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Deputy Prime Minister

Creating sustainable communities

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

Wiltshire (comprising Wiltshire and the Borough of Swindon)

Commissioned Report CR/04/049N



BRITISH GEOLOGICAL SURVEY

COMMISSIONED REPORT CR/04/049N

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

Wiltshire (comprising Wiltshire and the
Borough of Swindon)

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1 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 Wiltshire 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 important 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 the South West 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 discussion on specific planning proposals for minerals 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, crushed rock aggregate, chalk, brick clay, building stone, fuller's earth and hydrocarbons.

1.1 RESOURCES AND RESERVES

Mineral resources are natural concentrations of minerals or bodies of rock (or fluids such as oil and gas) that are, or may become, of potential interest as a basis for the economic extraction of a mineral product. They exhibit physical and/or chemical properties that make them suitable for specific uses and are 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 markets decline or

expand, 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 also 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.

2 Sand and gravel

Sand and gravel are defined on the basis of particle size rather than composition. In current commercial practice, following the introduction of new European standards from 1st January 2004, the term 'gravel' (or more correctly coarse aggregate) is used for general and concrete applications to define particles between 4 and 80 mm, and the term 'sand' for material that is finer than 4 mm, but coarser than 0.063 mm. For use in asphalt 2 mm is now the break point between coarse and fine aggregate. 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.

Wiltshire produced 1.3 million tonnes of sand and gravel in 2002, and had estimated permitted reserves of 13.5 million tones at the end of 2001 (source: AM2001 survey). Recent production figures may be seen in Figure 1.

Sand and gravel resources occur in a variety of geological environments. In Wiltshire, these resources fall into two categories: superficial deposits (mostly river terrace deposits), and bedrock sand and gravel. The first category was assessed in parts of Wiltshire by BGS in the 1970s and 1980s. Resources identified in these areas are identified separately on the map, and the possible extent of sand and gravel concealed beneath overburden is shown. These concealed resources were defined by overburden to mineral ratios (overburden to mineral less than 3:1). Outside these areas, available data are more limited. Generally, only exposed sand and gravel are defined, although sub-alluvial resources of sand and gravel occurring beneath modern river floodplains may be extensive in some areas, and are marked on the map. However, narrow (< 200 m width) spreads of sub-alluvial deposits are mainly excluded from the map. Their limited width is likely to preclude economic working of any sand and gravel present.

2.1 RIVER TERRACE DEPOSITS

Most current sand and gravel workings in Wiltshire are in river terrace deposits. The river terrace deposits were probably deposited mostly from meltwater during glacial episodes. These deposits occur in both raised river terrace sequences and as flood plain terraces associated with and

underlying present day alluvium. They are of late Anglian to Devensian age. River terraces occur at several levels in most of the major valleys in the county flanking the present floodplain, particularly associated with the River Thames, the Bristol River Avon near Bath and the Salisbury River Avon. The Thames river terraces are more extensive and generally thicker than those on the other major rivers in Wiltshire, and therefore constitute a greater resource.



Figure 1 Sand and gravel extraction from River Thames Terrace Deposits at Kent End Quarry, Cotswold Water Park Complex, Moreton C. Cullimore (Gravels) Ltd.

The older terraces are higher above the present course of the river and are generally dry in their upper parts. Younger terraces can be saturated at their bases. The deposits comprise sequences of sands and gravels with sheet-like morphology, sub-horizontal upper surfaces, and thicknesses of up to a few metres. The younger deposits are more laterally continuous since they have been less down cut by subsequent river erosion.

River terrace deposits represent an important resource in the county since they are generally clay-poor. They are being worked extensively in the Thames Valley in the north of Wiltshire.

2.2 BEDROCK SAND AND GRAVEL

Several formations in Wiltshire consist of poorly consolidated sandstones that have been worked for building sand. In particular, the Lower Calcareous Grit Formation of the Corallian Group (also known as the Kingston Formation) in the north and west of the county, the Lower Greensand Group near Calne, and the Bracklesham Group in the south-east of the county are currently being quarried.

The Lower Calcareous Grit Formation crops out in roughly a north-south direction through the central northern part of Wiltshire. The Lower Calcareous Grit Formation (also known as the Hazelbury Bryan Formation) consists mainly of fine-grained sands with occasional layers of coarser calcareous sandstone. It has only limited development, but has a maximum thickness of up to 20 m to the north-east of Melksham. It is currently being quarried in this area.

