County Durham Plan

Minerals Technical Paper

2019






Altogether better

Durham County Council

1 Introduction

1.1 The purpose of the Minerals Technical Paper is to set out evidence in relation to minerals, to underpin the development of the new statutory development plan for County Durham. It should be noted that the technical paper does not contain all of the minerals evidence, in this regard detailed evidence on aggregates is also set out in the Joint Local Aggregate Assessment for County Durham, Northumberland and Tyne and Wear, (December 2018). Furthermore, it should be noted that there are also a range of other documents and reports which have been previously published by the British Geological Survey and other organisations which form part of a wider evidence base for minerals planning in County Durham and which will be relied upon as and where necessary.

The County Durham Plan and Minerals and Waste Policies and Allocations Document

1.2 All councils are expected to have what's known as a Local Plan, ours will be called the County Durham Plan. Once in place, the County Durham Plan will set out the new development planned for the county, where it will take place and how it will be managed. This will include potential sites for businesses and houses as well as everything that supports them, such as roads, shops, utilities and education. The plan will also contain policies for how we determine planning applications. It is our intention that the the main County Durham Plan document will set out strategic policies for minerals and waste in County Durham over the Plan period to 2035 and will:

- Identify the scale of future minerals extraction and waste management capacity that will need to be accommodated within the County over the plan period.
- Set out where and when new provision will be necessary;
- Provide clear guidance to enable site specific allocations and planning applications to be considered in both locational and criteria based terms; and
- Allocate strategic sites for new minerals and waste development, where considered necessary.

1.3 In addition it is our intention that a Minerals and Waste Policies and Allocations document will complement the minerals and waste policies of the County Durham Plan. Through its policies and provisions it will set out specific policies for a number of minerals not addressed by the County Durham Plan such as all conventional and unconventional forms of oil and gas, vein minerals and will contain detailed development management policies for minerals and waste and in addition, if necessary, will allocate any non strategic mineral or waste site which are required to meet the longer term need.

1.4 Following the adoption of the County Durham Plan and in the interim until the Minerals and Waste Policies and Allocations document is adopted, planning applications for new mineral working and waste development will be determined in accordance with the minerals and waste policies in the County Durham Plan document and other relevant policies in that document and by saved policies of the County Durham Minerals Local Plan (December 2000) and the County Durham Waste Local Plan (April 2005). Once adopted the policies and provisions of the Minerals and Waste Policies and Allocations document will replace any remaining saved policies of the County Durham Minerals Local Plan and the County Durham Waste Local Plan.

1.5 The Minerals and Waste Policies and Allocations document will be progressed following adoption of the County Durham Plan. The timescale for the preparation of the Minerals and Waste Policies and Allocations document is explained within the Council's current Local Development Scheme which was published in November 2017[(i)].

Joint Consultation and Research Reports produced by Durham County

1.6 In order to accord with the National Planning Policy Framework (NPPF), the Council is required to prepare an annual Local Aggregate Assessment. In order to comply with this requirement and as part of work to ensure that the Council is working constructively and in partnership with neighbouring authorities under the Duty to Cooperate the Council has worked with other Councils within Northumberland and Tyne and Wear to produce five Joint Local Aggregate Assessments. Following consultation with relevant stake holders including neighbouring Councils, Aggregate Working Party's and the Minerals Industry and their representatives the most recent Joint Local Aggregate Assessment was finalised in December 2018. This Technical Paper seeks to incorporate relevant updated information emanating from this report.

i The County Durham Local Development Scheme can be accessed here: https://www.durham.gov.uk/article/7440/About-the-County-Durham-Plan

2 Minerals

Why are minerals important?

2.1 Minerals are a fundamental natural resource. Virtually everything we use is made of minerals, requires minerals in its manufacture or depends on minerals for its operation. They are vital to modern economies. Without minerals and mineral extraction life would be very different. The importance of planning for minerals is also explicitly set out in the National Planning Policy Framework (July 2018), 'It is essential that there is a sufficient supply of minerals to provide infrastructure, buildings, energy, goods that the country needs'.

2.2 County Durham is fortunate in having a very complex geology. As a direct result of this geology the County has been blessed with an abundance of both energy and non-energy mineral resources. Some of these minerals are of national or regional importance. Many of the minerals worked from County Durham's quarries are essential in enabling the construction industry to deliver new built development including new homes[ii], shops, offices, factories, hospitals, schools, flood and coastal defences and maintain the built fabric of existing communities, maintain and build new transportation infrastructure including roads[iii], as a use of fuel for electricity generation and in agriculture to improve the productivity of soil. County Durham also contains important reserves of industrial minerals which are nationally scarce and are essential for a range of industrial operations including steel production and glass manufacture.

2.3 County Durham has a long and distinguished history of mineral working. Indeed to many people the County's name is synonymous with mineral working, especially with coal mining. In this respect in the early 20th Century, County Durham was one of the world's greatest sources of coal. The millions of tonnes of coal extracted fuelling a range of industries, railways and shipping locally and across the world. In this respect coal mining is widely recognised, more than any other industry in shaping the landscape, economic, political and cultural heritage of the central and eastern part of the County. Indeed many of the County's settlements owe their existence to the coal industry, originating as coal mining settlements.

ii An average house consumes around 60 tonnes of aggregate (crushed rock or sand and gravel). This is about 3 lorry loads. Quarry products play their part from the foundations right the way up to tiles on the roof. Bricks and tiles are made from clay. The mortar than bonds bricks is made from sand, lime and cement. The foundations and blocks are made of concrete, a mixture of cement, aggregates and water. The plaster is made from gypsum. The glass in windows is made from sand. In addition quarry products are used for footpaths and access roads. (Source, Quarry Products Association, 2008).

iii Aggregates are used to make asphalt for our roads. In addition the road structure is made from aggregates.

2.4 While coal is no longer 'king' in County Durham and minerals extraction is no longer the County's main economic activity or the County's principal source of employment, a very wide range of minerals continue to be worked in the County. The continued extraction of minerals is essential. Without the continued extraction of a range of minerals such as magnesian limestone, carboniferous limestone, dolerite, sand and gravel, brick clay, fire clay and building stone it would be very difficult for the construction and building industry to deliver the new housing and employment development which the Council is required to plan and deliver through the County Durham Plan.

2.5 Many of the minerals worked in the County are also important in that they help to ensure that the character and aesthetics of the County' settlements are maintained. For example, by ensuring the ongoing supply of bricks with certain aesthetic properties or local building stone which reflects local building styles. Brick clay extracted in County Durham produces 'red bricks' which are common in many of the villages in the central and eastern parts of County Durham, while buff coloured bricks are based upon a blend of brick clay with fireclays. Similarly, much of the distinctive character of many of the settlements and countryside in the west of the County has been created through the use of locally sourced natural building and roofing stone.

Employment in Mining and Quarrying

2.6 Mineral extraction has historically played an important role in economic development both nationally and locally, but this sector has experienced significant job losses over the past couple of decades. Within County Durham this been mainly due to the curtailing of deep coal mining together with substantial gains in productivity through increased mechanisation and automation in the quarrying industry. Compared to the early 20th Century when over 100,000 men were employed in the County's deep coal mines and quarries the number of jobs provided by mineral extraction in the County is now relatively small. Nevertheless, mineral working does still make an important contribution to the local economy through direct and indirect employment and the purchase of supplies and services. The Business Monitor[iv] PA1007, covering Mineral Extraction in Great Britain (March 2016), indicated that 467 jobs[v] were provided by mineral extraction in County Durham in 2014. This figure included 100 employees directly employed and 317 drivers and 50 contractors. Unfortunately, no further editions of the Business Monitor has been published.

2.7 It is assumed that employment in mineral working in County Durham has now risen since 2014, as the economy has now left the period of recession caused by the 2008 financial crises and because additional mineral sites are now in production. For example, coaling started at both

iv Mineral Extraction in Great Britain is a business monitor which presents the results of the Annual Minerals Raised Inquiry conducted by the Office for National Statistics (ONS).

v The figures show the number of persons employed directly and indirectly during the week ending 7 September 2014 (or in the nearest normal working week) who were subject to the provisions of the Mines and Quarries Acts 1954 and 1969. Included are working proprietors, drivers of external and internal haulage and other vehicles (whether or not on the quarry payroll) and persons employed by contractors and sub-contractors to carry out drilling, blasting, plant installation and modification etc. (excluded are persons who were employed on any operations subject to the provisions of the Factories Act 1961). Where more than one mineral is extracted at a mine or quarry, all employment is attributed to the chief mineral (in terms of tonnage sold). Please note due to the way information is collected by ONS the employment figures include all employment in Durham and Darlington.

the Field House and the Bradley surface mined coal sites in 2018, together in total both sites have created an additional 80 direct jobs and 24 indirect jobs. In addition it is also understood that at least a further 15 jobs have now been created as a result of sand and gravel working starting at the Low Harperley sand and gravel site near Wolsingham in 2016.

3 Minerals Policy Context

3.1 Following the changes made to the planning system by the coalition Government national planning policy guidance relating to the 'winning and working' of minerals is now set out in the National Planning Policy Framework (NPPF) (which was first published in March 2012 and revised in July 2018) and the Internet based Planning Practice Guide (March 2014).

3.2 As set out above the Council intends to discharge the NPPFs requirements through the preparation of the County Durham Plan and a Minerals and Waste Policies and Allocations Document. Further detail of the Minerals and Waste Policies and Allocations Document is set out within chapter 6 of this technical paper.

Planning for future Minerals extraction

3.3 The NPPF requires (para 204) that in preparing Local Plans that Mineral Planning Authorities provide for the extraction of mineral resources of local and national importance, but not identify new sites or extensions to existing sites for peat extraction. The Glossary of terms accompanying the NPPF identifies that minerals of local and national importance are minerals which are necessary to meet society's needs, including aggregates, brickclay (especially Etruria Marl and fireclay), silica sand (including high grade silica sands), cement raw materials, gypsum, salt, fluorspar, shallow and deep-mined coal, oil and gas (including conventional and unconventional hydrocarbons), tungsten, kaolin, ball clay, potash, polyhalite and local minerals of importance to heritage assets and local distinctiveness. Through the County Durham Plan and the accompanying Minerals and Polices and Allocations Document the Council will seek to ensure that the Council identifies and include policies for the extraction of mineral resource of local and national importance.

Safeguarding

3.4 The NPPF requires (para 204) Mineral Planning Authorities safeguard mineral resources by defining Mineral Safeguarding Areas; and adopt appropriate policies so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development where this should be avoided (whilst not creating a presumption that the resources defined will be worked). It also requires Mineral Planning Authorities to set out policies to encourage the prior extraction of minerals, where practicable and environmentally feasible, if it is necessary for non-mineral development to take place.

3.5 The NPPF also requires (para 204) that Mineral Planning Authorities safeguard:

- safeguard existing, planned and potential sites for: the bulk transport, handling and processing of minerals; the manufacture of concrete and concrete products; and
- and the handling, processing and distribution of substitute, recycled and secondary aggregate material.

Aggregates

3.6 The NPPF requires (para 207) that Mineral Planning Authorities should plan for a steady and adequate supply of aggregates.

3.7 The approach to planning for aggregate minerals is underpinned by the Managed Aggregates Supply System (MASS). This seeks to ensure there is a steady and adequate supply of aggregate minerals to meet the needs of the construction industry and also to ensure that any geographical imbalances, in supply and demand are appropriately addressed at the local level. For example, in the North East of England, both County Durham and Northumberland are net exporters of aggregates to the more populated urban areas of Tyne and Wear and the Tees Valley, where suitable aggregate mineral resources are less abundant.

3.8 One of the key elements of the MASS involves mineral planning authorities preparing an annual Local Aggregate Assessment (LAA) either individually or jointly by agreement with another or other mineral planning authorities, based on a rolling average of 10 years sales data and other relevant local information, and an assessment of all supply options (including marine dredged, secondary and recycled sources); participating in the operation of an Aggregate Working Party (AWP) and taking the advice of that Party into account when preparing their LAA; and making provision for the land-won and other elements of their LAA in their mineral plans taking account of the advice of the Aggregate Working Parties and the National Aggregate Coordinating Group as appropriate.

3.9 National and sub-national guidelines for the provision of aggregate minerals are also published by central government to provide an indication of the total amount of aggregate the mineral planning authorities within each AWP cluster should seek to provide. The NPPF requires mineral planning authorities to take into account the published National and Sub National Guidelines on future provision which should be used as a guideline when planning for the future demand for and supply of aggregates. There is, however, no expectation that each AWP should meet the guidelines especially if the environmental cost of doing so is likely to be unacceptable. The most up-to-date guidelines for aggregates provision were published in June 2009[vi], although these guidelines are now seen by many mineral planning authorities to becoming increasingly dated to their age.

