British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

DETR
ENVIRONMENT TRANSPORT REGIONS

DORSET
(comprising Dorset, Bournemouth and Poole)

A Summary of Mineral Resource Information
for Development Plans

Mineral Resources

Scale 1:100 000

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SAND & GRAVEL

Superficial deposits

- Sub-alluvial sand & gravel
- River terrace deposits
- Storm beach deposits
- Boundary of area assessed for sand & gravel at the indicated resource level
- Boundary of Wareham Basin project area

Bedrock sand

- Poole Formation and Branksome Sand Formation — Palaeogene (Tertiary)

CHALK

- Outcrop of higher purity chalk (93-98% $CaCO_3$) — Middle and Upper Chalk
- Outcrop of lower purity chalk (<93% $CaCO_3$) — Lower Chalk

Cretaceous

LIMESTONE

- Purbeck Limestone Group
- Portland Stone Formation and Todber Freestone

Jurassic

SALT

- Approximate sub-surface extent of salt-bearing strata — Triassic

MINERAL PLANNING PERMISSIONS
(as at 1.1.01)

Source: Dorset County Council

- Surface planning permission (valid and expired)
- Underground planning permission (valid and expired)

MINERAL WORKINGS

- Swanworth — Active site
- *Chesil* — Inactive, worked-out and/or restored site
- ○ — Planning Permission undefined
- ♦ — Active marine sand & gravel wharf

MINERAL COMMODITY

Bc	Ball Clay
Ch	Chalk
Cl	Common clay & shale
Lst	Limestone
Oil	Oil
MSg	Marine sand & gravel
Sg	Sand & gravel

ENVIRONMENTAL DESIGNATIONS

- Area of Outstanding Natural Beauty: Dorset, Cranborne Chase (part)
- Site of Special Scientific Interest
- National Nature Reserve
- + Scheduled Monument

ADMINISTRATIVE AREAS

- Mineral Planning Authority
- District

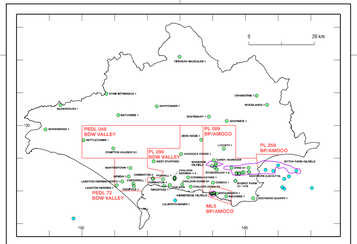
Aims and Limitations

The purpose of the maps and associated reports 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 form 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 Commission, 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 a 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 which are referred to in the accompanying report.

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.



- Hydrocarbon Well (Summary details of the wells are given in the report).
- Hydrocarbon well offshore
- PEDL — Petroleum Exploration and Development Licence issued under the Petroleum (Production) Act 1934 (as at April, 2000)

Hydrocarbons

Historically the Kimmeridge Clay oil shales have been worked at Kimmeridge as a local fuel and attempts were made to establish commercial oil production by distillation on various occasions. Hydrocarbon seepages in the Wessex Basin prompted exploratory drilling for hydrocarbons commencing in 1936. Results were generally disappointing, providing in most cases only shows or short term production. However, initial tests provided further impetus for continued exploration, which is ongoing today. As a result, three producing oilfields exist in Dorset; namely Wytch Farm, Wareham and Kimmeridge Bay, and a number of wells are suspended as oil producers (see map). Wytch Farm is the most important oil ciscovery, but initially started as a modest producer. Subsequent drilling proved deeper target horizons and it is now both the largest onshore oilfield in Britain and in the top ten of UK fields, including those of the North Sea. The oilfield extends far to the east of the discovery well and present technology, involving drilling up to 10 km-long horizontal wells offshore, permits greater reserves to be exploited from existing onshore production sites at Goathorn Peninsula.

As most wells outside the Wytch Farm/Kimmeridge/Wareham area have proved disappointing this suggests that large reserves do not exist elsewhere in Dorset. Instead targets must be special local structural or stratigraphic trap developments. The most likely prospective areas are in the south of the county.

Salt

Halite ('rock salt') occurs in the Dorset Halite Formation of the Triassic Mercia Mudstone Group, which is concealed beneath Jurassic and younger rocks and is only known from boreholes. Salt-bearing strata underlie at least 1200 km² of central, southern and most of the western part of the county. Rock salt is interbedded with mudstone through a sequence varying between 55 m and 488 m in thickness and at depths, to the top, of between 422 m to nearly 2000 m.