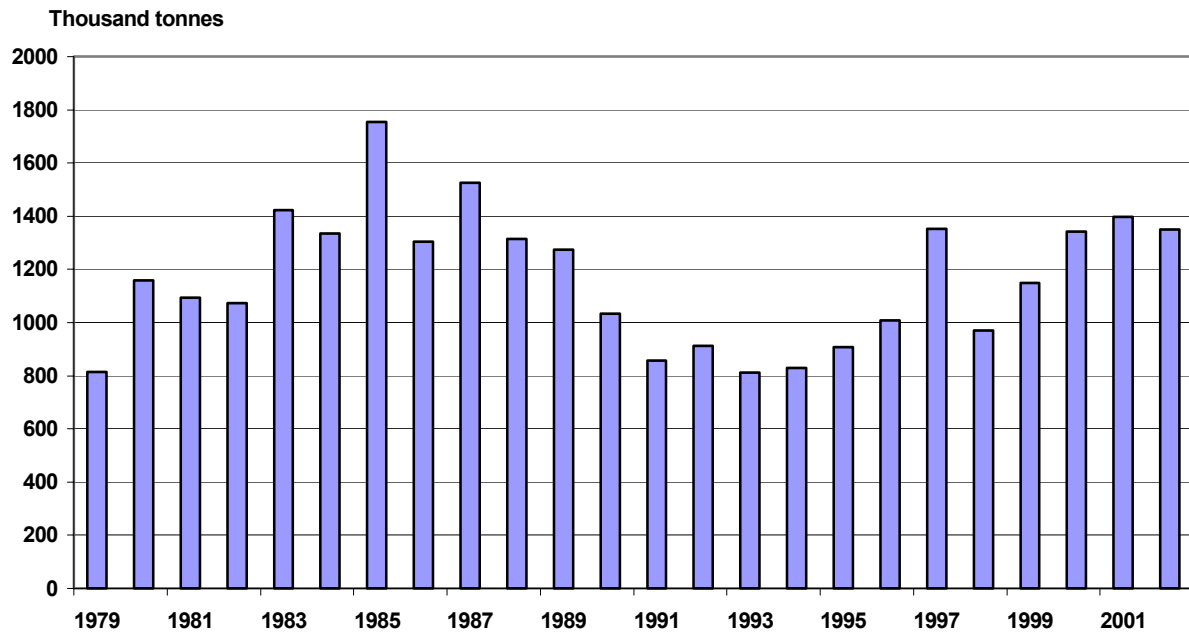


Figure 2 Production of sand and gravel in Wiltshire, 1979-2002

Source: 1979 – 1990 Annual Minerals Raised Inquiry, Office for National Statistics
1991 – 2002 Wiltshire County Council.

The Lower Greensand Group follows a similar distribution to the Corallian Group, but crops out further to the east. Its thickness is variable, with a maximum of about 12 m between Melksham and Calne. There is also a thin bed around Tisbury in the south of the county. The Lower Greensand Group consists of marine sands and sandstones with some mudstone beds, and is generally highly ferruginous. It is currently being quarried at two locations near Calne.

The Bracklesham Group of the Eocene crops out in the far south of Wiltshire and has only a limited extent in the county. In Dorset, it is the principal sand resource and it is of regional importance as a source of concreting and asphaltting sand. In Wiltshire there are currently workings to the south-east of Redlynch in the Marsh Farm Formation of the Bracklesham Group.

In the south east of the county the Reading Formation of the Lambeth Group of Palaeogene age is worked for sand in the vicinity of Whiteparish. The formation consists predominantly of clay, but locally sand and pebble beds also occur. There are marked differences in the proportions of the different rock types. The full extent of the Reading Formation is, therefore, shown.

Several other formations have been worked for sand and gravel in the past. These include the Bridport Sand Formation of the Lower Jurassic Lias Group in the west, the Upper Calcareous Grit Formation, the Upper Greensand Formation, and the Whitecliff Sand Member of the London Clay Formation. None of these formations are currently worked, and are thus not shown on the map face.

3 Crushed rock aggregate

A variety of hard rocks, when crushed, are suitable for use as aggregates. The technical suitability for different applications depends 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 mixing with cement to produce concrete. For applications such as constructional fill and drainage media, with less demanding specifications, lower quality materials are acceptable.