3.10 This current approach differs from way the MASS has previously operated. Previously the MASS had more of a 'top-down' approach and involved central Government issuing National and Regional Aggregate Supply Guidelines for aggregates provision, based upon forecasts of demand for aggregate minerals within each aggregate working party cluster. This approach then required each AWP to apportion the guideline to each mineral planning authority (or sub-region in some instances) in their area. The mineral planning authorities were then expected to make provision for this apportionment in their local development plan. The approach to MASS was amended to reflect the Government's localist approach to planning matters.

3.11 Paragraph 207 of the NPPF also requires that Mineral Planning Authorities should also:

- using landbanks of aggregate minerals reserves principally as an indicator of the security of aggregate minerals supply, and to indicate the additional provision that needs to be made for new aggregate extraction and alternative supplies in mineral plans;
- maintaining landbanks of at least 7 years for sand and gravel and at least 10 years for crushed rock, whilst ensuring that the capacity of operations to supply a wide range of materials is not compromised. In this regard it also advises that, longer periods may be appropriate to take account of the need to supply a range of types of aggregates, locations of permitted reserves relative to markets, and productive capacity of permitted sites;
- ensuring that large landbanks bound up in very few sites do not stifle competition; and
- calculating and maintaining separate landbanks for any aggregate materials of a specific type or quality which have a distinct and separate market.

Industrial Minerals

3.12 The NPPF advises (para 208) that minerals planning authorities should plan for a steady and adequate supply of industrial minerals by:

- co-operating with neighbouring and more distant authorities to co-ordinate the planning of industrial minerals to ensure adequate provision is made to support their likely use in industrial and manufacturing processes;

vi National and regional guidelines for aggregates provision in England 2005-2020: https://www.gov.uk/government/publications/national-and-regional-guidelines-for-aggregates-provision-in-england-2005-to-2020

- encouraging safeguarding or stockpiling so that important minerals remain available for use;
- maintaining a stock of permitted reserves to support the level of actual and proposed investment required for new or existing plant, and the maintenance and improvement of existing plant and equipment. It also advises that, these reserves should be at least 10 years for individual silica sand sites; at least 15 years for cement primary (chalk and limestone) and secondary (clay and shale) materials to maintain an existing plant, and for silica sand sites where significant new capital is required; and at least 25 years for brick clay, and for cement primary and secondary materials to support a new kiln.
- taking account of the need for provision of brick clay from a number of different sources to enable appropriate blends to be made.

Oil, gas and coal exploration and extraction

3.13 The NPPF advises (para 209) that Minerals Planning Authorities should:

- recognise the benefits of on-shore oil and gas development, including unconventional hydrocarbons, for the security of energy supplies and supporting the transition to a low-carbon economy; and put in place policies to facilitate their exploration and extraction
- when planning for on-shore oil and gas development, clearly distinguish between, and plan positively for, the three phases of development (exploration, appraisal and production), whilst ensuring appropriate monitoring and site restoration is provided for;
- encourage underground gas and carbon storage and associated infrastructure if local geological circumstances indicate its feasibility;
- indicate any areas where coal extraction and the disposal of colliery spoil may be acceptable;
- encourage capture and use of methane from coal mines in active and abandoned coalfield areas; and
- provide for coal producers to extract separately, and if necessary stockpile, fireclay so that it remains available for use.

3.14 In terms of coal the NPPF advises (para 210) that, planning permission should not be granted for the extraction of coal unless: a) the proposal is environmentally acceptable, or can be made so by planning conditions or obligations; or b) if it is not environmentally acceptable, then it provides national, local or community benefits which clearly outweigh its likely impacts (taking all relevant matters into account, including any residual environmental impacts).

3.15 Through the Local Plan and the accompanying Minerals and Polices and Allocations Document the council will seek to ensure that all forms of energy minerals that are necessary to address are addressed.

Environmental Criteria

3.16 The NPPF advises (para 204) that Minerals Planning Authorities should:

- set out criteria or requirements to ensure that permitted and proposed operations do not have unacceptable adverse impacts on the natural and historic environment or human health, taking into account the cumulative effects of multiple impacts from individual sites and/or a number of sites in a locality;

- when developing noise limits, recognise that some noisy short-term activities, which may otherwise be regarded as unacceptable, are unavoidable to facilitate minerals extraction; and

- ensure that worked land is reclaimed at the earliest opportunity, taking account of aviation safety, and that high quality restoration and aftercare of mineral sites takes place;

3.17 Through the County Durham Plan and the accompanying Minerals and Polices and Allocations Document the Council will seek to ensure that it sets out environmental criteria against which planning applications will be assessed and put in place policies to ensure worked land is reclaimed at the earliest opportunity.

4 County Durham's Geology

4.1 County Durham is a geologically complex County. A wide range of rocks and more recent sedimentary deposits are found throughout the County. The extent of potential mineral resources found within the County and available for extraction is defined by this complex geology.

4.2 In terms of its solid geology, the County consists principally of a succession from west to east of Carboniferous (between 354 and 290 million years ago) and Permian deposits (between 290 and 248 million years ago). Much older Ordovician rocks from around 495 and 443 million years ago also outcrop to a limited extent in the west of the County. All the geological strata in the County dip gently towards the east.

- Igneous rocks underlie much of the County. They tend to appear as either sills (horizontal strata) or dykes (vertical projections from sills, formed when semi-molten rock under pressure flowed into joints or weak points between other strata). The most famous of the igneous rocks in the County is the Great Whin Sill which is well exposed in Upper Teesdale and to a lesser extent in Weardale. It has been extensively quarried for crushed road aggregate. Outcrops of igneous rocks comprise approximately 2,523 hectares or about 1% of the surface area of County Durham.

- The rocks of Carboniferous age are divided into three main lithological groups - the Coal Measures (also known as Westphalian), millstone grit (also known as Namurian) and the carboniferous limestone series (also known as Dinantian).

- Westphalian rocks were formed during the Westphalian Epoch of the Carboniferous period between 316 and 306 million years ago. Westphalian rocks are commonly known as the coal measures after the coal seams which they contain. Because of their coal, iron ore and shale reserves the Westphalian rocks comprise one of the most economically significant parts of Britain's geology and were instrumental to the development of Britain as a world power during the late 18th and 19th centuries. Outcrops of Westphalian rocks comprise 75,227 hectares or approximately 34% of the surface area of County Durham.

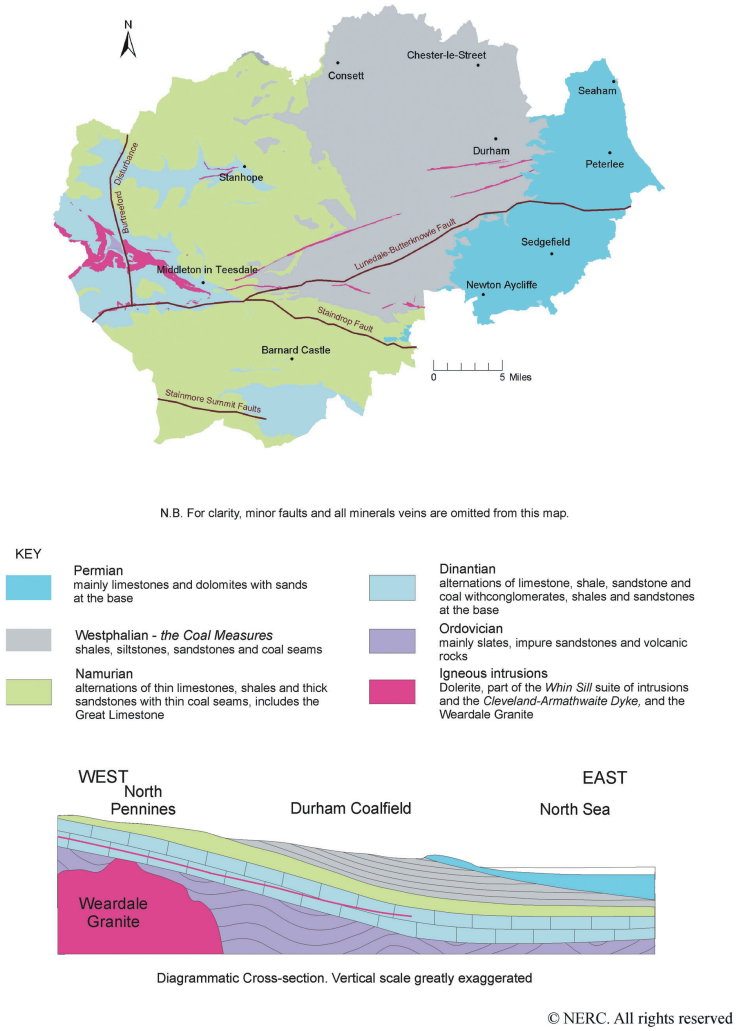
- Namurian rocks were formed during the subdivision or Epoch, of the Carboniferous period known as the Namurian, generally regarded as having extended from approximately 327 to 316 million years ago. Namurian rocks mainly comprise thick successions of hard, coarse-grained sandstones to which the term 'Millstone Grit' is commonly applied. The Millstone Grit, deriving its name from the suitability of its sandstone beds in Derbyshire for making millstones. While it is now recognised as the wrong term for the Namurian rocks in County Durham, 'Millstone Grit' is still used for ease of recognition. Outcrops of Namurian rocks comprise approximately 84,530 hectares, or approximately 38% of the surface area of County Durham.

- Dinantian rocks were formed during the Dinantian Epoch of the Carboniferous period. This period of earth history is generally believed to have extended from approximately 354 to 327 million years ago. Outcrops of Dinantian rocks comprise approximately 25,322 hectares or approximately 11% of the surface area of County Durham. They are mainly located in the upper parts of Teesdale and Weardale, with a further outcrop south of Barnard Castle.

Table 1 Rocks of the Carboniferous Age

Traditional Name	Modern name.	
Coal Measures	Upper Carboniferous	Westphalian
Millstone Grit		Namurian
Carboniferous Limestone	Lower Carboniferous	Dinantian

Figure 1 Geology of County Durham



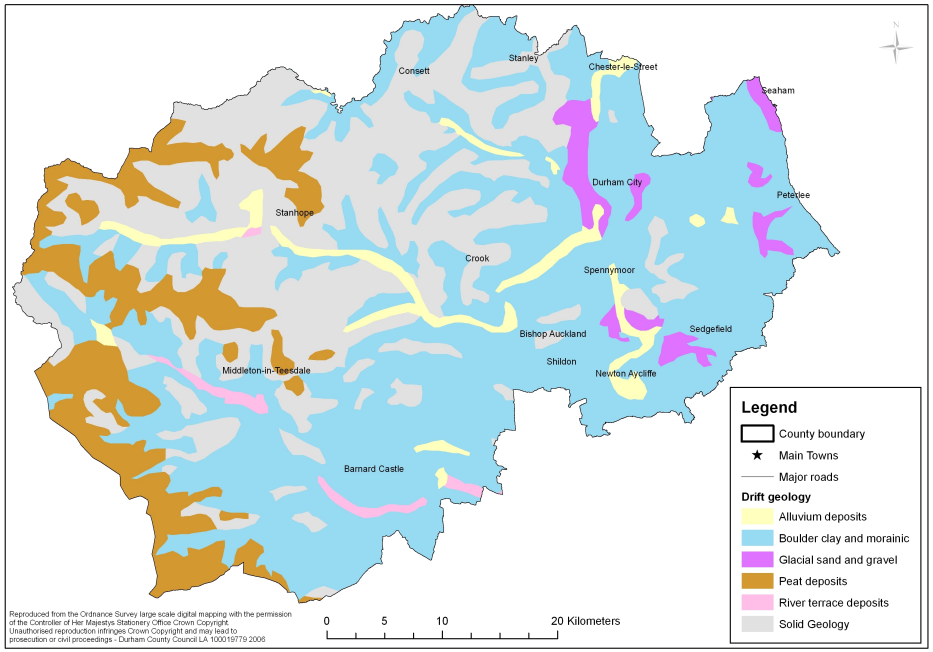
4.3 The carboniferous limestone (Dinantian) series is represented by alternative layers of sandstone, shale and relatively thin limestone bands, which outcrop in the west of Durham. The carboniferous sequence plays host to an ore field consisting of numerous mineral infilled fractures and although it is mainly developed in the carboniferous limestone and millstone grit (Namurian) to the west of the County, it also extends to the coal measures in the east. The Orefield consists of two distinct zones, with an inner zone centred on Weardale dominated by fluorspar, and an outer zone in which barytes is the dominant mineral. Lead ore occurs and has been exploited throughout the ore field, but the richest deposits occur within the outer fringes of the fluorspar zone. This ore field is unique in that it carries economic deposits of the rare mineral witherite.

