British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

DETR
ENVIRONMENT TRANSPORT REGIONS

CUMBRIA AND THE LAKE DISTRICT

(comprising Cumbria, the Lake District National Park and part of the Yorkshire Dales National Park)

A Summary of Mineral Resource Information for Development Plans

Mineral Resources (South)

Scale 1:100 000

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PEAT
- Peat

LIMESTONE

Limestone
- Limestone (generally < 97% $CaCO_3$), High purity limestone (> 97% $CaCO_3$) } Carboniferous

IGNEOUS ROCK

Intrusive
- Dolerite, Gabbro (Whin Sill, Carrock Fell Complex)
- Granitic rocks (Shap Granite, Threlkeld Microgranite, Embleton diorites)

Extrusive
- Thermally altered (hornfels) volcanic rocks; Mainly andesite and tuff including Millom Park Formation } Borrowdale Volcanic Group

SANDSTONE
- Kirkby Moor Formation, Coniston Group, Wray Castle Formation } Ordovician and Silurian

COAL

Areas of shallow coal
- Principal resource area - thick, closely spaced coals } Coal Measures
- Subsidiary resource } Little Limestone Coal
- Opencast coal: Worked area

FIRECLAY
- Fireclay (coincident with areas of shallow coal - Coal Measures)

SLATE
- Lakeland blue-grey slate — Windermere Supergroup
- Lakeland green slate — Borrowdale Volcanic Group

EVAPORITES

Gypsum / Anhydrite
- D Bed outcrop, B Bed outcrop } Extent of Eden Shales - St Bees Shales (in Vale of Eden and West Cumbria only) } Permian

Salt
- Area influenced by groundwater solution - 'wet-rock head' } Extent of Preesall Salt

COAL LICENCE AREAS (as at 01.08.00)

Source: The Coal Authority
- Opencast coal site
- Deep mine

MINERAL PLANNING PERMISSIONS (as at 01.01.00)

Source: Cumbrian County Council and Lake District National Park Authority
- Surface planning permission (valid and expired)
- Underground planning permission for minerals other than coal (valid and expired)

Note : these areas represent mineral planning permissions which have been granted in the past, irrespective of their current status
- ○ Planning Permission area undefined

MINERAL WORKINGS
- Shap Beck — Active site
- *Baronwood* — Inactive, worked-out and / or restored site
- ▲ Active underground mine site
- ■ Active secondary aggregate producer
- ◆ Active wharf (for crushed rock aggregate)
- △ Site of formerly significant metalliferous mine (a small selection)

Mineral commodity

An	Anhydrite	Fe	Iron	Pt	Peat
Ba	Barytes	Fr	Fireclay	SAgg	Secondary aggregates
Cl	Common clay & shale	Gy	Gypsum	Sl	Slate
Co	Coal	Ig	Igneous rock	Sst	Sandstone
Cu	Copper	Lst	Limestone	Vm	Vein minerals
F	Fluorspar	Pb	Lead	W	Tungsten
				Zn	Zinc

ENVIRONMENTAL DESIGNATIONS
- Lake District and Yorkshire Dales (part) National Parks
- Area of Outstanding Natural Beauty : Solway Coast, North Pennines (part), Arnside and Silverdale (part)
- Site of Special Scientific Interest
- National Nature Reserve
- + Scheduled Monument

ADMINISTRATIVE AREAS
- 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 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 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.

Metalliferous Minerals

Historically two of the UK's foremost metal mining areas, the Lake District and North Pennines, lie wholly or partially within Cumbria but at present, apart from a very small amount of high-grade hematite for pigments, no metals are produced.

All the non-ferrous mines exploited vein-style deposits, with locally important replacement-style mineralisation in the Carboniferous limestones of the North Pennines. All known metalliferous deposits are now either exhausted, have no proven reserves or are currently uneconomic to exploit. The veins in the Lake District contained a wide variety of minerals producing copper, lead, zinc, tungsten and smaller amouts of antimony, arsenic, cobalt, manganese and nickel. Pyrite was also extracted for acid production and large amounts of barytes and minor quartz have also been extracted. In the North Pennines a smaller range of minerals were mined, mainly galena, sphalerite, baryte, fluorite, witherite and iron ores. The last operating mines were Carrock Fell, worked for tungsten until 1981, and Force Crag, worked for lead, zinc and barytes until 1991. In recent years modest quantities of barytes have been produced from vein and replacement deposits at Silverband near Appleby.

Any future exploration for base metals is likely to be focused on stratabound deposits in Lower Carboniferous rocks.

Peat

Peat is an unconsolidated deposit of plant remains in a water-saturated environment such as a bog or fen. Bogs occur in areas where they are dependent on rainfall for supply of water and the vegetation is characterised by acid tolerant plant communities of which the genus *Sphagnum* is dominant. The two main types of bog are (i) raised bogs, characteristic of flat underlying topography and found on low plains and broad valley floors and (ii) blanket bogs which occur mainly in upland areas where conditions are cool and wet. Many lowland raised bogs have been designated as sites of international and national conservation importance.