Wiltshire produced no crushed rock aggregate in 2002. Some lithologies, particularly in the Great Oolite Group of the Middle Jurassic, and the Corallian Group and Portland Group of the Upper Jurassic, have been worked in the past as crushed rock, but are not currently being exploited as a result of low strength, high porosity, high mudstone content, limited thickness of beds or their greater value as a dimension stone. These include the Forest Marble Formation and Cornbrash Formation in the Great Oolite Group, the Highworth Limestone Formation in the Corallian Group and the Portland Formation from the Portland Group. Small amounts of waste for producing building stone may be sold for construction fill. The extent of the main limestone units is shown on the map as many are or have been worked for building stone.

4 Chalk

Chalk is a relatively soft, fine-grained, white limestone, consisting mostly of the debris of planktonic algae. In Wiltshire, it crops out across a large proportion of the south and east of the county. On this resource map, the chalk is subdivided into two categories: low purity and high purity. Low purity chalk (generally less than 93% CaCO_3) is found in the formations of the Grey Chalk Subgroup (formerly Lower Chalk) of the Upper Cretaceous. These formations tend to have a relatively high clay content. The Grey Chalk Subgroup is about 76 m thick in Wiltshire. High purity chalk (93-98% CaCO_3 excluding flints) includes formations in the White Chalk Subgroup (formerly Middle and Upper Chalk) of the Upper Cretaceous. Flint bands are common, particularly towards the top of the subgroup. The Chalk Group in total is up to 500 m thick in Wiltshire.

The main chalk operation is the Westbury Quarry where about 1 million tonnes a year are extracted for cement manufacture (see Cement raw materials).

The White Chalk Subgroup is quarried at two locations in south Wiltshire. At Mere, it is quarried for agricultural lime; at Quidhampton near Salisbury it is used as chalk whiting for filler applications.

Chalk is also an important aquifer and a major source of groundwater in the county.

5 Cement raw materials

Cement is an essential constituent of concrete and mortar and is a vital material for the building and civil engineering industries. Portland cement clinker is manufactured by heating an homogenised and controlled mixture of calcareous and clayey raw materials to partial fusion (typically at 1400° – 1500°C). Small amounts of iron oxide, sand (silica) and certain waste materials, such as pulverised fuel ash (pfa - a by-product of coal-fired power stations), 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 amounts of calcium aluminates that constitute cement clinker. The clinker is cooled and then finely ground, typically with 5% 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 clay or mudstone 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 feedstock, i.e. limestone/chalk. Large reserves of raw materials are required to provide security of supply.

Wiltshire is an important cement producing county with a large plant located at Westbury which was opened in 1962. The plant has a clinker capacity of 720 000 tonnes a year and production is based on chalk and clay. The Grey Chalk and the lower part of the White Chalk are the source of

the calcareous raw material. The source of the clay is the nearby Westbury clay quarry which exploits the Kimmeridge Clay of Jurassic age. The extent of the Kimmeridge Clay resource in Wiltshire has not been shown on the map as, except for at Westbury, it is not of economic importance. Usage of Kimmeridge Clay has declined because of the increased use of pfa as a partial substitute, which has been used to lower the alkalis content of the total blend.

6 Building stones

The Jurassic, Cretaceous and Palaeogene rocks of the county have provided a wide variety of stone for building purposes.

The Middle Jurassic (Bathonian) oolitic and shelly Bath limestones are the county's most prolific building stone resource. They are still mined and quarried extensively to the east of Bath, around Corsham, Box, and Monkton Farleigh. Further north smaller quarries operated at Luckington and Sherston. The shelly and fissile limestones of the Forest Marble Formation have been worked for local use as roofing slate across their outcrop, notably in the Chippenham and Malmesbury areas at Charlwood, Atworth and Botleaze.

The Upper Jurassic shelly and sandy Corallian (Oxfordian) limestones were also extensively quarried along their outcrop for local building stone in the past as at Calne, Goatacre Seend, Catcomb and Purton. The sandy limestones of the Portland Group of the Vale of Wardour, used for the construction of Salisbury Cathedral, are still mined and quarried in the Chilmark, Tisbury and Chicks Grove areas. Important quarries once worked the Portlandian and Purbeckian limestones in Swindon (Okus and Town Garden quarries). The fissile limestones from the Lower Purbeck succession were also used locally for roofing slate.

