



# HEREFORDSHIRE & WORCESTERSHIRE

## A Summary of Mineral Resource Information for Development Plans: Phase One

### Mineral Resources

Scale 1:100 000

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Positions of Scheduled Monuments at 1st April 1998 as supplied by English Heritage. The majority of monuments are plotted against a centred NGR datum. 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.

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AMG ANNOTATIONS  
The purpose of the map and associated reports in this series is to show the broad distribution of these mineral resources which may be mined or processed in the future. The map does not represent a detailed resource assessment. The map is intended to assist in the identification and assessment of mineral resources. The map is not intended to be used as a basis for mineral planning or as a basis for mineral resource assessment. The map is not intended to be used as a basis for mineral resource assessment. The map is not intended to be used as a basis for mineral resource assessment.

The map has been produced by collection and interpretation of mineral resource data principally held by the British Geological Survey. Information on the extent of mineral planning permissions has been based on reports. The status of mineral planning permissions can be ascertained from the appropriate MPA, Location Information or mineral planning applications held by the appropriate MPA. Location Information or mineral planning applications held by the appropriate MPA. Location Information or mineral planning applications held by the appropriate MPA.

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### Sandstone

Sandstones of Ordovician, Silurian and Carboniferous age have been widely used as building stone within the area. These rocks (which include gritstones and quartzites) may represent resources which are suitable for applications which require high resistance to abrasion. The Ordovician Lacey Quartzite occurs in a small outlier near to Bromsgrove. Silurian sandstones are found in association with limestones in the north-western part of Herefordshire. The Folly Sandstone Formation was worked for aggregate (along with the overlying Nash Scar Limestone) at Nash Rock quarry near Knighton. A thick sandstone occurs within the Carboniferous Highly Bedded of the Wyre Forest Coalfield. Information on the quality of this Coal Measure sandstone is extremely limited and it is therefore depicted on an inset, rather than the main map.

### Silica Sand

The Wildmoor Sandstone Formation (formerly the Upper Mottled Sandstone) of the Triassic Sherwood Sandstone Group, was an important source of naturally-bonded foundry sand in the past. Naturally-bonded sands were of great importance to the early development of the foundry casting industry and the Wildmoor Sandstone was worked in different parts of the West Midlands for this purpose. However, changes in foundry technology have led to a decline in the use of this material and production is now confined to the Bromsgrove area. The fine-grained, weakly-cemented Wildmoor Sandstone is now principally worked as a source of building sand.

### Rock Salt

Halite (sodium chloride, NaCl), or rock salt, underlies an area of at least 50 km<sup>2</sup> to the north-east of Worcester. The rock salt occurs as the Droitwich Halite within the Triassic Mercia Mudstone Group. It occurs in the northern part of the Worcester Basin, but its southern limit is not clear. Younger strata mostly conceal the deposit. Salt-bearing strata do not crop out at surface because of solution, but have a concealed crop, or 'wet rockhead', masked by collapsed strata and younger beds. Limited borehole information indicates that individual salt beds are relatively thin and interbedded with mudstone.

There has been a long history of brine production in the Droitwich area. More recent production was centred on Sloke Prior, but natural brine pumping ceased there in 1971 because of the subsidence problems it was causing. The deposit is unlikely to be of economic interest in the foreseeable future.

### Sand and Gravel

Two main categories of sand and gravel are defined: (i) superficial (glacial) deposits, subdivided into both glacial and river sands and gravels, together with (ii) bedrock (solid) deposits represented by sandstones of the Triassic Sherwood Sandstone Group.

### Superficial deposits

River sands and gravels are unconsolidated deposits which include sub-alluvial material beneath the floors of the major river valleys and river terrace deposits flanking the valley sides. In Herefordshire and Worcestershire, they are mainly associated with the rivers Severn, Teme, Avon, Wye, Frome and Lugg. The deposits consist of a varied mixture of sand and gravel. The Mafon Sand and Gravel consists of older deposits of a pre-glacial river which flowed west of the Malverns.

River deposits rarely exceed 10 m in thickness, with 3 to 6 m being typical for the river terraces of the Severn and Avon. The deposits are generally thinner elsewhere. Terrace deposits comprise the major resource of sand and gravel in the area. The floor plains of the major valleys are underlain by a layer of clay or silt which averages 3 to 5 m thickness. Much of this overbank deposit is underlain in turn by sand and gravel which may be workable in places. Not all river sand and gravel deposits are of commercial value, some being too limited in extent, thickness or quality. Spreads of alluvium less than 100 m wide have been omitted from the map as these are unlikely to contain sufficient sand and gravel to make commercial extraction viable.