4.4 Although generally well eroded in the upper reaches of west Durham, the millstone grit increasingly forms the fells and ridges between the main Dales to the east of a line between Blanchland and Middleton in Teesdale. The millstone grit series is represented by three groups of sandstone beds separated by shales, with a few thin coal seams.

4.5 The succession eastwards continues with the millstone grit being overlain by the Coal Measures (Westphalian), the division broadly corresponding with the easterly extent of the open moorland of west Durham. The Coal Measures extend to the east of the Wear Valley, where they are unconformably overlain by Permian rocks. Southwards the strata are thrown into strong undulations beyond the Butterknowle Fault and end in a sharp upraise beneath the magnesian limestone. These boundaries to the east and south mark the extent of the 'exposed' part of the Durham coalfield; the concealed part of the coalfield extends beneath the Permian strata eastwards across the County and beneath the North Sea. The Coal Measures consist essentially of beds of sandstone and shale with numerous coal seams of varying thickness. Ironstone is sometimes found as workable deposits in the strata between the coal seams and fireclay (seat earths) is sometimes found in conjunction with the coal seams. Over the lowlands of

the Wear valley and its tributaries the Coal Measures are generally covered by glacial drift (glacial till or boulder clay) deposits which give rise, from time to time, to deposits of sand and gravel and brick clay.

Figure 2 County Durham's Drift Geology



4.6 The eastern edge of the Wear lowlands is marked by the edge of the Permian rocks. These rocks were laid down during the Permian Period about 290 to 248 million years ago. The Permian rocks form a bold escarpment running in a north - south direction between Pittington and Ferryhill in County Durham and then south-westwards, with the escarpment gradually disappearing to the south of Shildon. To the north of Pittington, the escarpment gradually disappears towards Sunderland in Tyne & Wear.

The base of the Permian is represented by the Yellow Sands formation which outcrops north of Ferryhill and at various points around the escarpment. These were laid down under desert conditions and are found only in discrete deposits. Above the Yellow Sands Formation lies a thin bed of marl slate, itself overlain by deposits of magnesian limestone which consists of a variable mixture of the minerals dolomite and calcite. Where the mineral dolomite is the principal constituent and scarcely any free calcite is present, the deposit is referred to as a dolomite rock. The occurrence of such deposits of dolomite is mainly confined to the lower beds of the magnesian limestone, the occurrence of which within the County is restricted to the lower levels of the deposit between Ferryhill and Pittington. Throughout the remainder of the magnesian limestone series the rock ranges through varying degrees of dolomitised limestone to pure limestone. Eastwards from the escarpment, the magnesian limestone is extensively covered by glacial drift deposits, which occasionally give rise to deposits of sand and gravel and brick clay. Outcrops of Permian Rocks comprise approximately 35,273 hectares, or 15.8% of the surface area of County Durham.

4.7 Further detailed information on the geology of County Durham is set out in a number of reports including the County Durham Geo-diversity Audit and the British Geological Survey publication 'Mineral Resource Information for Development Plans – Durham and the Tees Valley: Resources and Constraints', (2000)[vii].

vii Mineral Resource Information for Development Plans – Durham and the Tees Valley: Resources and Constraints can be accessed from this webpage: http://www.bgs.ac.uk/mineralsUK/planning/resource.html.

5 Mineral Resources and Mineral Working in County Durham

5.1 In quantitative terms, the most important minerals currently extracted in the County today are known as aggregates. The British Geological Survey defines aggregates as being 'hard, granular materials which are suitable for use either on their own or with the addition of cement, lime or a bituminous binder in construction'. There are two main types of aggregates, crushed rock aggregates including magnesian limestone (with agricultural lime as a by-product); carboniferous limestone and dolerite (an igneous rock); and sand and gravel. Figure 3 below shows the distribution of current mineral workings in County Durham.

5.2 A range of other economically important non-aggregate minerals are also currently extracted including nationally important high-grade dolomite (suitable for use in the steel and chemical industries), natural building and roofing stone, brick-making raw materials (coal measures mudstone, glacial clay and fireclay), and surface mined coal. In addition a number of other minerals have been extracted in the recent past but are not currently worked including vein minerals, such as lead, fluorspar and barytes and silica sand used for casting mouldings in foundries and ganister (a high silica sandstone)[(viii)].

5.3 The following paragraphs provide a detailed overview of the broad extent of mineral resources in the County, the importance of individual minerals, their uses, information on recent sales and the location of individual mineral sites. The following are considered:

1. Aggregates – magnesian limestone (including high grade dolomite), carboniferous limestone, igneous rock (dolerite also known as whinstone), and sand and gravel;
2. Non aggregates – brick making raw materials (brickshale, fireclay, brick clay), natural building and roofing stone; ganister and moulding sand;
3. Energy minerals – coal, coal bed methane, oil and gas;
4. Vein Minerals – fluorspar and barytes; and
5. Other – peat.

5.4 This part of the evidence base is directly supported by Appendix B which sets out the location of County Durham's mineral sites.

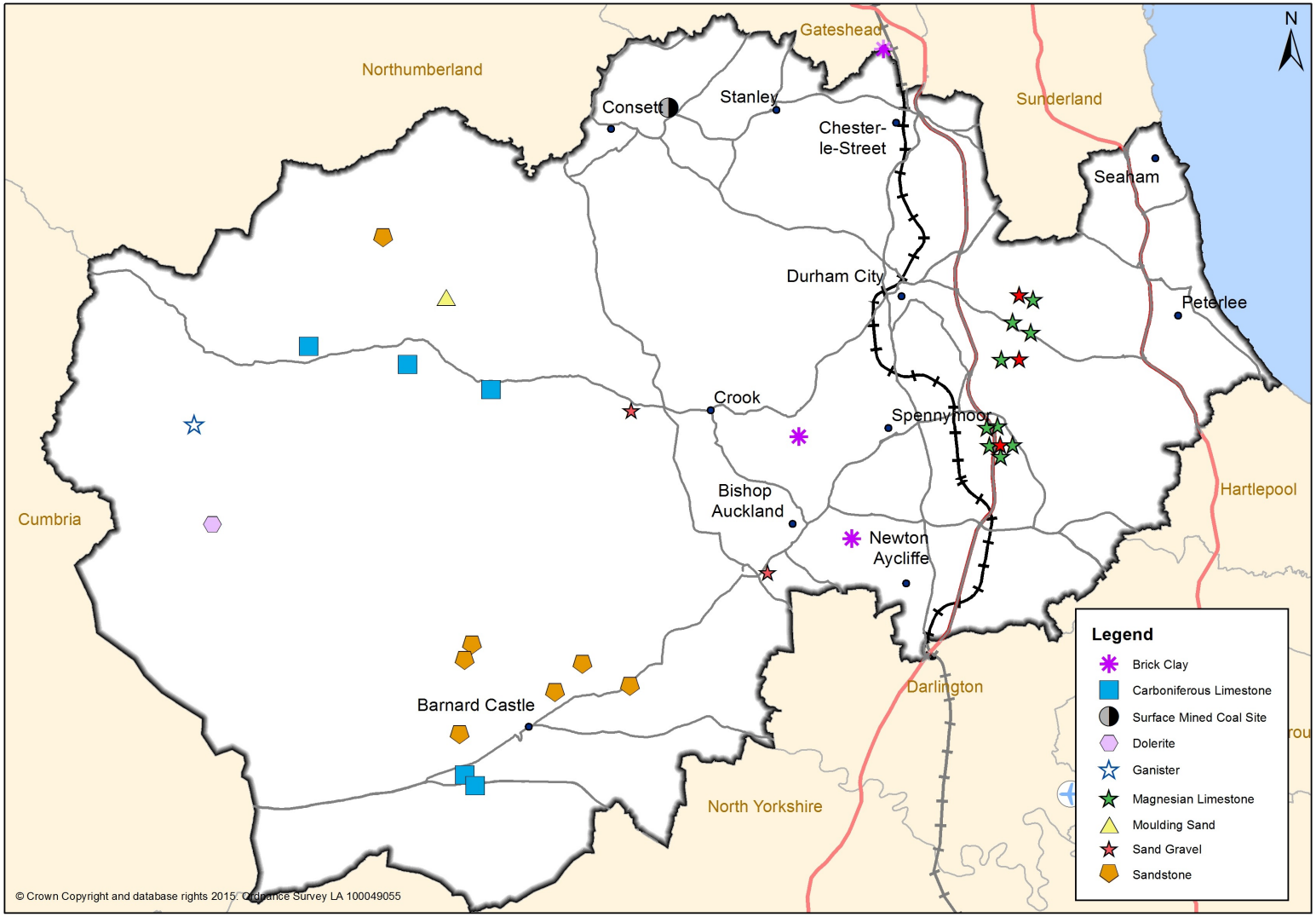
Aggregates (including high grade dolomite)

5.5 County Durham is a major aggregate producing County producing a range of types of crushed rock and sand and gravel. While sales have fallen over the last ten years due to the economic recession, County Durham was the major producer of aggregates in the North East of England in 2017 producing approximately 2,636,000 tonnes of crushed rock and 330,000 tonnes of sand and gravel.

5.6 County Durham's future potential to produce both crushed rock and sand and gravel is also significant. At the end of 2017 County Durham's crushed rock quarries contained approximately 130,745,000 tonnes tonnes of permitted reserves of crushed rock (equivalent to a landbank of 46.6 years (based on the annual demand forecast[(ix)]) and approximately 7,113,000 tonnes of sand and gravel (equivalent to a landbank 24.9 years (based on the annual demand forecast).

viii Ganister is being worked for building stone at Harthope Head Quarry near St Johns Chapel in Weardale.
ix See, Joint Local Aggregate Assessment for County Durham, Northumberland and Tyne and Wear (April 2018)

Figure 3 Mineral Sites in County Durham (excluding sites which require new conditions for working and restoration).



Limestone - an overview

5.7 County Durham is one of the major centres of limestone production in Great Britain. Two types of limestone are extracted: permian magnesian limestone and carboniferous limestone. Although both are limestones, the two types are different in terms of their physical properties and make up. This is related to the environment in which they were formed, as well as the types of materials that formed them.

5.8 Carboniferous limestone is harder and more durable in use. It resists weathering and can be used in situations where it is frequently exposed to precipitation and freezing. Accordingly, it is used predominantly for such things as road building and maintenance and concrete manufacture. Previously carboniferous limestone has been used for building work, particularly in the Pennine towns. However, this is less common today. Magnesian limestone is generally softer, more porous and less durable in use. It weathers rapidly and, if exposed to freezing conditions when wet, will break down very quickly. Accordingly, it is used predominantly for purposes where it is not exposed to the weather, such as construction fill, base courses for roads and pipe bedding. Only parts of the lowest beds of magnesian limestone have been found to be hard enough to be used in concrete manufacture or road building.

5.9 Carboniferous limestone is found in the older rock formations towards the western part of County Durham and was formed as part of a succession, while magnesian limestone is found towards the east of County Durham and lies unconformably over the upper-carboniferous deposits (coal measures).

Limestone - chemical properties

5.10 Both limestones are formed predominantly of calcium carbonate, accompanied by a variety of other materials. Calcium carbonate is prone to chemical attack by carbon dioxide and sulphur dioxide, which form carbonic acid and sulphurous acid in rainwater, most especially in cities. This dissolves the surface layers of the limestone, causing disfigurement of buildings and monuments.

5.11 Magnesian limestone varies considerably throughout the deposit in terms of chemical make up. Where more than 90% of the rock is formed of the double carbonate, calcium magnesium carbonate, then the rock is classed as 'dolomite' - although this term is commonly used to refer to the whole of the deposit. True dolomite is formed as the replacement of calcite by solutions passing through the rock, usually in shallow sea water. This is a metasomatic[x] change to the rock, which also causes a contraction in volume of up to 12.3%, leading to increased porosity and permeability. Dolomite, when calcined, can be used in the formation of refractory linings to kilns, metal smelting vessels and their attendant transport structures. This protects the vessels from chemical attack by the basic steel slag. In addition, it can be used in steel making as a flux and this is its current predominant use. The purer deposits extracted at Whitwell Quarry in Derbyshire are also suitable for use in clear glass making, as they contain less iron. To date dolomite of sufficient purity to produce clear glass has not been discovered in County Durham, although dolomite from Hawthorn Quarry, near the North Sea coast has been used in the production of heat-proof glass at Sunderland. Formerly dolomite was also used to make magnesia using a sea water process at Hartlepool. Because of its exceptional electrical resistance and heat conductivity properties this was used in the manufacture of insulation and industrial heating elements.