About 98% of the peat extracted in the UK is used as growing media by amateur and professional gardeners.
In Cumbria, three sites have extraction permissions; Bolton Fell, Wedholme Flow and Solway Moss. All are active raised bogs.

Slate

Slate is most commonly developed from fine-grained sedimentary rocks, such as mudstones, which have a well marked slaty cleavage due to the crystallisation and realignment of platy minerals within the rock mass. It is along this cleavage that the rock can be split, thus giving it its economic importance. Bodies of slate generally have a restricted occurrence within more extensive masses of less perfectly cleaved rock, which accounts for the large tips of waste commonly associated with the slate industry.

The Lake District has had a long history of slate production stretching back some 2000 years. Slate extraction has been based on two distinct products. The most famous is the 'Lakeland green slate' obtained from the intensely cleaved volcanic rocks of the Borrowdale Volcanic Group in the central part of the Lake District. In addition, 'Blue-grey slate' is also produced from evenly cleaved mudstones within the lower parts of the Windermere Supergroup.

Lakeland green slate has been obtained at a number levels in the Borrowdale Volcanic Group. The most important are shown on the map, including the most extensive slate belt extending from Coniston north-eastwards to Kirkstone, and on which most of the currently active quarries are based. The eastward extension of this belt, which contains a number of disused slate workings, cannot be defined until mapping of the area is complete.

Blue-grey slate is mainly used for roofing and a regular even cleavage is required; the best quality slate is found where the cleavage is perpendicular to the bedding. The Wray Castle Formation is extensively worked at the Kirkby Slate Quarry.

The resource areas shown on the map have a number of limitations. Firstly, they are generally of rock at or near surface. Locally, and particularly in the major valleys, the resource may be covered by a substantial thickness of drift. Secondly, the intensity and regularity of the cleavage varies across the outcrop or may be affected by intrusions or fracturing. The areas shown on the map thus provide only an indication of where suitable material may occur.

Gypsum / Anhydrite

Gypsum ($CaSO_4.2H_2O$) and anhydrite ($CaSO_4$) are naturally occurring forms of calcium sulphate which normally occur as beds or nodular masses up to a few metres thick. Gypsum is formed by the hydration of anhydrite at or near surface but passes into anhydrite at depth. Anhydrite is, therefore, much more extensive than gypsum.

In Cumbria, gypsum/anhydrite beds occur within mudstones of late Permian age (Eden Shales - St Bees Shales). Commercial extraction, mainly by underground mining, has been confined to two main areas; the Vale of Eden, and west Cumbria, near Whitehaven. Anhydrite was formerly mined on a large scale in both the Vale of Eden and at the Sandwith Mine, near Whitehaven for the manufacture of sulphuric acid. This process is no longer viable and mining operations for this use ceased in the mid-1970s. Today anhydrite is produced on a small scale at the Newbiggin Mine, near Kirkby Thore, for cement manufacture and specialist applications.

Gypsum production has been confined to the Vale of Eden, in an area extending to the southern part of the Carlisle Basin. Current production is now confined to the Birkshead Mine, near Kirkby Thore. Output has declined because of the availability of desulphogypsum from the Drax coal-fired power station in Yorkshire. Gypsum is used principally in the manufacture of plaster and plasterboard. A mixture of gypsum/anhydrite is also used as a retarder in the manufacture of cement.

Resources of gypsum/anhydrite occur only within the Eden Shales - St Bees Shales and these formations are shown on the resource map in the Vale of Eden and west Cumbria. The formations also occur in south Cumbria and in the Carlisle Basin but are unlikely to be of commercial interest in the foreseeable future and are not shown on the map. In the Vale of Eden the inferred outcrop of one or more of the evaporite beds has also been shown where data are available. Anhydrite is highly unlikely to be of economic importance as a large-scale source of sulphur in the foreseeable future. It is anticipated, therefore, that future interest will be directed principally at gypsum and thus on beds that are close to outcrop.

Halite

Halite ('rock salt', NaCl) occurs interbedded with mudstones in the Triassic Mercia Mudstone Group on Walney Island and beneath the Walney Channel and parts of western Barrow-in-Furness. The highest and thickest salt-bearing horizon (up to 110 m) is continuous with the Preesall Salt of west Lancashire. The Walney Island salfield supported a small brine pumping industry in the early part of the 20th century. However, the deposits are highly unlikely to be of economic interest in the future, either as a source of salt or for the development of storage cavities, because of the presence of wet rock-head (upper surface subject to solution) and the fact that individual halite beds are relatively thin.

Crushed Rock Aggregate

Igneous rocks and hard sandstones are relatively widespread in Cumbria and some are sufficiently extensive, with desirable physical and mechanical properties, to form potential sources of crushed rock aggregate. However, many Cumbrian hard rock outcrops are too remote for commercial extraction and many also occur within the National Park. Igneous rocks and some sandstones are the source of high specification aggregates for road surfacing, due to their higher abrasion and polish resistance. However, production costs are higher for igneous rock and sandstone aggregates than for limestone, hence limestone is the preferred material for general purpose aggregate.