The Lower Cretaceous glauconitic sandstones were once extensively worked for local building purposes. Particularly notable were the quarries at Potterne, east of Calne, Fovant, Seend and in the Horningsham and Penselwood areas. The Upper Greensand Formation has also been quarried locally for use in traditional buildings at Hurdcott near Barford St. Martin, and is still exploited on a small scale.

The chalk rocks of the Upper Cretaceous have been sparsely used in the past for local building stone across its outcrop, as at Corton Down. Flints derived from the Chalk are, however, commonly used as a local building material over much of its outcrop area, in typical chequerwork patterns, as at Wilsford and Tilshead.

As a result of their hardness the grey and reddened silica-cemented sandstone boulders known as Sarsen stones, remnants from a once more extensive Lower Tertiary (Eocene) succession, commonly occur. They have been used throughout the area, not only for the well known prehistoric stone structures like Avebury and Stonehenge, but also dressed for use in local housing as in Marlborough and Lockeridge.

There are currently seven quarries in the county working the Middle Jurassic limestones, and two quarries working the Upper Jurassic limestones for building stone.

7 Hydrocarbons

7.1 CONVENTIONAL OIL AND GAS

The county of Wiltshire occupies a large tract of land that straddles the Variscan Front in southern Britain. Beneath the north of the county, Palaeozoic basement forming part of the ancient London Brabant Massif lies at relatively shallow depths. However, up to two thirds of the county lies to the south of the Variscan Front, occupying a tract of land over which Variscan basement thrusts were reactivated in extension during mainly Mesozoic times and controlled the development and location of a series of major down-south syndepositional normal faults. These faults controlled the development of the Pewsey, Weald and Wessex-Channel basins and were themselves, reactivated during Palaeogene (Alpine) compression, suffering reversal of movement (inversion). Two arcuate lines of en echelon anticlinal structures in the Mesozoic cover rocks were formed above these faults across the central and southern regions of the county, referred to as the Pewsey-London Platform Monoclines and the Wardour-Portsdown Monoclines respectively.

At crop, thin Palaeogene deposits represent the western limits of the Palaeogene London Basin whilst Cretaceous rocks crop out over most of the county. Along with earlier Mesozoic rocks, they mostly dip gently southeastwards but this changes markedly in the region of inversion structures. Although Westphalian Coal Measures occur at depth both to the west (Somerset and Bristol Coalfield) and to the east (Oxfordshire-Berkshire Coalfield), they are only present beneath a very small part of the county in the extreme west. However, Wiltshire lies around the northern margins of the hydrocarbon-producing Wessex-Channel Basin, where Jurassic source rocks are buried deeply enough to have generated hydrocarbons.

Consequently, a total of nine hydrocarbon exploration wells have been drilled in the county, the majority (seven) reflecting interest in the inversion structures across the southern two thirds of the county and in which hydrocarbons generated might have been trapped. The earliest was a shallow well drilled at Ham in 1936 that proved to be dry. There was then a gap until the seventies when Ulster Petroleum (Canada) Ltd drilled Devizes No.1 (1972). The well was similarly plugged as dry and abandoned. Between 1979 and 1985 a dense coverage of seismic reflection data was acquired, mainly across the southern half of the county. Further wells were drilled by Carless at Yarnbury (1980) and Norton Ferris (1985), by Shell at Farley South (1980) and Netherhampton (1986) and BP Petroleum Development Limited at Urchfont (1986). All proved dry and were abandoned, though traces of gas and oil are recorded in the Norton Ferris well.

In the northern regions of the county a more sparsely-spaced grid of seismic reflection data also exists. Both Shell and Consolidated Oil and Gas (UK) Ltd drilled exploration wells at Cooles Farm (1975) and Highworth (1976) respectively. In both cases, the wells were designated as dry and subsequently abandoned. There has been no drilling in this area since then.