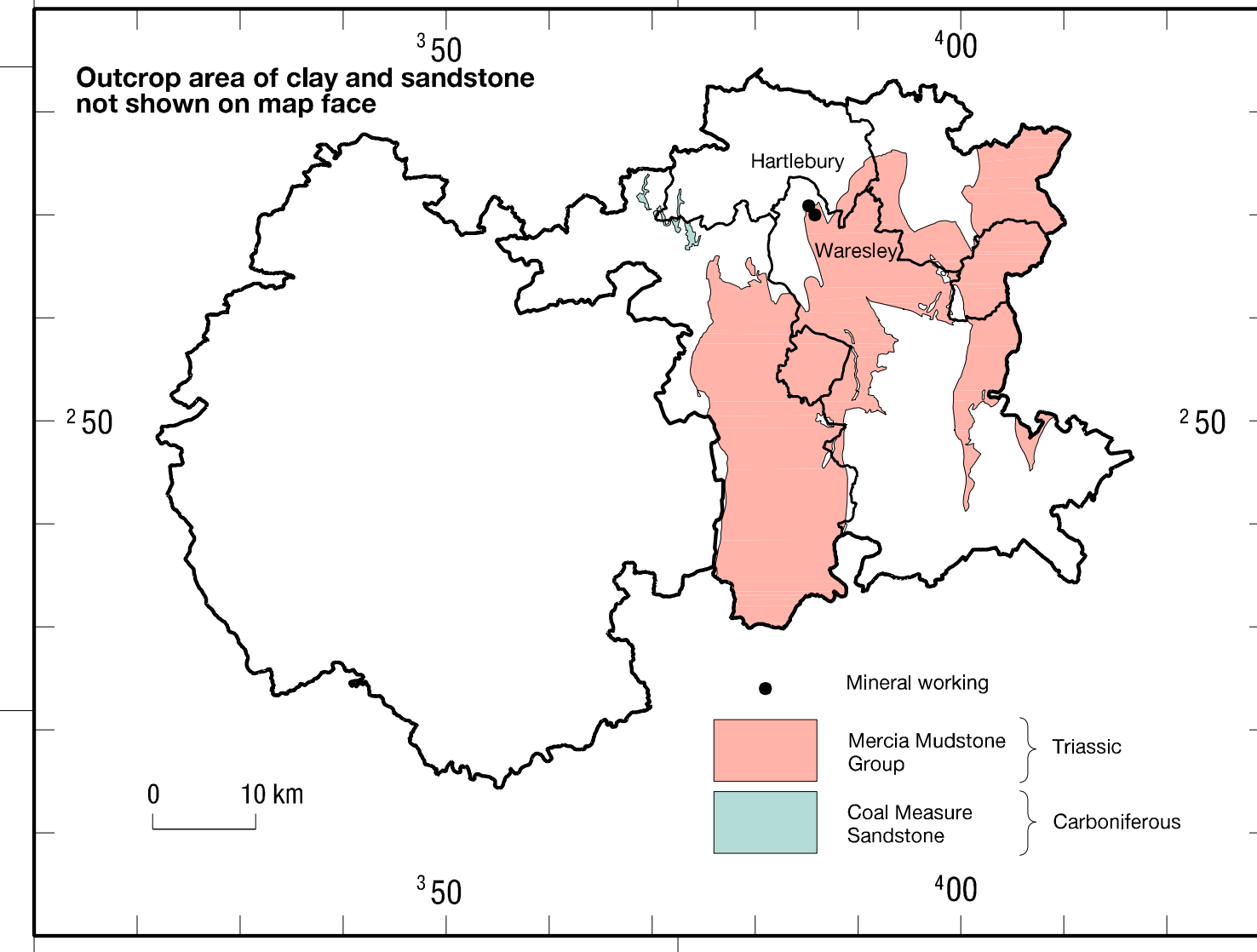
Glacial sand and gravel deposits are laid down by a variety of glacial and glacioluvial processes associated with glaciers. They are also unconsolidated deposits, but are more variable in areal extent and have a wider range of particle sizes which may restrict their commercial potential. They may be extensive locally and often show considerable lateral variations in thickness and grading. In general, they are likely to be less than 10 m thick but may exceed 20 m thickness where they fill follows in underlying deposits.

Around Hereford and Leominster, glacial sand and gravel occurs in association with spreads of till (boulder clay) and other glacial deposits. These deposits are very variable in extent, thickness and lithology, but such accumulations may include valuable sand and gravel resources. The moraine deposits typical of the Wye valley west of Hereford contain one of the largest potential sand and gravel resources in the area and up to 20 m of sand and gravel are exposed in the working pits at Stretton Sugwas. Further north, patches of gravel with lenses of sand lie within, or extend beneath, the till plain and have been worked in the past for local use.