Igneous Rock

The Lower Palaeozoic igneous rocks in the area provide a large resource of crushed rock aggregate. Two main categories can be identified: fine-grained, dominantly extrusive volcanic rocks and coarse- to fine-grained intrusive rocks. The volcanic rocks form thick sequences in the northern and central Lake District, specifically the Eycott Volcanic Group and the Borrowdale Volcanic Group (BVG). Smaller areas of volcanic rocks occur in the Vale of Eden.

The BVG consists of a complex sequence of lavas, tuffs and sedimentary rocks composed of variably sized volcanic debris, which have widely differing rock properties. Andesite and basalt, which form the Eycott and the lower part of the BVG, have been relatively little worked as a source of aggregate. Andesites and basalts were formerly worked at Greenscoe, in the Furness inlier, south Cumbria. Tuffs are a major component of the upper BVG and certain types, such as the coarser welded tuffs, can produce high specification aggregate with very high polished stone values. This lithology is quarried at Ghyll Scaur, near Millom, for road surfacing materials. Knock Pike Quarry, in the Cross Fell inlier, formerly produced a similar material, again from the upper BVG.

Of the coarse- to fine-grained, acid intrusive rocks, the largest bodies are the Eskdale and Ennerdale granites of the western Lake District. Smaller bodies that have been exploited include the Shap Granite, now a source of dimension stone, the Threlkeld Microgranite, worked for aggregate until 1980, and smaller intrusions of diorite, formerly worked at Embleton. Some rocks surrounding these intrusions have been baked by the heat of the magmas and converted into hard durable rocks called hornfels. The best example is at Shap Blue Quarry which exploits BVG andesites hornfelsed by the Shap Granite, and which are quarried to produce road surfacing, concrete products and railway track ballast. Basic intrusive rocks occur on Carrock Fell (gabbro) and around Haweswater (gabbro and dolerite) and, in addition, there are numerous small intrusions of dolerite, diorite and basalt, including the Whin Sill, which crops out along the Pennine escarpment and near Brampton.

Sandstone

Traditionally valued for building purposes in Cumbria, the largest present day use of sandstones is in the aggregates industry, although relatively few sandstones in Cumbria are suitable enough to form important aggregate resources. In general older, more indurated sandstones offer better potential sources where they are not weathered. Hard sandstones containing mineral and rock fragments cemented in a clay matrix are referred to as a greywackes and this rock is typically highly resistant to polishing and has high polished stone values. Hence they are particularly valued as sources of high quality, skid resistant, high specification aggregates used for road surfacing. Such greywackes occur both within parts of the Skiddaw Group and, more extensively, within the Windermere Supergroup. The Ordovician Skiddaw Group sandstones are found in the northern Lake District but have not been worked as a source of aggregate. The greywackes of the late Ordovician to Silurian Windermere Supergroup crop out mainly in the southern Lake District, with the thickest accumulations of sandstones in the Coniston Group and the Kirkby Moor Formation. These are shown on the map. Greywackes within the Kirkby Moor Formation are quarried near Kendal for high specification aggregate.

Coal

The Coal Measures rocks of the West Cumbrian Coalfield have been the principal source of coal in the county. An isolated outcrop of Coal Measures rocks in the north-east of the county, around Midgeholme, has also been worked. Smaller amounts of coal have been, and continue to be, raised from pre-Coal Measures rocks in the north-east of the county. Future commercial interest in coal is likely to be confined to those deposits suitable for opencast extraction.

The main West Cumbrian Coalfield extends from Whitehaven, through Workington and Maryport, and thence eastwards to Aspatria and Bolton Low Houses. Coal Measures crop out east of this point but there is a progressive reduction in the number of seams and a marked deterioration in quality due to oxidation, which makes this part of the outcrop unworkable. These easterly Coal Measures, including poorly known Coal Measures rocks in the Vale of Eden, have been excluded from the map.

Deep-mining ceased in the West Cumbrian Coalfield with the closure of Haig Colliery at Whitehaven in 1984. An attempt to re-start underground mining at the Main Band Colliery near Whitehaven has so far proved unsuccessful. Large-scale opencast mining began in West Cumbria in 1958. Since then several large sites have been worked and extraction is currently taking place at Keekle Head, near Distington. The extent of the exposed coalfield, comprising closely-spaced coal seams within the Lower and Middle Coal Measures, is shown on the map.

Coal has also been produced from seams lower in the Carboniferous succession. The most important is the Little Limestone Coal, which lies beneath the limestone of that name in the Caldbeck and Alston areas. It is currently mined in the Alston area, although only the small Clarghyll Colliery falls in Cumbria. The coal is shown as a subsidiary resource on the map.

Building Stones

A wide range of igneous, metamorphic and sedimentary rocks has been quarried in Cumbria for local use and a number has been exploited on a commercial basis.