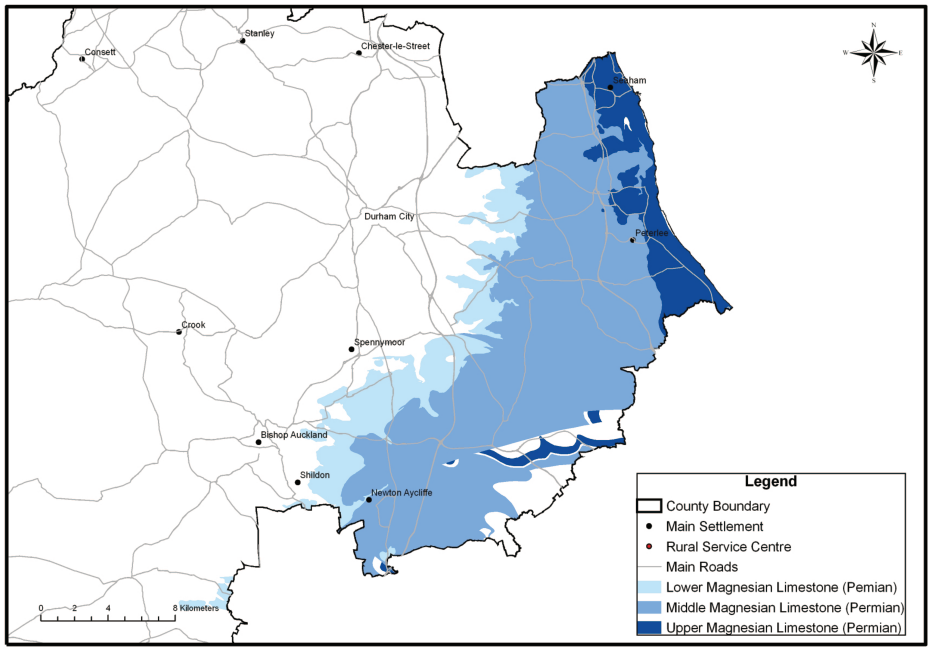
Magnesian Limestone (including high grade dolomite)

5.12 The magnesian limestone resource in County Durham is of both national and regional importance and is the most important mineral worked in County Durham today. The resource underlies the majority of east Durham and at its western edge forms a bold escarpment running in a north - south direction between Pittington and Ferryhill and then south-westwards,

x This is a metamorphic process whereby existing minerals are transformed totally or partially into new minerals by the replacement of their chemical constituents.

with the escarpment gradually disappearing to the south of Shildon. To the north of Pittington, the escarpment gradually disappears towards Sunderland in Tyne and Wear.

Figure 4 Magnesian Limestone



5.13 The magnesian limestone resource is understood to be highly variable, both regionally and locally. It has been traditionally divided in to the lower magnesian limestone, middle magnesian limestone and upper magnesian limestone. Within County Durham the lower magnesian limestone (also known as the Raisby formation), which only outcrops extensively along the escarpment between Pittington and Shildon in County Durham, is the most important formation of the magnesian limestone succession due to its chemical qualities, purity and range of applicable uses. In the past most quarrying (but not all) for aggregate uses and industrial uses has been from the lower magnesian limestone, with the overlying limestones of the middle magnesian limestone (Ford formation) generally not being suitable for aggregate use, apart from granular sub-base of fill applications. Similarly, the upper magnesian limestone has not been extensively quarried as generally it is only suitable for low grade aggregate uses, such as granular sub-base roadstone and fill.

5.14 Most magnesian limestone extracted in County Durham is sold as aggregate for use in the construction industries. Only one magnesian limestone quarry, Coxhoe Quarry (formerly Raisby Quarry), has an asphalt/coating plant in County Durham[(xi)]. That quarry is also the only one to work the harder 'Permian blue' found at the base of the deposit, although Thrislington Quarry is expected to work these beds in the future. The remaining magnesian limestone which is extracted is sold for non aggregate purposes including agricultural lime, which is often the fines which remain after limestone and dolomite has been crushed and screened to meet specifications for aggregate or other markets.

5.15 Dolomite which has relatively low levels of impurities is considered to be 'high grade' and depending upon its specific properties can be suitable for use industrial purposes such as in the production of magnesia, as a flux in steel making, as an iron sinter or in glass manufacture. The lower magnesian limestone (raisby formation) at Thrislington Quarry is a nationally important source of dolomite for industrial applications. Evidence suggests that Thrislington Quarry and the area immediately to the east is the only area in Great Britain other than Whitwell Quarry in Derbyshire which contains dolomite of sufficient quality to be used both in the steel and magnesia industries, although none is currently consumed in the steel or magnesia industry[(xii)].

xi There are four asphalt/coating plants in the County at Coxhoe Quarry, Heights Quarry, Hulands Quarry and Force Garth Quarry.
xii Britain's sole sea water Magnesia Plant closed in June 2005.

Table 2 Mineral Qualities - Magnesian Limestone

Formation	Type and Value	Aggregate Uses	High Grade and Other uses
Lower (Raisby)	Hard limestone - Relatively strong, durable & frost resistant	Suitable for concreting aggregates and coated road-base materials	The chemical composition of the raisby formation in Thrislington Quarry East and the area to the east makes its suitable for a range of industrial and chemical applications Agricultural lime
	Dolomitic parts - Generally weaker & more porous	Sufficiently frost-resistant for use as road sub-base and fill	
	Lower magnesian limestone aggregates	Suitable for use and filter aggregate, building stone and armour stone	
Middle (Ford)	Overlying dolomites & dolomitic limestones - Mostly relatively soft and porous	Not generally suitable for aggregate use, apart from low grade granular sub-base or fill applications.	The chemical composition of the ford formation in and around Hawthorn Quarry makes it suitable for wide range of industrial and chemical grade applications. Agricultural lime
Upper (Seaham, Roker & Concretionary Limestone)	Limestones	Generally only suitable for low grade aggregate applications, such as granular sub-base road stone or fill	Agricultural lime

5.16 Available evidence on high grade dolomite (relating to its occurrence on the escarpment) is set out in Appendix 2 of the Magnesian Limestone Escarpment Plan [Minerals and Landscape Restoration Plan] Local Plan and the British Geological Survey Dolomite Mineral Planning Fact sheet. While it is recognised that the Magnesian Limestone Escarpment Local Plan is now a historic document a number of the findings (in respect of high grade dolomite) remain valid. Appendix 2 of the plan reports upon a survey conducted by a Dr Davies (later Professor of Applied Geology at the University College of Wales at Aberystwyth) who undertook a survey of dolomite sites throughout Great Britain in the 1960's. His survey concluded that the most important sites were on the escarpment in County Durham, South Yorkshire/Nottinghamshire and Derbyshire[(xiii)]. In the early 1980's Dr Davies reassessed the results of his survey in light of the new specifications for high grade dolomite and concluded:

- the area of about 300 hectares to the east of Thrislington Quarry is the only area in Great Britain where there are sufficient reserves with a low enough silica content to provide material economically for the Hartlepool Magnesia Plant;
- the above area, together with the southern part of Cornforth Quarry is the only area in the County where there are sufficient reserves suitable for providing calcined Dolomite for steel flux. Reserves of this material area also available at Whitwell Derbyshire; and
- the other high grade Dolomite reserves identified in the first review of the County Development Plan (1964) are no longer suitable, largely because of high silica contents, for calcined uses. The appendix also reports that the Institute of Geological Sciences (now British Geological Survey) supported Dr Davies conclusions and stressed that the work involved in assessing Dolomite reserves is as comprehensive as could be expected and that to carry out such a survey now (in the 1980's) would cost in the order of £3million.

xiii Understood to be at Thrislington in County Durham, Cadeby and Warmsworth in Doncaster and at Whitwell in Derbyshire.

5.17 In these respects the British Geological Survey fact sheet "Industrial Dolomite" indicates that:

- 'the Permian Dolomites are the main source of dolomite in the UK and are a resource of national and regional importance";
- "the sequence is highly variable, both regionally and locally, in its geology, and its chemical and physical properties. Impurities such as silica, iron oxides and alumina are a prime consideration in the selection of industrial applications, and some industrial uses also require a hard stone. Dolomites with sufficiently low levels of impurities to be used as a flux in steel making, for refractory use and glass making are comparatively scarce in the UK".
- "in north east England (County Durham) the Raisby formation and Ford formation are important carbonate resources. The Raisby formation at Thrislington Quarry is a major source of high-grade dolomite for steel making"; and
- "because of the restricted distribution of suitable quality dolomite for these applications, certain sites will remain of considerable economic importance."

5.18 In addition to the deposits of high grade dolomite at Thrislington Quarry and the area to the east of the quarry, deposits of dolomite of sufficient purity for colourless glass manufacture have also been proved at Hawthorn Quarry, on the coast south, of Seaham[(xiv)]. In 1980 boreholes made in the floor of Hawthorn Quarry, established the presence of large reserves (recognised to be up to 9 million tonnes) of chemically consistent low iron high magnesia dolomite. This low iron high magnesia dolomite can be used as flux in coloured glass manufacture an alternative to soda ash. (Glass making needs the presence of fluxes in certain quantities. (In the 1980s, an essential flux soda ash increased rapidly in price as energy costs escalated)).

5.19 Following the discovery of this low iron high magnesia dolomite a planning permission was granted in 1984 for the extraction of limestone and dolomite at Hawthorn Quarry[(xv)]. The planning permission recognised the importance of the high grade dolomite within the site as a national resource. A section 52 planning agreement was signed as part of planning permission 5/81/274/CM which limited where possible the mineral extracted to be sold for high grade specialised purposes, such as a flux in the manufacture of colourless glass. Hawthorn Quarry, ceased working in 1993. In November 2017 an application was submitted to the Council seeking to update the existing permissions with modern working and restoration conditions. This application is currently waiting to be determined.

5.20 In January 2019 there were ten quarries with planning permission to work magnesian limestone in County Durham[(xvi)]. In addition there are also a further five sites which are identified as dormant or which are Interim Development Orders. Thrislington Quarry West of the A1(M) and Thrislington Quarry East of the A1(M), however, are the only quarries on the escarpment in County Durham which has produced high grade dolomite in recent years (for use as flux in the steel industry). Its long term future was confirmed on

xiv In addition to the high grade material at Hawthorn Quarry. Tarmac the operator of Hawthorn quarry has advised the Council that they consider that the high grade Ford Dolomite extends to the north of Hawthorn Quarry and that it is highly likely that the high grade Ford Dolomite extends to the west of the existing permitted quarry boundary for an unknown distance, with the British Geological Survey map information shows further outcrops of the Ford Formation extending to the west.

xv The permitted reserves at Hawthorn Quarry include a reported 12,004,000 tonnes of magnesian limestone or which 9,033,000 tonnes is claimed as high grade. Unlike the material at Thrislington Quarry East where the high grade material consists of material from the Raisby formation (lower magnesian limestone), the deposits of high grade mineral at Hawthorn Quarry consist of dolomite from the Ford formation (middle magnesian limestone). It is understood that the Ford Dolomite can be split into three layers within the quarry including mineral with a high magnesium oxide (MgO) content, in excess of 20% and low levels of impurities i.e. minor iron oxide (FeO2), silicon dioxide (SiO2) and aluminium oxide (Al2O3).

xvi In January 2019 there were ten quarries with planning permission to work magnesian limestone in County Durham. (Aycliffe Quarry East which was operated by Stonegrave Aggregates ceased mineral extraction in May 2014).

25 July 2011 when the Council issued planning permission to extend Thrislington Quarry West of the A1(M) to the east of the A1(M). This permission allowed the extraction of approximately 29 million tonnes of magnesian limestone, of which it is estimated that some 11.35 million tonnes would be used for high grade purposes.

