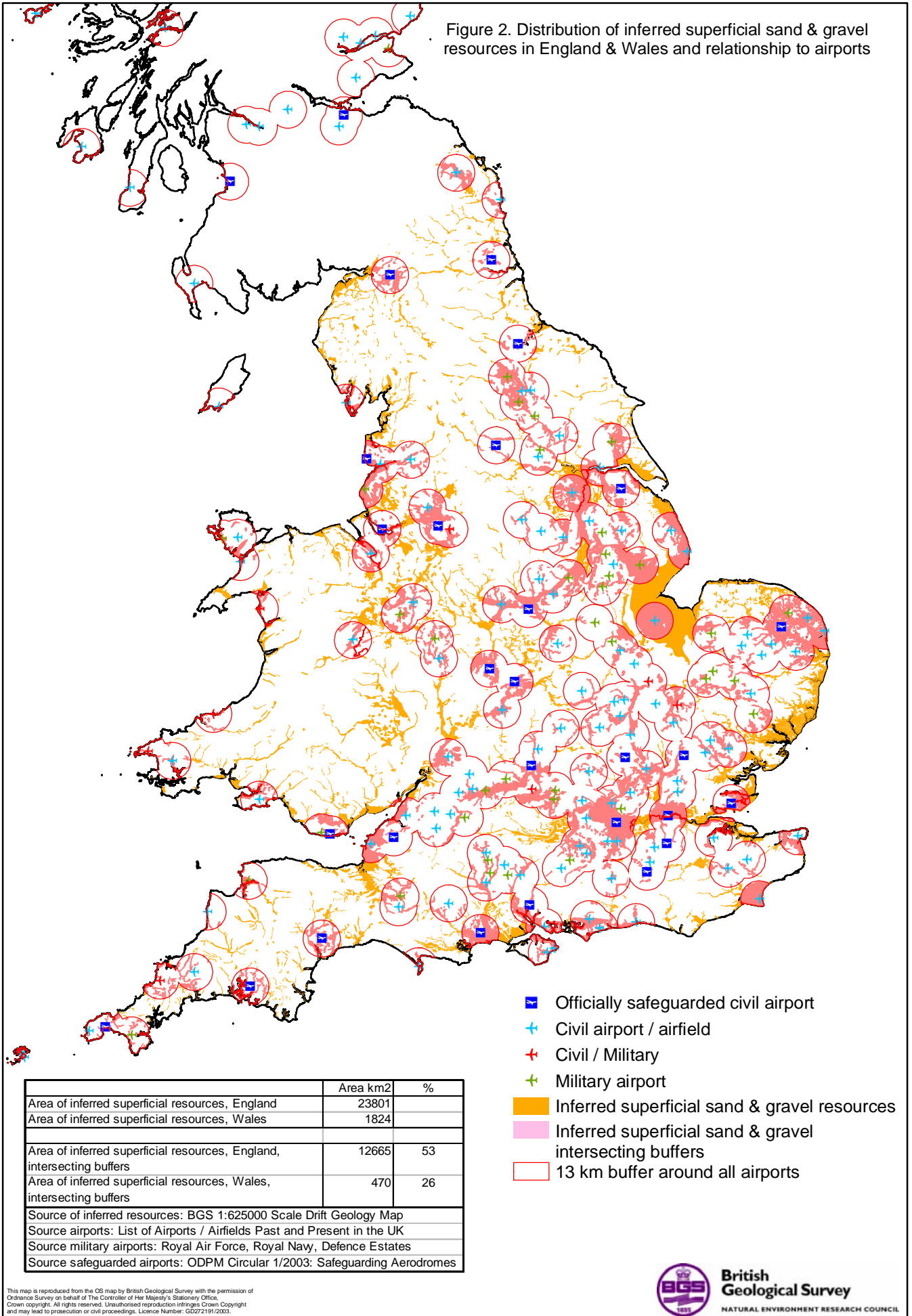
Figure 1. Location of active sand and gravel quarries in England and Wales and relationship to airports.