The geological setting of, and exploration results in, the county suggests that hydrocarbon prospectivity is likely to be poor. The northern areas of the county overlie the London-Brabant Massif and thus shallow Variscan Basement. As such, the overlying Mesozoic cover is relatively thin, impacting on the quality and extent of potential reservoir and source rocks. In addition, any source rocks present will be neither thick enough nor likely to have been buried deep enough for the generation of commercial quantities of hydrocarbons. Elsewhere in the county, prospective structures lie close to areas of the Wessex-Channel Basin that contain thicker reservoir and source rocks. However, the county lies beyond the generally accepted northern limits of commercial hydrocarbon accumulations. The main problem is proving either that potential Jurassic source rocks exist in the county and if so, have suffered sufficient burial to have entered

the oil generation window, or that long distance migration of hydrocarbons into the county from the south, across major basin–bounding faults could have occurred. Neither scenario seems to have been adequately proven. However, it is noted that structures en echelon to the east in neighbouring Hampshire have proved prospective, with for example, the discovery in 1984 of the Stockbridge Oilfield, the main reservoir being Middle Jurassic oolitic limestones.

As of Dec 2003, PEDL69 operated by Sterling and extending into neighbouring Hampshire to the east, represents the only active licence block in the county. It covers the area of the Wardour-Portsdown structures extending towards Winchester and beyond.

7.2 COAL BED METHANE (CBM) POTENTIAL

Concealed coal-bearing strata are essentially absent in Wiltshire except for a small and poorly defined area of the Somerset-Bristol Coalfield in the extreme west. The levels of coalbed methane in the coal seams of the Somerset-Bristol Coalfield are not accurately known, but are low (ca. $0.1 \text{ m}^3\text{t}^{-1}$). Thus the potential for coalbed methane development from virgin coal seams in Wiltshire is unlikely to exist.

8 Brick clay

The term ‘brick clay’ is used to describe clay used predominantly in the manufacture of bricks and, to a lesser extent, roof tile and clay pipes. These clays may sometimes be used in cement manufacture, as a source of construction fill, and for lining and sealing 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 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 material 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 no brick and tile manufacturing sites in Wiltshire, although the formations that are exploited in neighbouring counties such as Hampshire (Reading Formation) and Dorset (London Clay Formation) are also present in Wiltshire. In the past the Ampthill Clay Formation, Gault Formation and Kellaways Formation have all been used for brick making or as engineering clay in Wiltshire, although they are not being worked at present.

At Purton, near Swindon, the Weymouth Member of the Oxford Clay Formation is currently exploited as source of engineering clay. Near Westbury in west Wiltshire, the Kimmeridge Clay Formation is quarried for clay for use in cement manufacture. The extent of the various clay-bearing formations is not shown on the map because of their very localised use.

9 Fuller’s earth

The term ‘fuller’s earth’ is used to describe clays composed essentially of the clay mineral Ca-smectite, which exhibits a unique combination of properties on which its many industrial applications are based. Fuller’s earth deposits were formed by the alteration of volcanic ash deposited in seawater. The accumulation and preservation of volcanic ash into thick beds

involved a complex set of geological processes and consequently fuller's earth deposits of potential economic interest have a very restricted distribution in Britain.

A single bed of fuller's earth of Jurassic age (the Fuller's Earth Bed) up to 3.3 m thick occurs between 3 m and 10 m below the top of the Fuller's Earth Formation and the base of the Great Oolite Formation. It was mined to the south of Bath in Somerset at the Combe Hay Mine until its closure in 1979 because of the high costs of underground extraction. The eastern limit of the Fuller's Earth Bed is not known but east of the River Avon, and into west Wiltshire, it has only been proved in boreholes, where it is of lower quality than at Combe Hay.

With the exception of the Bath deposits, all the other fuller's earth deposits which are, or have been, worked in southern England are of Lower Cretaceous age and occur in the Lower Greensand. In Wiltshire the principal outcrops of Lower Greensand occur to the east and south west of Calne. These have, in the past, been examined for their fuller's earth potential but no beds were discovered. Prospects for discovering significant fuller's earth resources in the county are, therefore, believed to be small.

10 Aims and limitations

The purpose of the maps in this series is to show the broad distribution of those mineral resources that 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 reflects 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.