Table 3 Sites with Planning Permission for Magnesian Limestone extraction in County Durham

Quarry	Location and Grid Reference	Operator	Planning Status 1 January 2019	Expiry Date for Extraction
Thrislington Quarry (west of A1(M))	Cornforth NZ 317 322	Tarmac	Active	18/01/2015[(1)]
Thrislington Quarry east of the A1(M)	Cornforth NZ 317 322	Tarmac	Active	1/07/2045.
Crime Rigg Quarry and extension	Sherburn NZ 346 416	Breedon[(xvii)]	Active	31/12/2022.
Witch Hill Quarry	Sherburn NZ 345 397	Breedon	Inactive	21/02/2042.
Running Waters Quarry	Bowburn NZ 334 403	Breedon	Inactive	21/02/2042.
Old Quarrington Quarry and Cold Knuckles	Bowburn NZ 330 380	Tarmac	Active	21/02/2042.
Cornforth West (IDO/7/5/1)	West Cornforth NZ 325 344	Tarmac	Inactive	21/02/2042.
Cornforth East (MRA/7/2)	West Cornforth NZ 325 344	Tarmac	Inactive	21/02/2042.
Coxhoe Quarry (formerly known as Raisby Quarry) and extension, Coxhoe[(2)].	Coxhoe NZ 347 352	Breedon [(xviii)]	Active	01/09/2018[(3)].
Bishop Middleham Quarry and extension.	Ferryhill NZ 328 326	W & M Thompson Quarries	Active	30/06/2029.

1. In January 2015 Lafarge Tarmac (now known as Tarmac) submitted a planning application to enable the extraction of remaining limestone reserves within the quarry west of the A1(M) together with a revised working area for sand extraction. The planning application proposes that the remaining limestone permitted reserves and the identified basal permian sand within the quarry would be worked over a fifteen year period and ending in 2030. At the meeting of the County Planning Committee on 3 October 2017 members resolved to grant planning permission.
2. As part of the principal condition to receiving final clearance from the Competition Commission for the formation of a 50:50 joint venture with Lafarge Aggregates Ltd, Tarmac Northern sold Coxhoe Quarry to Hope Construction (part of Mittal Investments). In Agust 2015 Hope Construction Materials were aquired by the Breedon Group.
3. In April 2017 Breedon applied to the Council seeking to extend the period of working until 2042 with restoration by 2044. At the meeting of the County Planning Committee on 6 February 2018 members resolved to grant planning permission.

xvii In December 2016 Breedon aquired Sherburn Stone Co Ltd.
xviii In August 2015 Breedon acquired Hope Construction Materials (part of Mittal Investments).

5.21 Due to the way that information is reported in the North East Aggregates Working Party's (NEAWP's) annual aggregates monitoring reports no information is available from the NEAWP on either sales or permitted reserves of magnesian limestone in County Durham[(xix)]. In recent years in response to the Council's own annual survey of mineral operators, mineral operators have provided the Council with both sales and permitted reserve information for their quarries. The survey returns indicate that sales have generally fallen year on year since 2007, in line with the overall decline in crushed rock sales since the recession began. For example using these returns our best estimate is that sales were approximately 2.4 million tonnes in 2007, approximately 1.9 million tonnes in 2008, before falling to approximately 1.2-1.3 million tonnes each year between 2009 and 2012. Sales are reported to have risen to approximately 1.8 million tonnes in 2015 and approximately 2 million tonnes in 2016, before falling back to approximately 1.9 million tonnes in 2017. Estimated permitted reserves of magnesian limestone in 2017 are set out below.

Table 4 Estimated permitted reserves of magnesian limestone aggregate in County Durham 2017 (tonnes).

Quarry	Estimated/Actual Permitted reserves remaining at 31.12.17
Aycliffe Quarry	0[1]
Witch Hill Quarry	1,532,500[1]
Running Waters Quarry	350,000[1 5]
Crime Rigg Quarry	1,033,000[1 5]
Bishop Middleham Quarry	3,808,000[2 5]
Old Quarrington and Cold Knuckles Quarry	12,865,000[1]
Thrislington Quarry (West and East)	16,168,000[1]
Cornforth West / Cornforth East	37,719,000[1]
Coxhoe Quarry (formerly known as Raisby Quarry) and extension, Coxhoe.	26,472,000[2 4]
Total magnesian limestone permitted reserves	**99,947,500[2]**

Source: Durham County Council, 2017. Notes: 1 Operator returns to Council survey 2 Mineral Planning Authority best estimates. 3 Note this figure is slightly lower than the figure set out within the North East Aggregates Working Party Annual Monitoring Report for 20176, however, it is within 1% of the AWP figure. 4 Excludes permitted reserves of industrial dolomite. 5 Excludes permitted reserves suitable for agricultural lime. 6 Includes permitted reserves suitable for agricultural lime.

5.22 Agricultural lime, which is used to correct the acidity of soil is produced as a by-product from a number of magnesian limestone quarries in County Durham, where the primary purpose of extraction has been the production of aggregates or for use in the steel and chemical industry[(xx)]. Until relatively recently no information has been collected relating to agricultural lime sales from County Durham's magnesian limestone quarries. Information derived from the Council's agricultural lime survey is set out below. The table shows that form many years reported production has been

xix Information on sales and permitted reserves of magnesian limestone (for County Durham) on a resource basis were last published in the North East Regional Aggregates Working Annual Aggregates Monitoring Report for 2003. This report included a combined figure for magnesian limestone and dolomite production for County Durham, Tees Valley and Tyne and Wear. Using this information and information derived from the Joint LAA it was calculated that in 2003 approximately 2.45 million tonnes of magnesian limestone was sold for aggregates purposes from County Durham's magnesian limestone aggregate quarries. The corresponding figures for 2002 and 2001 being 2.19 million tonnes and 2.42 million tonnes.

xx Over the period 2005 to 2012 survey returns indicate that agricultural lime has been produced at six quarries in County Durham: Thrislington Quarry, Crime Rigg Quarry, Coxhoe Quarry, Aycliffe Quarry, Witch Hill Quarry and Bishop Middleham Quarry.

approximately been between 200,000 and 300,000 tonnes per annum. Reported sales in 2014 indicated that sales were approximately 200,000 tonnes.

Table 5 Reported Agricultural Lime Sales from County Durham's Magnesian Limestone Quarries 2005 - 2009.

31.12.05	31.12.06	31.12.07	31.12.08	31.12.09
305,145	321,677	321,933	271,699	220,303

Table 6 Reported Agricultural Lime Sales from County Durham's Magnesian Limestone Quarries 2010- 2014.

31.12.10	31.12.11	31.12.12	31.12.13	31.12.14
202,248	205,261	120,377	173,445	200,320

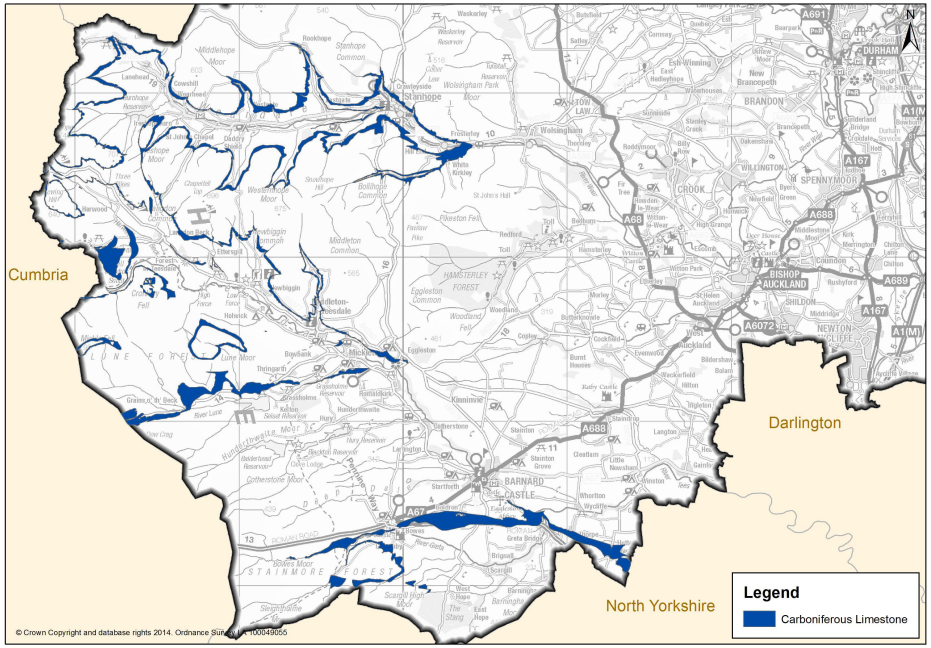
Source: Durham County Council's agricultural and aggregates surveys. 1 Best estimate to take into account missing returns.

5.23 Following the grant of planning permission to extend Bishop Middleham Quarry in March 2015, and taking into account other information, the Council's best estimate of dedicated reserves suitable for use for agricultural lime, is that approximately 9.8 million tonnes of reserves remain available for extraction in County Durham. This includes at least 2.8 million tonnes at Bishop Middleham Quarry and further reserves at Witch Hill Quarry, Crime Rigg Quarry and at Running Waters Quarry. Through a submission made as part of the ROMP at Witch Hill Quarry in 2015 it is understood that the quarry contains 3,125,000 tonnes of recoverable mineral. It is assumed that approximately 50% of this material would be suitable for agricultural lime with the remainder suitable for aggregates.

Carboniferous Limestone

5.24 Carboniferous limestones exist in parts of West Durham where they occur in mixed sequences of limestone, mudstone and sandstone beds. Many of these limestones are less than 10 metres thick and are too thin to support modern quarrying. The most commercially important of the limestone beds within the carboniferous series is the Great Limestone (of Namurian Age). It outcrops fairly continuously along the sides of Weardale above Frosterley. In Teesdale, glacial drift deposits restrict its outcrop to localised pockets around Middleton in Teesdale and to the south of Barnard Castle around Boldron.

Figure 5 Carboniferous Limestone



5.25 Although similar in some respects to magnesian limestone, Carboniferous limestone often differs in some of its physical qualities. In particular Carboniferous limestone tends to be harder than magnesian limestone, and therefore more suited to particular heavy duty uses, for example in sea defence works.

Table 7 Mineral Qualities - Carboniferous Limestone.

Type	Value	Uses
Carboniferous Limestone.	Harder & more durable than Magnesian Limestone.	More suited to particular heavy duty uses e.g. road building, sea defence works and cement.

5.26 In January 2019 there were four active carboniferous limestone quarries in County Durham. In addition there are also a number of dormant quarries where working could theoretically resume, following the agreement of new modern working and restoration conditions by the Council under the provisions of the Environment Act 1995 (or any statutory modification to or re-enactment of that Act) and subject to permitted reserves remaining, (see Appendix C).

Table 8 Carboniferous Limestone Quarries operating in County Durham in January 2019.

Quarry	Operator	Expiry Date Extraction	Status in January 2019
Heights Quarry, Eastgate.	Aggregate Industries UK Ltd.	21.02.2042.	Active
Hulands Quarry & Extension, Bowes.	Aggregate Industries UK Ltd.	18.03.2026	Active
Kilmond Wood Quarry, Bowes.	Kearton Farms Ltd(1).	21.02.2042	Active
Broadwood Quarry, Frosterley.	Breedon	21.02.2042	Active (but to a limited degree).

1. Prior to 1 January 2014, Kilmond Wood Quarry was operated by Cemex Uk Ltd.

5.27 Two carboniferous quarries have asphalt/coating plants in County Durham. One of these, Heights quarry, is located west of Eastgate in Weardale. The other, Hulands quarry, is located in Teesdale, east of Bowes. By producing an 'added value' product, the additional cost of the transport to market from these relatively remote locations is ameliorated by the premium price that can be charged. Carboniferous Limestone has also been used to manufacture cement. However, in 2002 the only cement works in the North East, at Eastgate closed and the quarry which was associated with the works completed its aftercare in 2012.

5.28 Due to the way that information on sales and permitted reserves is reported in the North East Aggregates Working Party's Annual Aggregate Monitoring Reports, for many years there has been no published information available on either sales or permitted reserves of carboniferous limestone in County Durham(xxi). However, in recent years in response to the Council's own annual survey of mineral operators, mineral operators have provided the Council with both sales and permitted reserve information for their quarries. The survey returns indicate that sales have fallen year on year since 2007 until 2012 before steadily increasing once more in line with the overall pattern of crushed rock sales. The results of the Council's survey of mineral operators indicate that sales were approximately 1 million tonnes

xxi Information on sales of carboniferous limestone on a resource basis (in County Durham) were last published in the North East Regional Aggregates Working Annual Aggregates Monitoring Report for 2003. This report indicated that sales from County Durham in 2003 were 734,000 tonnes. The corresponding figures for 2002 and 2001 being 492,000 tonnes in 2002 and 879,000 tonnes in 2001.

in 2007, 810,000 tones in 2008, 616,000 tonnes in 2009, 554,000 tonnes in 2010, 500,000 tonnes in 2011, 444,000 in 2012, 437,000 in 2013, 593,000 in 2014, 782,000 tonnes in 2015, 800,000 tonnes in 2016 and 570,000 tonnes in 2017.