Igneous

A variety of igneous rocks is found in Cumbria and is worked for aggregate but some have also been worked for building and decorative use. The Eskdale Granite (pink) and Threlkeld (grey) microgranites have been used for wallstone, but it is only the Shap Granite, quarried on Wasdale Fell, that has been exploited commercially for building and decorative purposes on a significant scale.

Sandstones

Lower Palaeozoic sandstones are now principally quarried for roadstone but have been widely used in the past for wallstone. Upper Palaeozoic and Triassic sandstones are the principal source of building sandstone quarried in Cumbria today. Carboniferous sandstones from the Millstone Grit Group were worked at Lamonby and Greystoke but are now only quarried near Nenthead and Whitehaven. The Permian Penrith Sandstone is quarried for building stone from quarries around Lazonby Fell, near Penrith. The Triassic sandstones of the St Bees Sandstone Formation are quarried around St Bees headland and, formerly, at Shawk Stone Quarry near Carlisle.

Limestones

Carboniferous limestones in the Kendal and Kirkby Lonsdale areas have been extensively used in the past for local building stone and three quarries still work the limestone for building purposes near Orton. Beds of fossiliferous limestone are worked at Ulverston for decorative rock and ashlar.

Secondary Aggregates

The term 'secondary aggregate' is used to describe a range of materials which may be used as aggregate but which arise as wastes from a variety of activities. These may be considered under three main headings:

- Naturally occurring materials arising from mineral extraction and processing activities such as slate waste, colliery spoil, overburden and quarry/processing waste. Significant volumes of slate waste are present in Cumbria, derived in part from the roofing slate industry. Crushed and graded material can be used for Type 1 and 2 sub-base, large blocks for armour stone and smaller blocks for rip rap, drainage blankets, trench backfill, capping and binding layers as well as bulk fill for construction. The most extensive areas of slate waste are those in the Kirkby-in-Furness area.
Colliery waste is mainly siltstone and mudstone but, in Cumbria, most old tips have been reclaimed or restored and hence sterilised in terms of resource potential. Ironstone tips have been worked for aggregates but are mostly restored, although some large tips remain. Small waste tips from former base metal mining operations occur in some areas but these have variable compositions and the presence of sulphides presents a pollution risk if disturbed.

- Materials arising from industrial processes, such as slags and power station ash. Iron and steel manufacture has ceased in Cumbria but small amounts of slag are still worked at Derwent Howe in Workington. There are no coal fired power stations in Cumbria hence no supplies of pulverised fuel ash or furnace bottom ash.

- Construction and demolition wastes, which may either be natural or manufactured, such as highway arisings, road sub-base, concrete rubble and masonry. These are not considered further here.

Apart from slate waste there are limited resources of secondary aggregates in Cumbria.

Coalbed methane

Methane contained within coal is known as coalbed methane and is a potential source of energy. The gas content, permeability and total thickness of coal within the West Cumbrian Coalfield suggests that the coalfield could rate amongst the best coalbed methane prospects in England. However, former deep mining operations will have desorbed methane over extensive areas and exploration would need to be focused on virgin strata. A detailed study of mine plans would be required to determine whether any good prospects remain. The concealed extension of the Canonbie Coalfield appears to have good prospects but there is no information on coal seam permeability. The artificial voids left in abandoned coal mines are potential sources of 'coal mine gas'.

Conventional hydrocarbons

The Carboniferous Northumberland / Solway Basin occurs in the northern part of Cumbria. The basin has gas-generating potential but oil-generating potential has not been proved. However, much of any oil and gas generated may have been lost already and, with a lack of good reservoir rocks, the prospects are not encouraging. Exploration activity to date in Cumbria has not been successful.

- County boundary
- National Park boundary (Lake District, Yorkshire Dales)
- Hydrocarbon Well
- PEDL — Petroleum Exploration and Development Licence issued under the Petroleum (Production) Act 1934 (as at Feb., 2000)
- Exposed Coal Measures
- Concealed Coal Measures
- Concealed Coal Measures (speculative - not proven)
- OCTAGON: Octagon (CBM) Ltd