This map is reproduced from the OS map by British Geological Survey with the permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office. Crown copyright. All rights reserved. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Licence Number: GD272191/2003.



Figure 2. Distribution of inferred superficial sand & gravel resources in England & Wales and relationship to airports



This map is reproduced from the OS map by British Geological Survey with the permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office. Crown copyright. All rights reserved. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Licence Number: G3272191/2003.

### 3. Methodology & Results

#### 3.1 *The extent of the Trent Valley Gravel Resource Zone (TVGRZ)*

For the purposes of this study, the resource zone was defined as the region of the Trent Valley that contains deposits of River Trent sand and gravel, as defined by the mapping carried out by BGS. The zone selected extends from Burton-on-Trent, along the Trent Valley to a point just north of Gainsborough. It also includes extensions towards Uttoxeter, along the valley of the River Dove and towards Leicester, along the valley of the River Soar. Although these latter areas are not within the Trent Valley *sensu strictu* they do include several important river sand and gravel operations, which could be affected by the 13 km safeguard zones.

The boundaries of the area underlain by river sand and gravel are derived from the geological line work used for maps published by BGS in the 'Mineral Resource Information for National, Regional and Local Planning' county maps series, funded by the Office of the Deputy Prime Minister (ODPM). This line work is based upon BGS 1:50K digital geological map data that has been assessed according to the mineral potential of the respective lithologies. In the case of the Trent Valley study, the geological resource line work includes the sub-alluvial and river terrace sand and gravel deposits, as used on the county map sheets for Staffordshire, Derbyshire, Leicestershire, Nottinghamshire and Lincolnshire. This data is held in a GIS. Data for bedrock, wind blown and glacial sands and gravels are not included in this study.

##### 3.1.1 *Note about estimates of mineral thickness and tonnage in the TVGRZ.*

Using data from boreholes and geological mapping together with information from active sites, an estimate has been made of the variations in the thickness of sand and gravel resources along the Trent valley. These range from 2 metres in the valley of the River Soar up to 6 metres in the northern part of the Trent valley. Obviously in detail, the thickness of river sand and gravel in the TVGRZ is more variable but we believe that the data used is a good approximation to overall general thickness trends in the TVGRZ.

For calculations of tonnages of resources we have used a bulk density of 1.64 tonnes/m<sup>3</sup> as representative of the average sand and gravel yield extracted from sites in the Trent valley. This is based on information on grades received from operators at sites in the study area.

#### 3.2 *All airfields within the Resource Zone and the extent of the associated 13 km buffer zone.*

BGS already holds data on CAA officially safeguarded and other civil airfields. We have added to this, data from the Defence Estates Agency for all military airfields. We have been advised to assume that all airfields should have the 13 km safeguard zone. There are actually few airfields within the TVGRZ, but it is covered by safeguard zones associated with numerous airfields on the margins of the zone, particularly East Midlands Airport and the RAF bases on the dip slope of the Lincolnshire Limestone to the east of the Trent valley. All these airfields are marked on Figure 3, together with their safeguard zones. These safeguard zones cover nearly 75% of the surface area of the river sand and gravel resources in the TVGRZ (Figure 3).

### *3.3 Existing mineral extraction operations and forms of restoration taking place (e.g. water/non-inert fill/inert landfill/agricultural land)*

BGS has contacted as many of the active operating sites in the TVGRZ as possible and obtained details of site restoration plans. This information is presented in Table 1.

### *3.4 Extent of reserves with planning permission*

The areas covered by planning permissions in the TVGRZ are derived from the data used in the county map project. These have been updated, where appropriate, with information from the local Mineral Planning Authorities (MPAs). Operators of active sites were also contacted to obtain data regarding current production and estimated reserves. Data for individual sites and operators were given on a commercial-in-confidence basis and cannot be disclosed. Combined totals are listed in Table 1, together with the area of mineral reserves with planning permission. These cover 159.4 million tonnes of which 67.2 million tonnes (42%) are covered by safeguard zones.