5.29 Information on permitted reserves in County Durham's carboniferous limestone sites are set out below. Without additional provision the majority of existing permitted reserves of carboniferous limestone will become exhausted during the first half of the Plan period (circa 2024). Based on current information a further 5.7 million tonnes of carboniferous limestone would be required to maintain sales to 2035. Furthermore, we also forecast that a further 9 million tonnes of carboniferous limestone will need to be permitted to meet longer term need[(xxii)]. Through the annual Joint LAA the Council will review the forecasts for further provision and seek to maintain a steady and adequate supply of this mineral.

Table 9 Estimated permitted reserves of carboniferous limestone in County Durham December 2017, (tonnes).

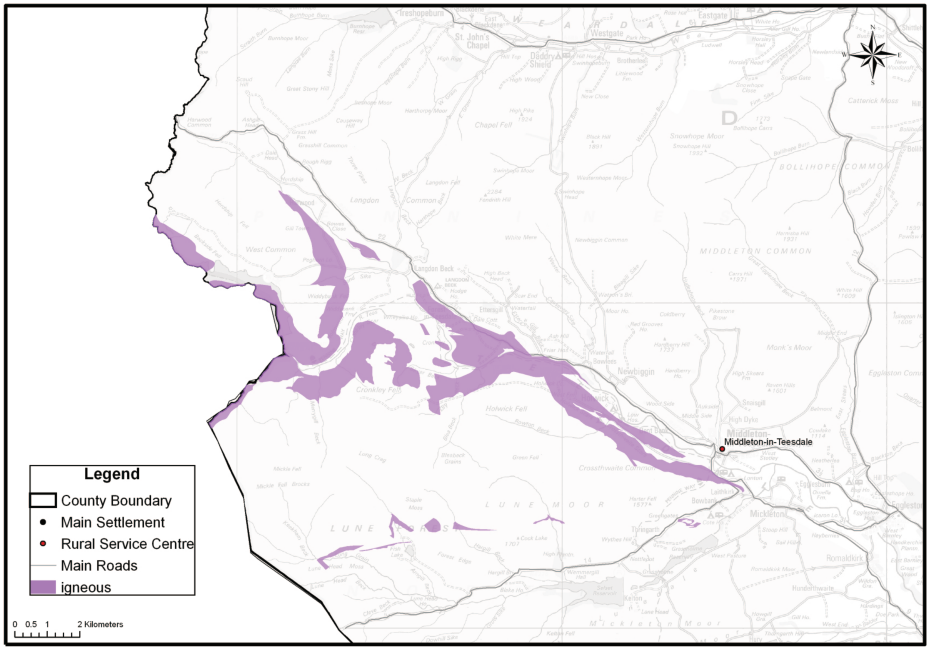
Quarry	Estimated/Actual Permitted reserves remaining at 31.12.17
Heights Quarry	3,270,000[1]
Hulands Quarry	1,770,000[1]
Kilmond Wood Quarry	6,000,000[1]
Broadwood Quarry	355,000[1]
Total Carboniferous Limestone Permitted Reserves	**11,395,000[2]**

Source: Durham County Council, 2018 Notes: 1 Operator returns to Council survey 2 Mineral Planning Authority best estimates.

Dolerite

5.30 Igneous rock (also known as dolerite or whinstone) is exceptionally hard and durable and has a high polished stone value (PSV). These qualities make it an important source of aggregate material/high specification roadstone for the top wearing course of roads which have to withstand heavy volumes of traffic. It is also used as a concrete aggregate and in the construction of sea defences.

Figure 6 Dolerite in County Durham



xxii These forecasts were based upon permitted reserve information, upon a potential maximum production figure of up to 900,000 tonnes per annum and the requirement to maintain production potential in the long term beyond 2035.

Table 10 Mineral Qualities - Igneous Rock (Dolerite).

Type	Value	Uses
Igneous Rock.	Exceptionally hard and durable.	Suitable for concreting aggregates and coated road-base materials including for the top course of some roads.

5.31 Within County Durham, igneous rocks are found as intrusions into the carboniferous limestone series in the west of the County. The most important of these is the series of intrusions collectively known as the Whin Sill, from which the term whinstone is derived. The Whin Sill is a sheet intrusion of igneous rock and is up to 80 metres thick where it outcrops in Upper Teesdale (within the North Pennines). Coupled to the sill are a number of dykes which run through the country rock in a roughly east-north-east direction.

5.32 In January 2019 there was only one quarry producing igneous rock in the County, Force Garth Quarry in Teesdale. In addition there are also a small number of dormant quarries where working could theoretically resume, following the agreement of new modern working and restoration conditions by the Council under the provisions of the Environment Act 1995 (or any statutory modification to or re-enactment of that Act) and subject to permitted reserves remaining, (see Appendix B).

Table 11 Dolerite Quarries with planning permission.

Quarry	Operator	Expiry Date for Extraction	Status in January 2019
Force Garth Quarry, near Middleton-in- Teesdale.	Cemex UK Ltd.	21.02.2042	Active.

5.33 Due to the way that information on sales and permitted reserves is reported in the North East Aggregates Working Party's Annual Aggregate Monitoring Reports, for many years there has been no published information available on either sales or permitted reserves of igneous rock in County Durham. However, in response to the Council's own annual survey of mineral operators the owner of Force Garth Quarry, Cemex UK Ltd has provided the Council with both sales and permitted reserve information for the quarry in recent years. The survey returns indicate that prior to the current economic downturn Force Garth quarry contributed approximately 250,000 tonnes of mineral to crushed rock sales in County Durham. In recent years in line with the overall trend to crushed rock sales production has fallen in line with the overall decline in crushed rock sales.

5.34 Current permitted reserves within the area of the quarry which is currently operating are estimated at approximately 18.1 million tonnes on 31.12.17. In addition further significant quantities of igneous rock are located within the wider permission area. Given the extent of permitted reserves at Force Garth Quarry it appears that more than sufficient permitted reserves of this mineral exist to meet the long term need without the grant of any further planning permissions.

5.35 The majority of the Force Garth permission is designated as part of the Moor House-Upper Teesdale Special Area of Conservation (SAC) and North Pennines Moors Special Protection Area (SPA) under the EU Habitats and EU Wild Birds Directive. The periodic review under the Environment Act 1995 is being undertaken but determination had been delayed due to the need to undertake separate assessment, as required by Section 63 of the Conservation of the Habitats and Species Regulations 2010 (as amended) and the EU Habitats Directive (Directive 92/43/EEC) as well as the need for further information in respect of the review permission itself. The County Council has now concluded the Regulation 63 Review and it has been concluded that the proposed working will have some affect but no adverse effect, on the integrity of the European sites. Similarly, given that a number of the dormant igneous rock quarries also lie adjacent to the

Moor-House Upper Teesdale SAC and North Pennines Moors SPA, further working at these sites would also require a separate assessment under the Habitats Directive.

Sand and Gravel

5.36 Sand and gravel has been quarried in County Durham for many centuries although the level of demand has only been sufficient to warrant large scale extraction in the last hundred years or so. County Durham contains two main categories of sand and gravel:

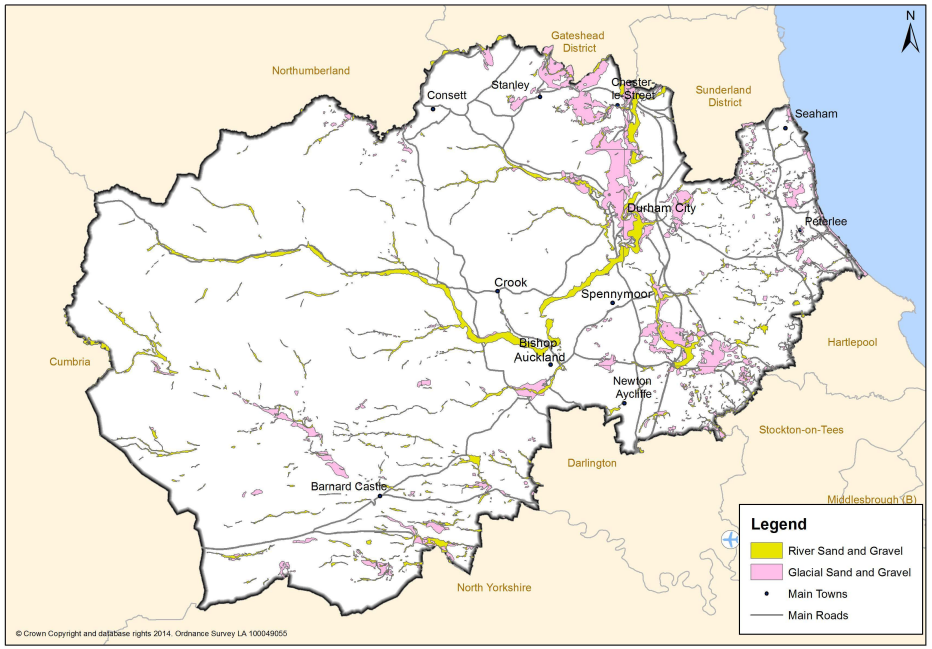
- Superficial deposits which include fluvial sand and gravel, glacial sand and gravel and beach and blown sand deposits; and
- Bedrock deposits and these are represented by the Basal Permian Sands.

5.37 Information on the known or suspected location of sand and gravel resources in the County are set out in two principal sources the British Geological Society (BGS) report 'Mineral Resource Information for Development Plans - Durham and the Tees Valley Mineral Resources and Constraints' and an independent study carried out by Engineering Geology Ltd for the Department of the Environment in 1989 using existing borehole and geological information, 'Assessment of the potentially workable sand and gravel resources of County Durham'. Both reports draw upon a series of sand and gravel Mineral Assessment Reports produced by the Institute of Geological Sciences in the period between 1979 and 1982. While the information which is available is recognised as the best available it is important to note that there is no definitive information on the precise extent and occurrence of sand and gravel in the County. As the BGS report notes, "The variability of sand and gravel together with their possible concealment within or beneath glacial till (boulder clay), means that, compared to other bulk minerals, it is more difficult to infer the location and likely extent of potentially workable resources from geological maps."

Table 12 Mineral Qualities - Sand & Gravel

Type	Value	Uses
Sand	Used for material which is finer than 5mm.	Fine aggregate in concrete, in mortar and in asphalt.
Gravel	Used for material which is coarser than 5mm	Coarse aggregate in concrete.

Figure 7 Sand and Gravel Resources (excluding basal Permian sand)



Superficial deposits

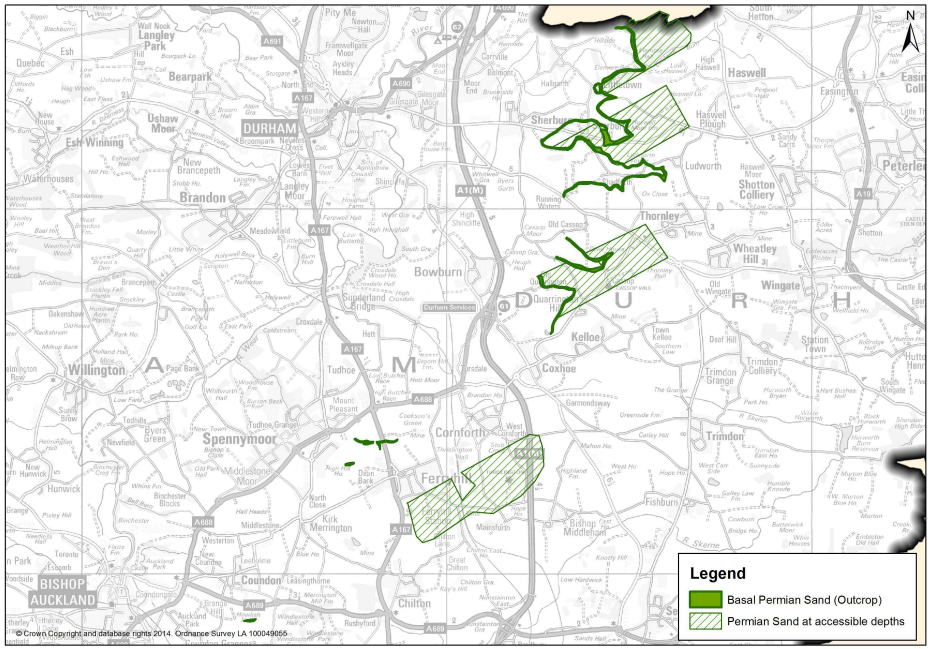
5.38 Glacial sand and gravel deposits are found in all parts of the County although they are more common in the central and eastern parts including around Chester-le-Street and Durham. In certain areas they have been assessed as being up to 30 metres thick, but this assessment is problematic, given their origin they can disappear within a short distances. In addition in certain areas such as the Durham Coalfield area they can contain a significant proportion of organic material, particularly coal.