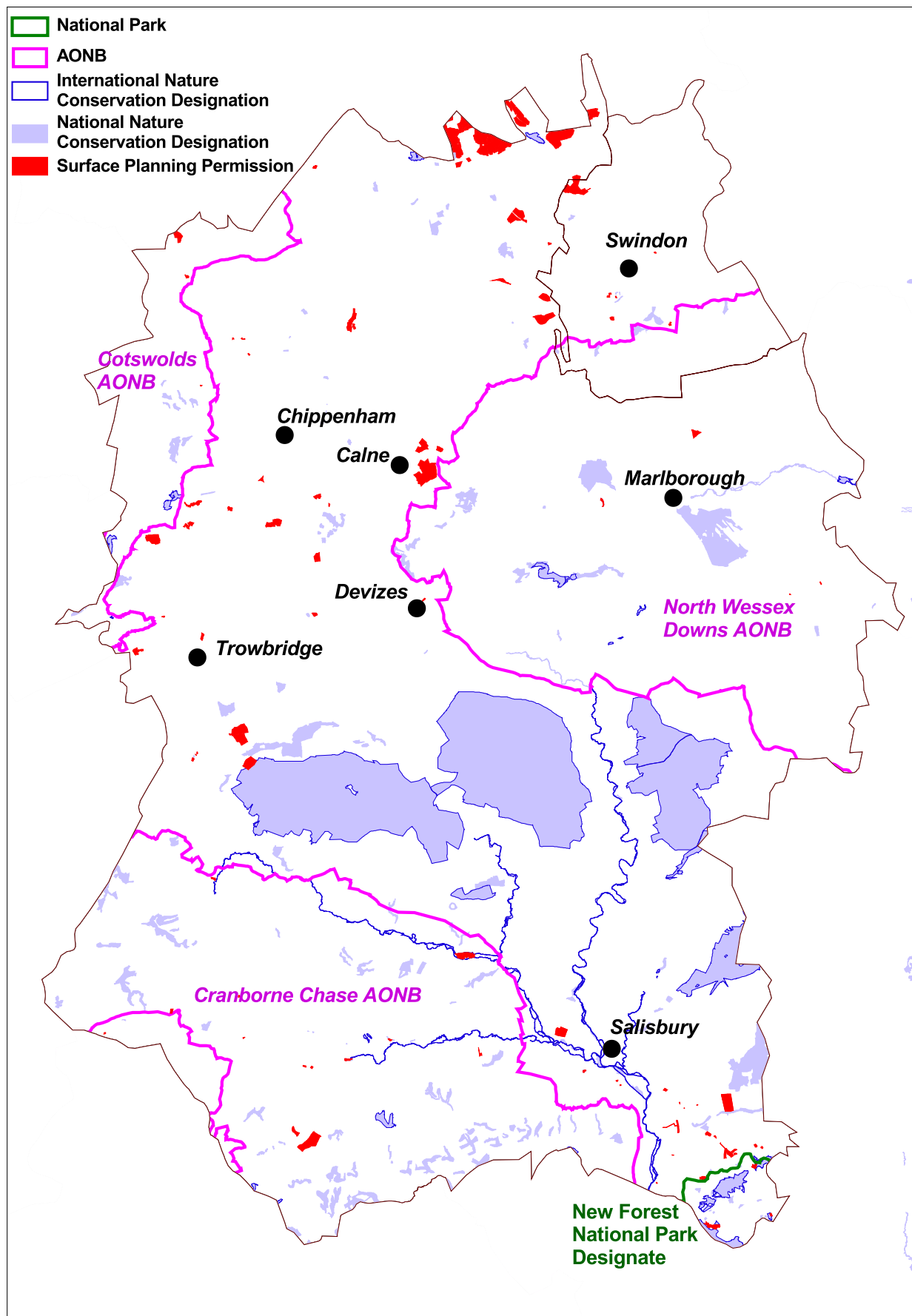


Figure 3 Surface mineral planning permissions and landscape and nature conservation designations in Wiltshire.

11 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 their current planning or operational status. The polygons were digitised by BGS from Plotting Sheets and other documents supplied by Wiltshire County Council, and any queries regarding the sites shown should be directed to these authorities at the addresses shown below. The polygons cover active, former and restored mineral workings and, occasionally, unworked deposits.

Planning Permissions represent areas where a commercial decision to work mineral has been made, a successful application has been dealt with through the provisions of the Town and Country Planning legislation, and the permitted preserve will have been depleted to a greater or lesser extent. The current planning status is not qualified on the map, but is available in the underlying database.

Contact address:

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Appendix

TOPOGRAPHIC BASE

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CONSTRAINT INFORMATION

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, NNR, SPA, SAC and Ramsar boundaries © English Nature 2003.

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 25th September 2003.

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 W1S 2ET. Tel: 0207 973 3132. Web page: www.english-heritage.org.uk

Countryside Agency

Digital AONB boundaries © Countryside Commission 1986 (Now Countryside Agency).

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