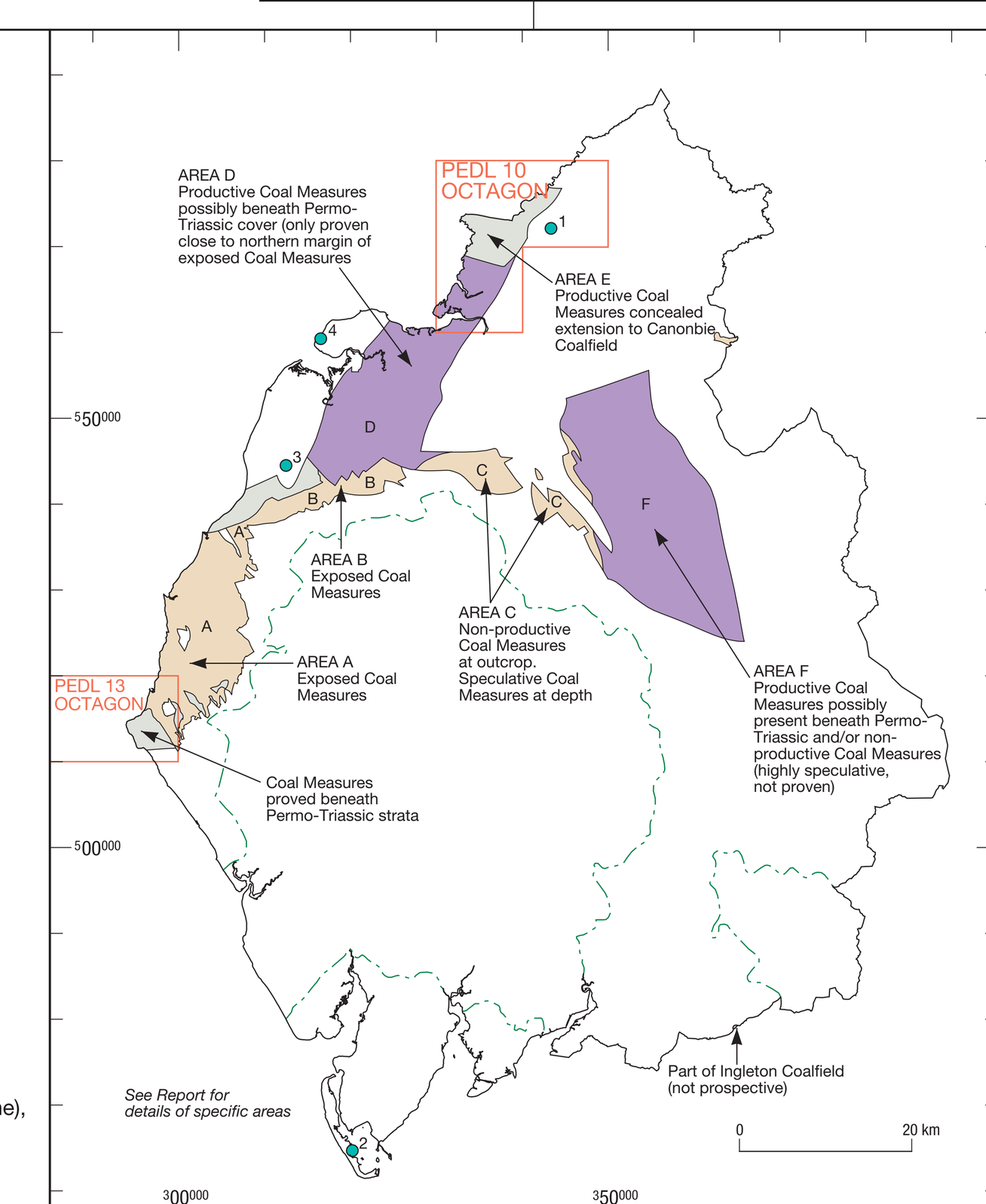
HYDROCARBON WELLS OF CUMBRIA

1 **EASTON 1**
Operator: Edinburgh Oil & Gas
Start date: 06.05.1990
Tested: Lower Carboniferous (Dinantian)
Terminal depth: 2200 m
Status: Plugged and abandoned with minor gas shows in Lower Border Group

2 **BIGGAR 1**
Operator: Ultramar
Start date: 19.10.1990
Tested: Triassic (Mercia Mudstone Group, Sherwood Sandstone Group)
Terminal depth: 644.6 m
Status: Plugged and abandoned dry hole

3 **WESTNEWTON 1**
Operator: Enterprise Oil
Start date: 02.04.1989
Tested: Triassic (Sherwood Sandstone)
Upper Carboniferous (Namurian)
Lower Carboniferous (Dinantian)
Terminal depth: 2044 m
Status: Plugged and abandoned dry hole

4 **SILLOTH 1A**
Operator: Ultramar
Start date: 11.06.1973
Tested: Triassic (Mercia Mudstone Group, Sherwood Sandstone Group)
Permian (St. Bees Shale, Penrith Sandstone), Carboniferous
Terminal depth: 1342 m
Status: Plugged and abandoned dry hole