### *3.5 Extent of resources allocated in Mineral Local Plans*

Allocated resources; i.e. preferred and allocated areas, were taken from the appropriate Mineral Local Plans and the polygons digitised for use in sand and gravel resource estimates in the GIS. In fact, there are only a few nominated preferred sites in the TVGRZ and the figures are quoted in Table 1. These areas cover 82.6 million tonnes of resource, with some 54.5 million tonnes (66%) within safeguard zones.

### *3.6 Estimate of the total potentially workable resources within the resource zone.*

Bearing in mind the restrictions discussed in sections 3.1 and 3.1.1 we derived a figure of around 4,608 million tonnes total sand and gravel resources within the Trent Valley Gravel Resource Zone as defined in section 3.1.

It should be noted that this is an upper estimate given the generalised thickness estimates used. In addition, the resource area includes those underlying urban areas, villages and transport infrastructure (roads and railways). Allowing for these would go beyond the scope of this study.

### *3.7 An estimate of the total quantity of permitted/non permitted resources sterilised by the 13 km. buffer zone.*

Using the data listed in Table 1 and the values discussed in section 3.1.1 we estimate that 3,478 million tonnes (75.4%) of potential sand and gravel resources in the Trent Valley Gravel Resource Zone would be sterilised by the 13 km safeguard zones. Although this is also an upper estimate, the same assumptions apply as in section 3.6.

#### 4. Conclusions

The CAA safeguard zones in the Trent Valley would have a significant impact on sand and gravel operations in this area, with up to three quarters of all sand and gravel resources being potentially sterilised by these zones. In addition, nearly half of all reserves with planning permission together with nearly two thirds of those allocated in Mineral Local Plans would be affected.

#### Appendix 1

**Table 1. Data from the Trent Valley Gravel Resource Zone**

	<b>Tonnes (million)</b>	<b>Percentage of totals</b>
Estimate of total potential resources	4,608	100
Estimate of total potential resources within 13 km buffer zones	3,478	75
Reserves with Planning Permission	159.4	100
Reserves with Planning Permission within 13 km buffer zones	67.2	42
Resources allocated in Mineral Local Plans	82.6	100
Resources allocated in Mineral Local Plans within 13 km buffer zones	54.5	66

<b>Restoration methodology (50 sites total)</b>	<b>Percentage of sites</b>
Water / Wetland	30
Inert Landfill	6
Non-inert landfill	na
Agriculture / Farmland	18
Woodland	8
Multiple use	38