5.39 Fluvial sand and gravel - These deposits include post-glacial river terrace deposits, alluvial deposits and fluvio-glacial deposits. Alluvial deposits are developed along the major river valleys. They are widespread and are well developed on both the River Tees and River Wear and some of the major tributaries. Fluvio-glacial deposits also occur in the area. These are the material left by the melt waters of glaciers. They give rise to more uniform deposits of sand and gravel than glacial deposits, although the quality is generally not up to that of river terrace deposits, particularly those of the River Tees.

Bedrock Deposits of Sand

5.40 Basal Permian Sand is currently worked at three quarries on the East Durham Limestone Plateau at Thrislington, Old Quarrington and Crime Rigg Quarries. Generally, this sand is linked with the working of the economically important overlying magnesian limestone.

Figure 8 Basal Permian Sand Resources



5.41 It is understood that Basal Permian Sands occur in County Durham in four linear deposits, or ridges (southwest of Hetton, Haswell, Thornley and West Cornforth) which outcrop along the base of the Magnesian Limestone Escarpment and continue for some distance and dip to the east under the Magnesian Limestone. It is believed that economically accessible resources do not occur very far beyond the outcrop due to the eastward dip of the resource and due to the presence of the overlying deepening magnesian limestone.

5.42 Basal Permian Sands consist mainly of weakly cemented, yellow, fine to medium grained well sorted sands of wind blown origin, with only a small proportion of fines or coarse sand and gravel. The deposit is a uniformly graded fine aggregate and is mainly worked as a source of building

sand and asphalting sand, although some quarries are also producing limited quantities of concreting sand. Information from Tarmac has advised that all basal permian sands from the quarry can be used for concreting sand following blending with magnesian limestone dust.

Table 13 Sand and Gravel quarries with planning permission.

Quarry	Operator	Expiry Date for Extraction
Thrislington Quarry West, Cornforth.	Tarmac	To be confirmed
Crime Rigg Quarry, Sherburn.	Breedon	31.12.2021.
Old Quarrington Quarry, Quarrington Hill.	Tarmac	21.02.2042.
Low Harperley, Wolsingham.	Breedon	08.08.2032
Hummerbeck West Auckland.	Hall Construction.	21.02.2042.

Permitted Reserves and Sales

5.43 Permitted reserves of sand and gravel in County Durham are currently healthy. On 31.12.17 County Durham's permitted sand and gravel quarries contained 7,113,000 tonnes of sand and gravel. This figure is equivalent to a landbank of 24.9 years based upon the annual demand requirement set out in the current Joint Local Aggregate Assessment for County Durham, Northumberland and Tyne and Wear[xxiii]

5.44 The table below also provides further information of the overall extent and distribution of permitted reserves at the 31 December 2017 using information provided by operators in response to Durham County Councils survey of mineral operators. No information is provided in the table below in relation to productive capacity of individual sites, however, information obtained by the County Council from both planning applications and operators indicate that when in full production County Durham's sand and gravel sites have a significant production capacity well in excess of historic sales levels.

Table 14 Estimated permitted reserves of sand and gravel permitted in County Durham 2017 by site (tonnes).

Quarry	Estimate of permitted reserves at 31 December 2017
Thrislington Quarry	1,709,000[3]
Crime Rigg Quarry	504,000[1]
Old Quarrington and Cold Knuckles Quarry	1,740,000[3]
Hummerbeck	670,000[2]
Low Harperley	2,490,000[3]
DCC best estimate	**7,113,000**

Notes: 1 Information provided by mineral operators in response to Durham County Council mineral survey. 2 Information sourced from planning committee reports. 3 DCC estimate informed by previous sales.

5.45 Sales of sand and gravel for County Durham are provided within the Joint Local Aggregate Assessment for County Durham, Northumberland. The following table provides updated sales information up to and including 2017. The general fall in sales has between 2007 and 2013 been due to the current economic recession and not due to a shortage of permitted reserves.

xxiii North East Aggregates Working Party Annual Aggregates Monitoring Report 2017.

Table 15 Land won sales of sand & gravel, 2007 to 2016 for County Durham (thousand tonnes)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
County Durham	183	199	164	237	199	218	276	256	322	330

Source: Joint Local Aggregate Assessment for County Durham, Northumberland (April 2018) + Mineral Planning Authority best estimates.North East Aggregates Working Party Annual Aggregates Monitoring Report 2017.

Non Aggregates

Brickmaking Raw Materials

5.46 There are essentially three types of material found in the County which can be used in brick making:

- coal measures mudstone, known as brick-shale;
- coal measures seat-earths, known as fireclay; and
- glacial clay deposits.

5.47 The latter are referred to as brick clays when found to possess the correct characteristics for brick making. Until recently there were two brickworks in the County, at Todhills near Newfield, and at Eldon, both of which were operated by Wienerberger [(xxiv)]. The supply of materials to these brickworks comes mainly from dedicated sources (i.e. permitted reserves adjacent to the brickworks), and are supplemented by supplies of fireclay from opencast coal sites. A third brickworks, the Union Brickworks operated by Ibstock Brick Ltd, lies at Birtley in Gateshead Borough, although the clay working which supplies it lies within County Durham.

5.48 During 2011 154,000 tonnes of brick clay and shale were extracted from County Durham[(xxv)]. Due to the way past information has been reported there is no corresponding information available for 2008, 2009 or 2010, however, the corresponding figures for 2006 and 2007 were 218,000 tonnes and 179,000 tonnes. No information is available on brick clay or shale extraction since 2011.

Table 16 Mineral Qualities - Coal Measures Mudstone, Coal Measures Seatearths and Brick Clay.

Type	Value	Uses
Coal Measures mudstone (brick-shale)	Kaolonite rich materials with carbon contents of less than 1.5% along with less than 0.2% sulphur.	Produces red bricks.
Coal measures seatearths (fireclay)	They display a wide range of mineralogical compositions and properties. Fireclays consist of clay minerals kaolonite and mica, together with fine grained quartz. Contain low carbon, sulphur and iron content.	Supplements brick clay to produce buff coloured bricks.
Brick clay	Glacial clay of quaternary age	Produces facing bricks.

Brick-shale

5.49 Coal measure mudstones are the principal brick making resource in County Durham and are fairly widespread in occurrence. However, since modern brick manufacture requires clays with consistent forming and firing properties it means that the mudstones which can be used have a more restricted geological distribution because of the need for clays with low levels of impurities such as carbon and sulphur. Fireclays typically occur

xxiv Wienerberger is the world's largest producer of bricks and number 2 on the roofing market in Europe. The Group also holds leading position in pavers in Europe, with a total of 218 plants in 23 countries.
xxv Mineral extraction in Great Britain 2011 Business Monitor PA1007, CLG.

beneath coal seams and are usually associated with certain seams (see below). Glacial deposits of clay found in the Team Valley are also used. Deposits of glacial clay occur elsewhere in the County but these are spasmodic and unknown with any degree of certainty. Due to the processes and machinery involved, glacial deposits and those found within the coal measures are not usually interchangeable and brickworks tend to use one or the other material.

Table 17 Brick Shale Permissions in County Durham.

Quarry	Operator	Expiry Date for Extraction
Long Lane, Todhills.	Wienerberger.	27.04.2018(1).
Eldon Brickworks Quarry and extension.	Wienerberger.	To be confirmed, current permission for the extension issued in 2009 allows a 31 year period of working form commencement.

1. In November 2017 Wienerberger submitted a planning application seek to vary the time period for working from 27 April 2018 to 27 April 2019.

5.50 The planning permission at Todhills (the Long Lane site) was granted in 1999. It replaced Wienerberger's other brick shale quarry (nearby at Clarence Farm) following that site's closure in 2004. Information provided by the operator indicates that sizeable quantities of reserves currently remain for extraction, although available permitted reserves are insufficient to maintain a 25 year landbank for this manufacturing plant. The adopted Minerals Local Plan recognised the potential shortfall of permitted reserves at this brick manufacturing plant and allocated an Area of Search for additional brick shale extraction south east of the existing brickworks to meet longer term needs (Policy M11). This policy has been 'saved' until it is is replaced by a new policy within the emerging Local Plan. In November 2017 Wienerberger submitted a planning application seek to vary the time period for working from 27 April 2018 to 27 April 2019. The stated purpose of this application was to allow more time to allow further planning studies to be completed. These studies were related to plans for further extraction. In May 2016 the Council was still considering this planning application.

5.51 In March 2008 Members resolved to grant planning permission to extend the existing clay pit at Eldon Brickworks. This permission which has now been issued permitted the extraction of brick making material from 22.76 hectares of land (comprising 11.36 hectares within the existing quarry and an 11.4 hectares extension to the existing quarry). This includes 2,330,000 tonnes of brick making material and 55,000 tonnes of coal. It was intended that this permission would provide the long term security of supply for Eldon brickworks and provide for a landbank in excess of 25 years for this brick manufacturing plant. However, Eldon Brickworks and the Eldon Quarry which serves the brickworks were both mothballed due to the recession and in 2012 Wienerberrger announced the closure of Eldon Brickworks.

Fireclay

5.52 Fireclays are non-marine sedimentary clays and occur as seat earths, the fossil soils on which coal forming vegetation once grew, which underlie almost all coal seams. Resources are therefore confined to coal bearing strata. Within County Durham, fireclay is produced in association with the extraction of certain coal seams (e.g. Brockwell, Busty, Tilley and Hutton seams) and the quality of these fireclays is recognised nationally by the brick making industry. Fireclays are mainly used in the manufacture of structural clay products, principally high quality facing bricks. The surface mining of coal provides opportunities to recover fireclay subject to quality and economic viability considerations.

5.53 Following the exhaustion of Eldon Deep in 2003, only a limited quantity of fireclay has been produced in County Durham in recent years. These limited quantities were extracted from the Southfield surface coal mine site that was situated in County Durham and Darlington Borough. More recently, planning permission was issued in April 2009 for an application for the extraction of coal and fireclay extraction at Park Wall North (near Tow Law). However, while this permission enabled the extraction of up to 500,000 tonnes of fireclay, no fireclay was actually extracted. Fireclay has also been extracted in Northumberland in the recent past, with 53,000 tonnes being extracted in 2006 and 2007 and 42,000 being extracted in 2008, (source Mineral Extraction in Great Britain 2006, 2007 and 2008, ONS). Within the North East of England unspecified quantities were also extracted in 2012 from sites in Northumberland contributing to the overall production of 96,000 tonnes in Great Britain in 2012 (Business Monitor PA1007 Mineral Extraction in Great Britain 2012, CLG/ONS). It is understood that no fire clay was produced in 2013 or 2014 (Business Monitor PA1007 Mineral Extraction in Great Britain 2013 and 2014, CLG/ONS).

Brick clay

5.54 The Union Brickworks, at Birtley in Gateshead Borough is operated by Ibstock Bricks Ltd and produces bricks from clay taken from the glacial deposit known as the Team washout. This deposit consists of laminated clays deposited in a deep channel running northwards towards the Tyne Valley. There have been a number of brick and tile works that have exploited this deposit over some 200 years, but the existing Union Brickworks is the only one still operational.

Table 18 Active Brick Clay sites.

Quarry	Operator	Expiry Date for Extraction
Union Brickworks, Birtley.	Ibstock Brick Ltd.	01 June 2044.