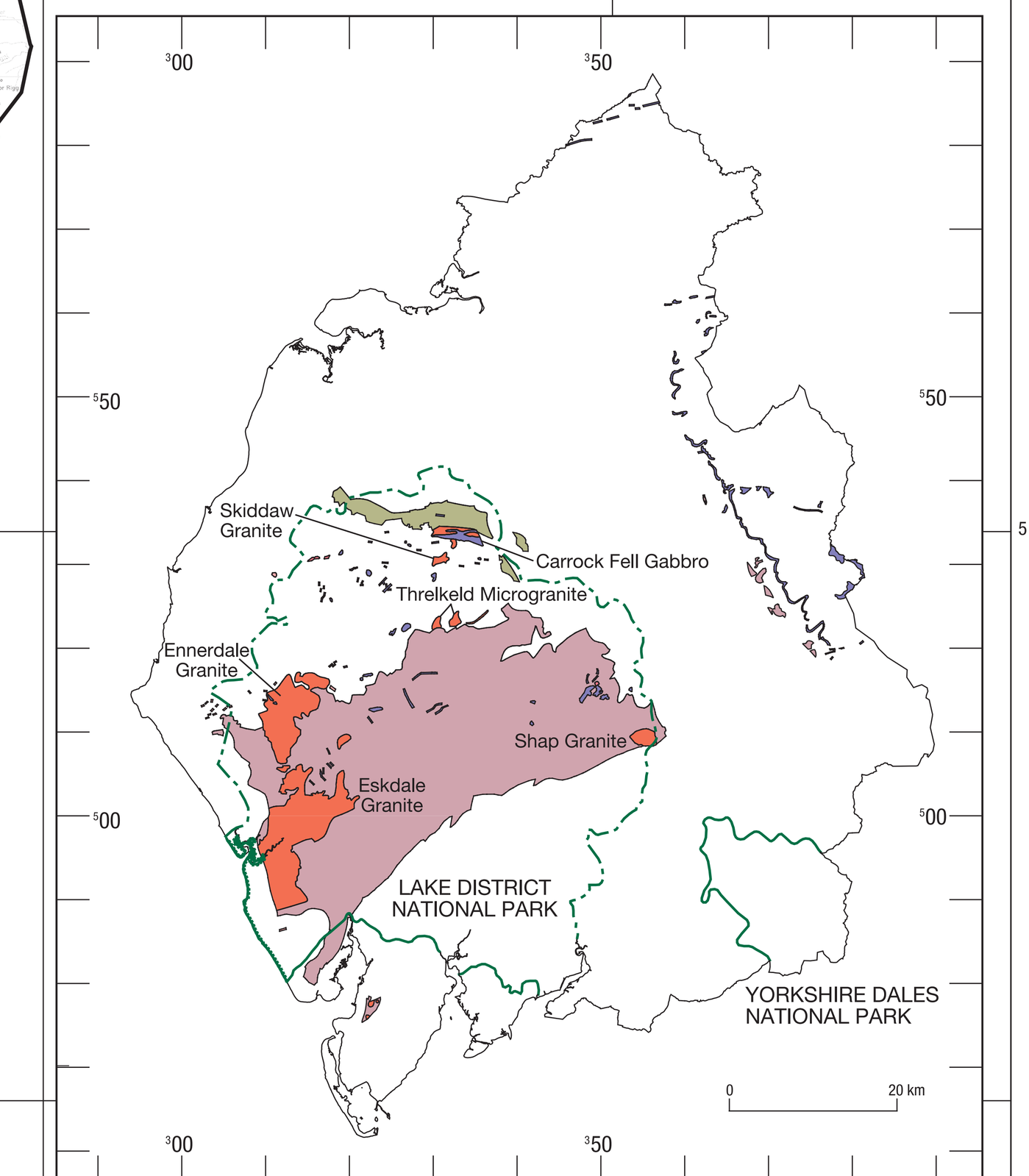
Clay and Shale, and Fireclay

Clay and shale are used mainly in the production of structural clay products, such as facing and engineering bricks, pavers, clay tiles and vitrified clay pipes. Brick manufacture is the largest tonnage use. Clay bricks are produced at one small plant in Cumbria, at Askham-in-Furness and the clays used are weathered mudstones from the Ordovician Skiddaw Group, quarried at High Greenscoe.

Fireclays occur as the seatearths, or fossil soils, beneath coal seams and resources are confined to coal-bearing strata. The close association of coal and fireclay means that opencast coal sites are one of the few viable sources of the clay. Resources are, thus, coincident with opencast coal resources. Fireclays were valued as refractory raw materials but demand has fallen markedly since the late 1950s. Fireclays with low iron contents are now valued for the production of buff coloured bricks and pavers and are usually recovered as by-products of opencast coal operations. Only small amounts of fireclay are currently produced from opencast coal operations in Cumbria.