**Estimated reserves reported for active sites: 114.6 million tonnes**

**Figure 3: Study of Trent River Gravel Resources and Airport Safeguard Zones**

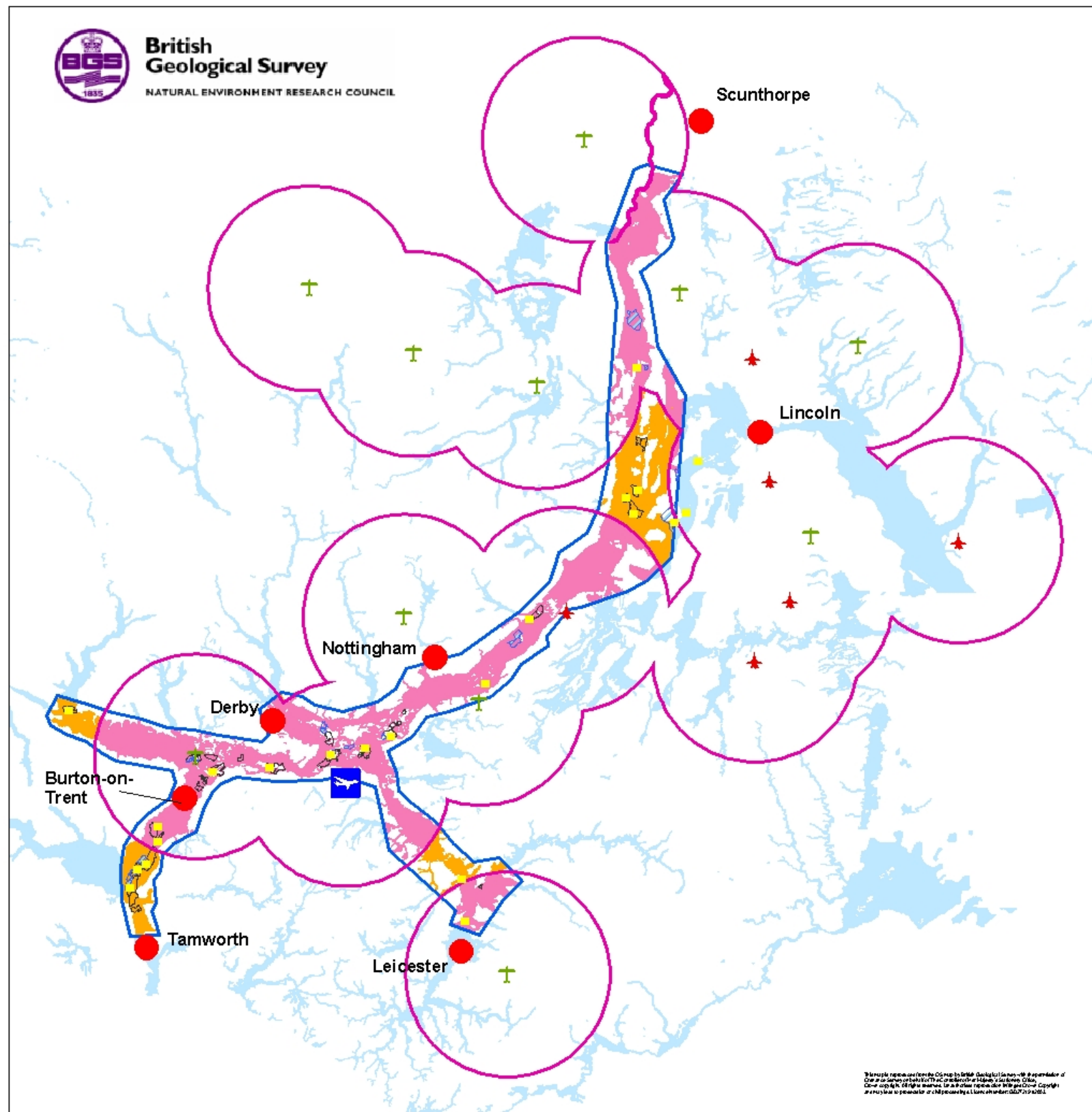
**Key:**

- Study area
- Airfields**
- + Civil
- ★ Military
- ✈ Officially Safeguarded Civil Airport - East Midlands Airport
- 13 km buffer of airfields
- Areas allocated for extraction
- Permission granted for extraction
- Study Area Pits - Active
- Area of Trent Gravels in Safeguard zones
- Area of Trent Gravels outwith Safeguard zones
- Potential sand & gravel resources outside Study Area

	Area km <sup>2</sup>
Sand & Gravel in Study area	612
Sand & Gravel in Safeguard Zones	455
Sand & Gravel outwith Safeguard Zones	157



Shardlow Pit, Derbyshire. Hanson Aggregates Central



© Crown Copyright and the Ordnance Survey. All rights reserved. This map is published under the terms of the Ordnance Survey Licence. The Ordnance Survey is the national mapping agency for Great Britain and Northern Ireland. It is a public body and its activities are funded by the public. The Ordnance Survey is a member of the Ordnance Survey Group, which also includes the Ordnance Survey's parent company, Ordnance Survey Limited. Ordnance Survey Limited is a public body and its activities are funded by the public. The Ordnance Survey is a member of the Ordnance Survey Group, which also includes the Ordnance Survey's parent company, Ordnance Survey Limited. Ordnance Survey Limited is a public body and its activities are funded by the public.