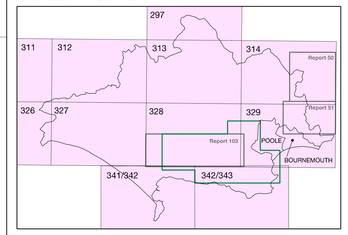
The total thickness of salt present ranges from 45 m to 280 m, with the total thickness of individual salt units exceeding 60 m at some locations, although most are between 20 m and 41 m. The halite is unlikely to be of commercial interest for salt production, but thick, relatively pure salt beds might be considered for storage cavity purposes where depths are appropriate.

Chalk

Chalk is a relatively soft, fine-grained, white or pale-grey limestone with bands of flint. It is up to 430 m thick in Dorset and occupies an extensive tract of land in the centre of the county and extending to the southern part of Salisbury Plain.

The Chalk has traditionally been sub-divided into three; the Lower, Middle and Upper Chalk. The Upper Chalk is the most extensive. The Lower Chalk is characterised by a higher clay content and has been separately distinguished on the map. The overlying Middle and Upper Chalk are of higher purity. Flints are common in the Upper Chalk. In the past chalk was extracted at numerous small pits. Despite being an extensive resource of high to medium purity calcium carbonate, currently chalk is only worked at two small sites. At Cocknowle, in the Isle of Purbeck, somewhat harder chalk is used for construction purposes to make-up haul roads for the ball clay industry, and at Shillingstone, in the north of the county, chalk is produced for agricultural purposes and lime.

BGS publications covering Dorset, Bournemouth and Poole



312 — 1:50 000 map published

1:25 000 map published (Industrial Minerals Assessment Sand & Gravel Resource Map)

Wareham Basin project area

Current digital availability of these sheets can be found at the British Geological Survey website www.thebgs.co.uk or www.british-geological-survey.co.uk

Common Clay

The term 'common clay' defines clays primarily used in the manufacture of structurall clay products, such as facing and engineering bricks, pavers, roofing and floor tiles, and vitrified clay drainage pipes. They are more silliceous and less plastic than ball clays and are normally red firing, due to the presence of appreciable amounts of iron oxides.

Common clay is produced on only a very modest scale in Dorset. High quality, hand-made facing bricks are produced at Swanage from a small outcrop of the Weald Clay and red-bodied, unglazed floor tiles are produced from clay in the West Park Farm Member of the London Clay at Knoll Manor, near Corfe Mullen. These resources are only of very local importance and are not shown on the map.

The Poole Formation clays in the Poole area were formerly extensively worked for the manufacture of bricks, drainage pipes and tiles, although these operations ceased in the 1960s and the sites have been redeveloped. However, the inherent mineralogy of the Poole Formation clays make them potentially suitable for the manufacture of facing bricks and roofing/cladding tiles where they are not of ball clay quality.

Sand & Gravel

The sand & gravel resources of Dorset fall into two main categories:

Bedrock, or 'solid,' sand deposits (mainly the Poole Formation), and

Superficial, or 'drift,' deposits (mainly gravel-bearing river terrace deposits).

There are also blown sand and beach deposits, but these are of limited extent. The latter have been worked in the past and are shown on the map.

Bedrock sands

Bedrock sands account for the major proportion of sand & gravel production in Dorset. The principal resource is the Poole Formation, which crops out extensively in the south and east of the area. It is the main resource of fine aggregate in Dorset and is also of regional importance as a source of concreting and asphalting sand. The formation consists of alternating layers of clay and fine- to coarse-grained, locally pebbly, sand. The sand units vary considerably in particle size, both vertically and laterally, but typically have mean particle sizes in the range 0.4 mm to 0.6 mm. Selective extraction and/or processing and blending allows the sands to meet specification. The sands are also relatively pure and are worked on a modest scale for industrial applications.

Thin sand units also occur within the London Clay Formation. These are much finer grained (mean grain size typically about 0.2 mm) than those in the Poole Formation, which significantly limits their commercial use. They are not shown on the map but are worked locally.

Superficial sand & gravel

The principal resource of gravel in Dorset is superficial deposits that occur as thin layers overlying the bedrock formations. Two types of deposit are distinguished on the map: (a) sub-alluvial deposits, and (b) river terrace deposits. These deposits are mainly associated with the main rivers in Dorset, notably the Frome, Piddle, Stour and Avon in the east and the Axe in the west. By far the most important are the river terrace deposits, which are locally fairly widespread, but generally fairly thin (average about 2-3 m but ranging up to 9 m). In places they are worked in conjunction with the underlying bedrock sands. Individual terraces vary both in thickness and composition and their commercial potential is, therefore, very variable. Those in the north of the county have not been worked and are thought to have limited potential. Extensive deposits have been worked out or sterilised by development.