### Bedrock deposits

Bedrock resources are confined to the Triassic Sherwood Sandstone Group. In Worcestershire, aggregates are quarried from the pebble-bearing Kidderminster Formation at Shelsley, in the north-east of the county near Bromsgrove. The overlying Wildmoor Formation is also worked in the Bromsgrove area as a source of building sand and silica sand (see separate text box).

- ### SAND AND GRAVEL
- Superficial deposits
    - River sand and gravel resources
    - Glacial sand and gravel resources
  - Bedrock deposits
    - Outcrop of Kidderminster Formation (formerly 'Butter Pebble Beds')
    - Wildmoor Sandstone (Construction sand/ Silica Sand)
- ### SANDSTONE
- Greywacke (Impure sandstone) - Silurian
  - Quartzitic sandstone - Ordovician
- ### LIMESTONE
- Limestone resources
  - Very High purity limestone (>98% CaCO<sub>3</sub>) - Carboniferous
  - Dolomite - Carboniferous
  - Limestones, including interbedded mudstones/siltstones - Silurian
  - Inferior Oolite - Jurassic
- ### IGNEOUS ROCK
- Extrusive (Warren House Formation) - Precambrian
  - Intrusive (Malverns Complex) - Precambrian
- ### COAL
- Area of shallow coal - (Trenchard seam)
- ### SALT
- Salt area influenced by groundwater solution - 'wet rockhead'
  - Salt (subsurface extent of salt-bearing strata)
- ### MINERAL PLANNING PERMISSIONS (as at 1.11.98)
- Source: Mineral Planning Authorities
- Surface planning permission (wild and exposed)
- ### MINERAL WORKINGS
- Ryall - Active site
  - Hoo Farm - Inactive, worked-out and/or restored site
- ### Mineral commodity
- Lst - Limestone
  - Sst - Sandstone
  - Sg - Sand and Gravel
  - Sat - Sandstone
  - SIS - Silica Sand
  - Ig - Igneous Rock
  - Co - Coal
  - Is - Ironstone
  - Cl - Common clay and shale
- ### ENVIRONMENTAL DESIGNATIONS
- Area of Outstanding Natural Beauty (Cotswolds (part), Malvern Hills (part) and Wye Valley (part))
  - Site of Special Scientific Interest
  - National Nature Reserve
  - Scheduled Monument
- ### ADMINISTRATIVE AREAS
- Mineral Planning Authority
  - District



### Brick Clay

Clay of the Mercia Mudstone Group is used for the production of facing bricks at two sites in the Stourport area. Although it is a locally important raw material for the brick manufacture, the variability of the Mercia Mudstone Group over much of Worcestershire has precluded this clay being shown as a resource on the main map, and it is instead shown on an inset map. The relatively pale fired body colour produced by this clay is suited to taking a variety of surface textures and colours on the fired brick, allowing the production of a significant proportion of the wide range of finishes demanded by the house building sector.

### Limestone

Limestones are not a major resource in Herefordshire and Worcestershire. Several limestones of Silurian age crop out in narrow zones west of the Malverns, south-west of Stourport, in the Woodhope Inlier between Hereford and Ludbury and also in the west of Herefordshire at Kington. The limestones are relatively thin and shaly and belong to three formations known as the Woodhope, Wenlock, and Aymestry limestones. They are generally suitable only for low-grade aggregate applications such as fill, although good quality crushed aggregate is produced from a quarry in the Aymestry Limestone at Lenthall Ears. In the south, a small area of Carboniferous limestone forms a continuation of the much larger outcrop in the adjacent Forest of Dean. This outcrop contains dolomite (Lower Dolomite) and both high-purity limestone (Grease Limestone) and lower purity limestone (Whithead Limestone). They are all capable of producing crushed-rock aggregate materials. Low-grade aggregate is also produced from a quarry in Jurassic limestone at Broadway in Worcestershire.

### Igneous Rock

The Precambrian Malverns Complex is composed mainly of intrusive rocks consisting of diorites and tonalites, with minor granites and ultrabasic rocks. Many of the rocks are extensively sheared and are cut by microdiorite dykes and granite pegmatites. These rocks are a potential source of good quality aggregate suitable for road surfacing as well as for use in the lower layers of road pavements. In the east they were widely quarried for roadstone and building stone, but quarrying ceased by the 1980s.

Volcanic (extrusive) igneous rocks of the Warren House Formation are also of Precambrian age and have a small outcrop in the Malvern Hills. These rocks have not been extensively quarried in the past and are likely to be inferior in quality to the Malverns Complex.