Limestone

Cumbria is an important source of limestone, with some 4.4 million tonnes quarried in 1999. Most is consumed in the construction industry as aggregate or fill, but high purity types are used in iron and steel manufacture and in the chemical industry. Limestones are a significant component of the geology of Cumbria, with examples from Ordovician up to Jurassic age. However, large scale extraction of limestone is now restricted to those of Carboniferous age, notably the Lower (Dinantian) and Upper (Namurian) sequences and it is within these that resources are located. Many limestones are too thin to support modern quarrying and only limestone units with a consistent thickness >10m are generally included. Where modern mapping is unavailable, e.g. between Shap and Ravenstonedale, the boundaries defined by Garrison (1912) and Harrison et. al. (1991) are used. High purity limestones (>97% $CaCO_3$) are identified separately. The main resource areas lie to the west and southwest of the Eden Valley. In south Cumbria, high purity limestones include the Red Hill Oolite, the Park and Urswick limestones. The last is the most actively quarried, mainly for aggregates, and both the Park and Urswick limestones are quarried at Dalton-in-Furness for industrial purposes and as aggregate. In central Cumbria, limestones dominate the Lower Carboniferous succession with the Scandal Beck, Ashfell and Knipe Scar limestone formations reaching up to 180 m in thickness. The overlying Namurian succession also includes the 20 m thick Great Limestone. The Knipe Scar and Potts Beck limestones are of high purity and the former has been extensively quarried, and is still worked at Hardendale Quarry, for the steel industry as well as for aggregate. In west Cumbria, limestones occur between Whitehaven and Cockermouth in a 200 m thick succession of Lower Carboniferous strata which is more argillaceous than that to the east and south. The Fourth and White limestones have the highest purity. In the Caldbeck-Penrith area, both the Lower Carboniferous (the White, Fifth, Sixth & Seventh) and Namurian limestones (First) form units >10 m in thickness. In the Pennines, several thick limestone formations occur within the Alston Group, including the Melmerby Scar, the Great Scar and the Robinson limestones, all of which are also classed as high purity limestones. In north Cumbria, most Lower Carboniferous limestones are too thin to be exploited. Exceptions are the Penton/Greengate Well, the Harelawhill and the Buccleugh limestones, although these outcrop in a very restricted area in the Liddell Water Valley. The Namurian Catsbit Limestone is also > 20 m thick but again is restricted in area of outcrop.

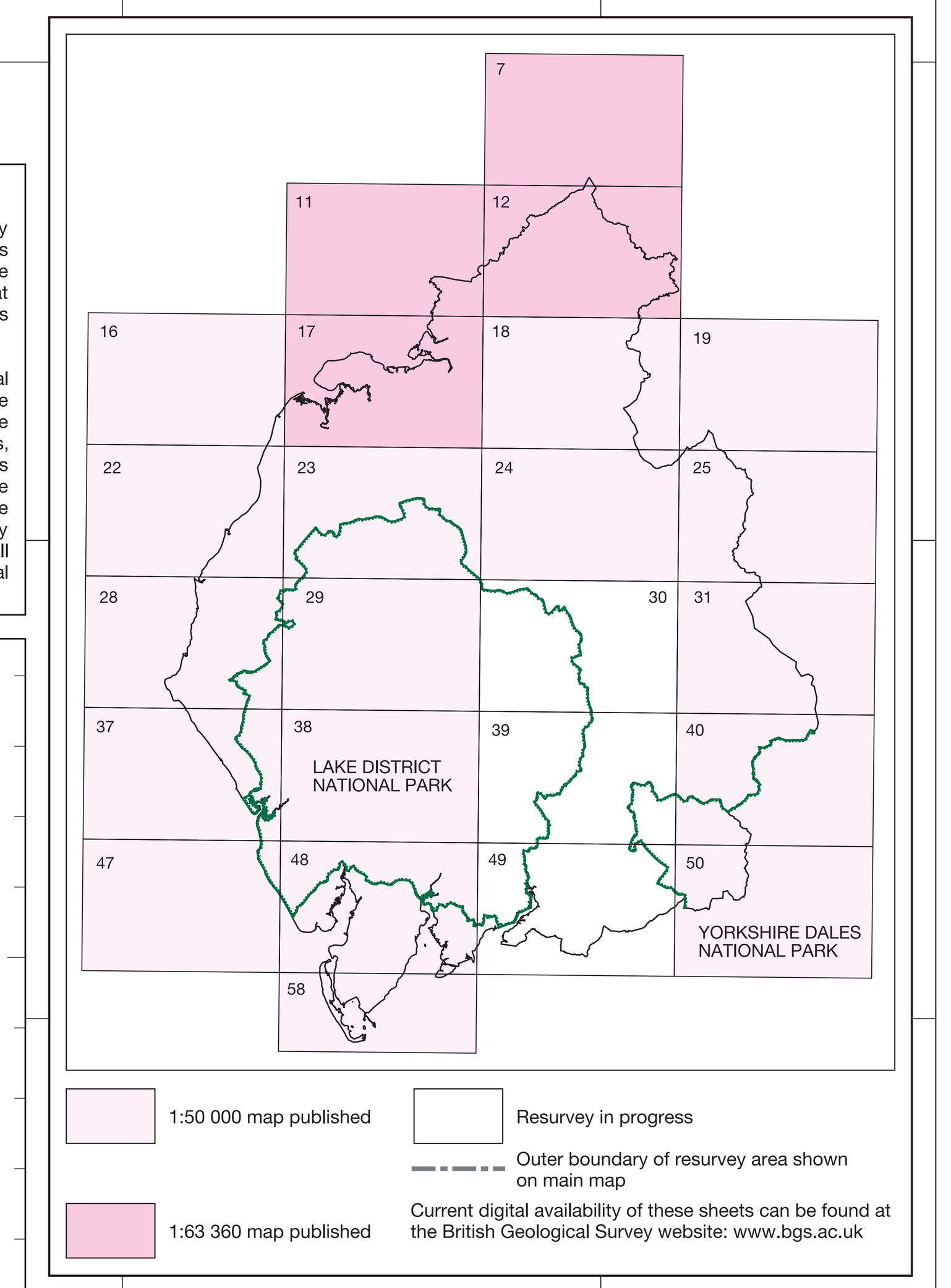


Igneous Rock Resources

Igneous rocks have an extensive outcrop in Cumbria. Most are remotely located and, except for those that are currently worked, are only shown on the inset map.