Gravel resources also occur beneath the flood plain alluvium of the major rivers and possibly beneath the marine alluvium of Poole Harbour. However, these deposits have been little worked because of operational and restoration difficulties associated with wet working beneath the water table.

Crushed Rock Aggregate

Rocks with the desirable physical and mechanical properties to form potential sources of crushed rock aggregate have a limited distribution in Dorset and are confined to limestones of Upper Jurassic age that occur in the southernmost parts of the county. Crushed rock aggregate is produced at several limestone quarries on the Isle of Portland, both from the Portland Stone Formation and from the overlying basal limstones of the Purbeck Limestone Group. The same limestones are also worked for aggregates at Swanworth quarry on the Isle of Purbeck.

Building Stone

Dorset has a long history of building stone extraction dating back at least to Roman times. Many of the limestone units that occur throughout the county have been worked for building stone in the past. Pre-eminent amongst these are the Portland and Purbeck limestones of Jurassic age. Portland Stone is perhaps the best known and possibly the most widely used of Britain's building stones. It is an even-grained, white oolitic limestone with very small particles of shell. The coastal location of the resource on the Isle of Portland was an important factor in the stone rising to pre-eminence. The architect Inigo Jones first used it in London in the 17th century and more importantly Sir Christopher Wren used it for the re-building of London after the Great Fire. The modern industry is still thriving and producing high quality stone.

The Isle of Purbeck also has historic quarrying associations and several limestone beds from both the Portland Stone Formation and Purbeck Limestone Group were extensively worked from shallow surface adits and quarries. Perhaps the best known stone is Purbeck 'Marble,' a hard fossiliferous limestone that can take a polish. It has been worked since Roman times and was extracted until the beginning of the 16th century for use in the columns and fonts of most of the churches and cathedrals in southern England. Today the supply of Purbeck Marble is limited. Quarrying of Purbeck Limestone for new building and conservation work remains an important local industry.

Workings in the Todber Freestone and Cucklington Oolite in the north of the county produce small amounts of building stone.

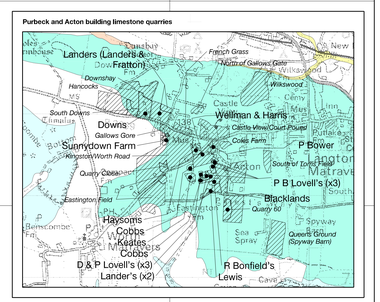
Ball Clay

Ball clays are fine-grained, highly plastic clays, which fire to a light colour and are used chiefly in the manufacture of ceramic whiteware. Dorset ball clays are particular noted for their high plasticity and strength and are mainly used in the manufacture of wall and floor tiles, but also tableware, sanitaryware and electrical porcelain.

They occur in four host clays in the Poole Formation in the central and eastern parts of the Wareham Basin. In ascending order, these are the Creekmoor, Oakdale, Broadstone and Parkstone clays. The average thickness of the host clays is in the range 6 m to 16 m, but thicknesses can vary rapidly over short distances and exceed 50 m locally. Each host clay contains workable ball clay, together with beds of inferior quality clay of no commercial value. The proportion of ball clay within a host clay varies but may be up to 25%. Ball clays are locally absent. The quality of a host clay, and any associated ball clay, can vary quite rapidly over short distances. The host clays exhibit vertical and lateral variations in properties which markedly affect their potential as ball clays. The presence of a host clay is not a guarantee that it will contain workable ball clay. In particular, north-east of Wareham towards Poole, where they were formerly extensively worked for brick and drainage pipe manufacture, they become contaminated with iron oxides and are classed as common clays.

The Creekmoor Clay provides the highest quality ball clay, and accounts for 55 per cent of total output. It is only worked south of the Frome within the AONB. The Oakdale Clay has an extensive outcrop, but is worked only on the Arne Peninsula and accounts for about 15 per cent of output. The Broadstone Clay is no longer worked on any scale. The Parkstone Clay has a limited outcrop and is worked both north and south of the Frome. It accounts for 30 per cent of total production.

Purbeck and Acton building limestone quarries



For details of Purbeck and Acton quarries see inset, right

Distribution of Ball Clay-bearing host clays in the Wareham Basin

Ball clay-bearing host clays at surface and locally beneath drift deposits, and their probable occurrence beneath sand overburden. Topography omitted for clarity.