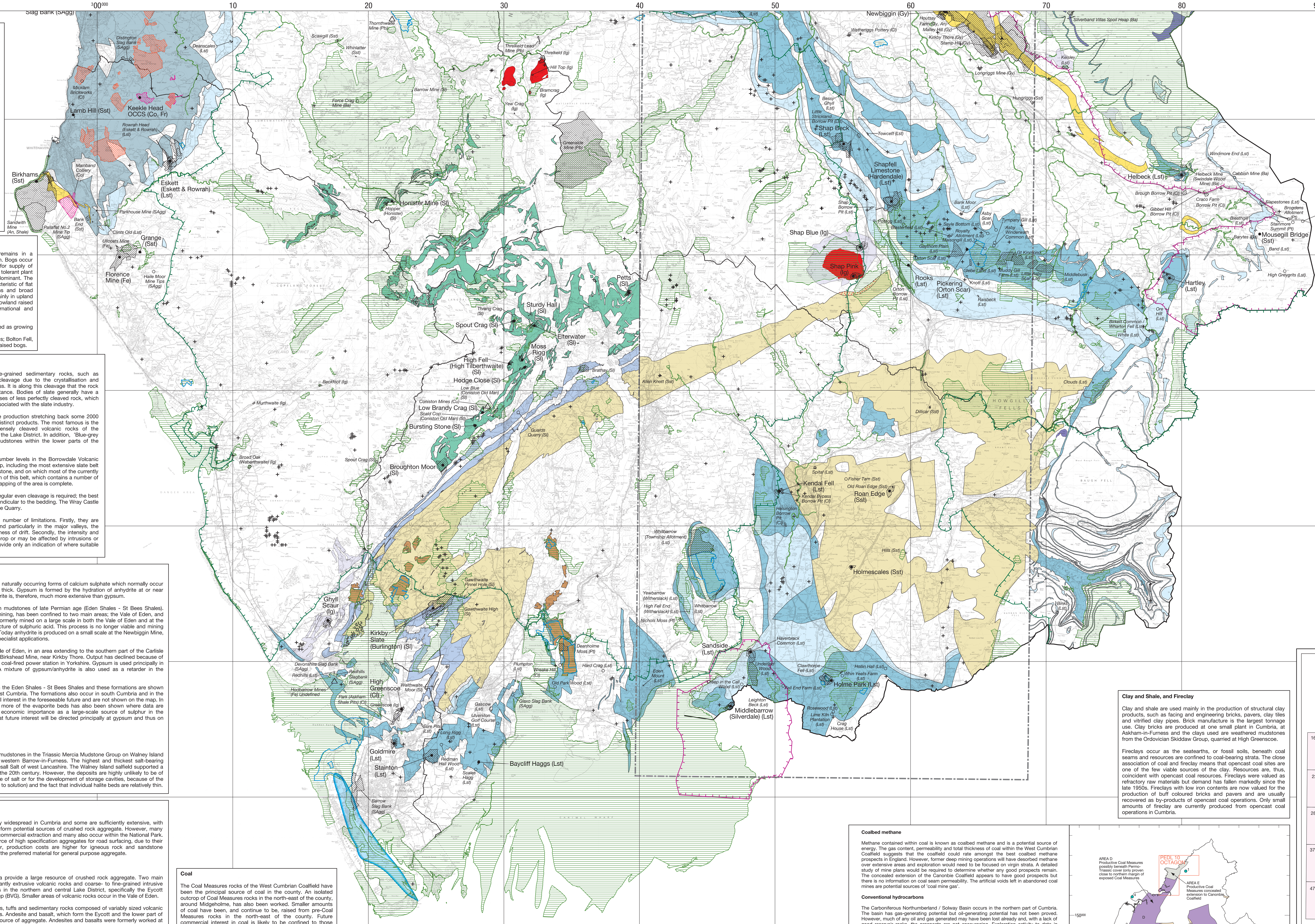
Volcanic (Extrusive) Rocks
- Eycott Volcanic Group - mainly andesite
- Borrowdale Volcanic Group - mainly andesite, tuff and volcanic sandstones

Intrusive Rocks
- Acid and intermediate rocks - mainly granitic and diorites
- Basic rocks - mainly gabbro and dolerite



- 1:50 000 map published
- Resurvey in progress
- Outer boundary of resurvey area shown on main map
- 1:63 360 map published

Current digital availability of these sheets can be found at the British Geological Survey website: www.bgs.ac.uk.



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