5.55 Birtley Quarry which meets the needs of the brickworks lies wholly within County Durham, but lies immediately to the east of the administrative boundary of Gateshead Borough. The quarry has a long history of clay extraction and brick manufacturing began at the site prior to 1900. Following this planning permission was granted for brickclay extraction in 1965. An extension to the site was granted in 1989 (2/88/116/CM) for 30 years resulting in a 26.73 ha site, 20.73 ha being within County Durham. During August 2014 Ibstock Brick Ltd submitted a planning application to deepen the existing quarry, import inert material to help stabilise the quarry walls and extend the time period of working at the quarry to 1 June 1944. This application was subsequently considered by the Council in November 2016 and permission has now been granted. Birtley quarry now provides a 25 year landbank of permitted reserves for the Union Brickworks.

Natural Building and Roofing Stone

5.56 Natural building and roofing stone is a traditional building material that has been extensively worked in County Durham for many years for a variety of purposes. These include general walling, building, paving, roofing, high quality architectural building stone and for the repair and maintenance of historic buildings and structures. The use of this material for construction in County Durham has contributed to the distinctive local character of a number of areas within the County. It is also widely used in the North East of England and is also exported nationally.

5.57 Sandstones of Carboniferous age, primarily the Stainmore Group (Namurian geological age) are the principal building stone resources in County Durham. They satisfy the accepted criteria for building stone use such as strength and frost resistance (low porosity), durability and hardness (well cemented and resistant), size of block based upon thickness of bed, and aesthetic qualities such as colour and texture.

Figure 9 Namurian Rocks of County Durham

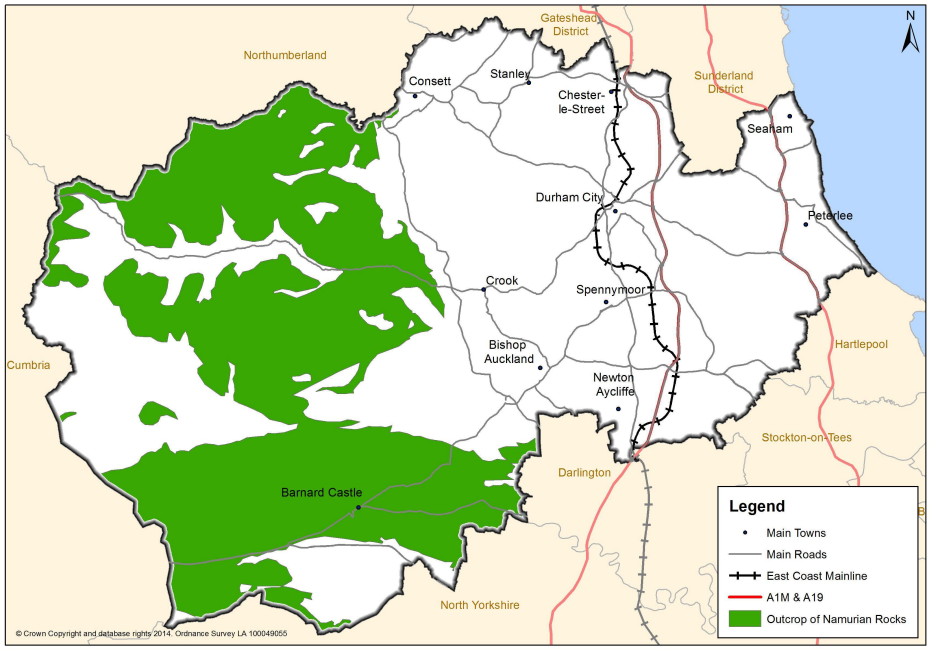


Table 19 Mineral Qualities - Natural Building and Roofing Stone.

Type	Value	Uses
Sandstone	Hard, durable, frost resistance with desired aesthetic qualities	Repair, restoration and erection of new buildings and other built structures i.e. stone walls.

5.58 In the past Dinantian sandstones have also been extensively employed as building stones in farms and villages in the Durham Dales from locally quarried Dinantian Rocks. In addition coal measures sandstones have also been used. The finest examples of their use within the County are Durham Cathedral and Castle, though they were widely used across the coalfield. The Namurian sandstones of County Durham however, constitute the principal source of building stone and are used both within the County and beyond.

5.59 There are now six remaining[(xxvi)] natural building and roofing stone quarries in County Durham. All six of the County's existing active natural building and roofing stone quarries work the Namurian stone. With the exception of two sites (Cat Castle Quarry and Dunhouse Quarry), all are relatively small scale operations, with the overall scale of production being no more than 500 to 2,500 tonnes per annum, with many being only worked intermittently.

5.60 Following the cessation of working at Dead Friars Quarry (near Stanhope) in 2015 and Baxton Law Quarry (near Hunstanworth) in 2012 all remaining natural building and roofing stone quarries are now located in the former district of Teesdale. In the past this part of the County has been considered a particularly important source of architectural building stone, with stone being used extensively in the County, the North East and outside the region. For example, building stone from two quarries, Cat Castle Quarry and Dunhouse Quarry (both near Barnard Castle) having been used extensively for the repair, restoration and erection of new buildings in the North East and Scotland e.g. Stirling Castle, (Catcastle Buff), Edinburgh House, Royal Bank of Scotland, Clydesdale Bank, Sheriffs Court, Edinburgh (Dunhouse Buff).

xxvi In recent years a number of natural building and roofing stone quarries have closed. Dead Friars Quarry, near Stanhope closed in 2015 and is now being restored. The periodic review submission for this site was due in 2014, but the Council agreed to suspend the submission of the Periodic Review until 30 September 2015. However, no submission was received and so the planning permissions now cease to have effect, except insofar as it imposes any restoration or aftercare condition. At a meeting held on 15 December 2015 (with the site operator, Wardell Armstrong and Council Officers in attendance) the site operator confirmed that he will no longer be pursuing an extension of the ROMP and that the site will now be restored and put into formal aftercare. Baxton Law Quarry, near Hunstanworth closed in November 2012.

5.61 A number of the County's building stone sites (Dunhouse and Shipley Banks Quarries) process stone on site. Dunhouse Quarry also processes imported stone from other sites in England and Scotland. When active stone from Cat Castle Quarry is transported, by road, to Dunhouse Quarry. Stone from Lingberry Quarry is taken to Cockfield and Alloa to be processed. Stone from Windy Hill Quarry is taken to a site at Barnard Castle owned by the site operator.

Table 20 Natural Building and Roofing Stone quarries.

Quarry	Operator	Expiry Date for Extraction
Lingberry Quarry, Staindrop, near Barnard Castle.	F & R Jackson	25.10.2018(1)
Shipley Banks Quarry, Marwood, near Barnard Castle.	Shipley Quarries.	21.02.2042
Cat Castle Quarry, near Lartington.	Dunhouse Quarry Co Ltd.	21.02.2042
Dunhouse Quarry & Extension, near Staindrop.	Dunhouse Quarry Co Ltd.	19.08.2030
Stainton Quarry.	Stainton Quarry Ltd.	21.02.2042.
Windy Hill Quarry, Marwood, near Barnard Castle.	Windy Hill Quarry and Construction Co.	23.06.2023.

1. A planning permission was approved by the Council on 25 October 2013 for a variation on the timescale for extraction, this being a further five years.

5.62 Planning to maintain supplies of natural building and roofing stone is a major challenge. Unlike other minerals where recent information on production and permitted reserves is available, only very limited information is available from individual sites. For many years the Office of National Statistics (ONS)[xxvii] provided the only consistent source of information. Unfortunately, no information on the scale of production is available since 2007 and in previous years information on the scale of production has not been consistent[xxviii] However, due to the closure or mothballing of some sites it is estimated that production in recent years may fallen to between 10-15,000 tonnes per annum.

5.63 It is considered that in future years the County's existing building stone quarries will make a major contribution to meeting future needs of this material. However, on the basis that working is due to cease at a number of sites, as permitted reserves are exhausted, that further permissions will be required to ensure that supplies can be maintained. In this regard, in March 2015 planning permission was granted to enable an 136,000 tonne extension to Dunhouse Quarry near Staindrop. It is expected that these additional reserves will be worked over a seventeen year period at a rate of 8,000 tonnes per annum with the site being restored by 2033.

5.64 In addition to the active building stone quarries it is recognised that there are many disused building stone quarries which predate planning control or have been subsequently abandoned, which could potentially supply building stone for the repair and conservation of historic buildings in the future. Such quarries have been identified by English Heritage through their Strategic Stone Study and through the emerging County Durham Plan the Council will seek to safeguard the former sandstone and slate quarries identified by this study.

xxvii Mineral Extraction in Great Britain PA 1007.

xxviii The Office of National Statistics report Mineral Extraction in Great Britain PA 1007 reported that sales of natural building and roofing stone in County Durham were 26,000 tonnes in 2003, 23,000 in 2004, 7,000 tonnes in 2005, 24,000 tonnes in 2006 and 11,000 tonnes in 2007.

Ganister

5.65 Ganister is a high silica sandstone. Within County Durham deposits of Ganister occur within the carboniferous limestone and millstone grit series, outcropping on the fells above Weardale and within the lower coal measures in a belt running between Knitsley and Butsfield. It has been traditionally used in the manufacture of refractory bricks and cements. For refractory use, the rock must have a minimum silica content of 97% together with a low percentage of impurities.

5.66 In January 2019 there was only one active ganister quarry in County Durham, this being Harthope Head Quarry near St. John's Chapel in Weardale. This planning permission is a large planning permission covering an area of 330 ha. However, the working scheme and conditions that have been approved relate to 6 ha of the total permission area reflecting the lease area of the current site operator. Currently, the Ganister extracted at this quarry is not being used for specialist purposes. Instead this mineral is being used as building stone. No information is available on permitted reserves or sales. However, it is understood that production is sporadic and very small in scale with only very modest quantities of stone transported off site.

Table 21 Active Ganister Quarry's.

Quarry	Location	Operator	Expiry Date for Extraction
Harthope Head Quarry	Langdon Fell, Weardale, County Durham	Messrs Scott.	21.02.2042.

Moulding Sand

5.67 Deeply weathered sandstones within the Millstone Grit have been extensively worked in the past for use as naturally bonded foundry sands. Such sands were formerly of great importance to the early development of the foundary castings industry.

5.68 In January 2010 there was only one quarry producing moulding sand in the County. For many years this sand was mainly used to optimise the chemistry of the feed for the manufacture of cement at Eastgate Cement Works which closed in 2002. Information previously provided to the County Council in response to the Council's survey of mineral operators and held on a confidential basis indicated that sales from Weatherhill Quarry are very low and that reserves are extensive. However, it is understood that Weather Hill Quarry closed in 2011 and extraction has now permanently ceased.

Table 22 Mineral Qualities – Moulding Sand (Silica Sand)

Type	Value	Uses
Moulding Sand (Silica Sand)	Naturally bonded foundry sands. Poorly cemented, friable and contains kaolinite.	Foundries or other industrial purposes.

Table 23 Moulding Sand Quarries.

Quarry	Operator	Expiry Date for Extraction
Weatherhill Quarry, near Stanhope, Weardale.	Hobson Brothers Ltd.	21.02.2042.

Surface Mined Coal

Coal: 'The extent of the resource'

5.69 The coal bearing rocks of County Durham were formed during the Westphalian Epoch of the Carboniferous period between 316 and 306 million years ago. Westphalian rocks are commonly known as the 'Coal Measures' after the coal seams that they contain. Rocks of the Lower and Middle Coal Measures outcrop within County Durham. The west of the coalfield, where the seams lie close to the surface or actually outcrop is known as the exposed coalfield. Further east, the coal measures are overlain by the Permian deposits which comprise the East Durham Limestone Plateau to form the concealed coalfield.

5.70 The coals of County Durham have been mined extensively from both the exposed and concealed portions of the coalfield. They cover a range of ranks from high quality coking coals in the west to lower rank, high-volatile bituminous coals in the east. Accordingly, the quality of the coal tends to decline in a west to east direction.

5.71 Historically, coal mining in the County has moved generally from west to east as the more accessible reserves in the west were worked out and the ability to access the deeper coal seams improved. This was encouraged by the growth of the east coast towns, ports and industry. As in other coalfield areas, the deep mined coal industry declined over several decades in the latter half of the last century. In its peak years over 41 million tonnes of coal was raised and 132,000 men employed in the collieries of the County. Exhaustion of reserves and economic factors led progressively to the closure of the large deep mines in the 1980's. During the final years of deep mining, coal extraction became concentrated in a handful of amalgamated coastal collieries in which workings extended up to 8km offshore. In 1993 the last two remaining deep mines in County Durham, Easington and Seaham/Vane Tempest ceased production. The closure of Park Drift mine, near Willington in 1999 brought underground coal mining to a close.

5.72 The Durham Coalfield has been an important source of surface mined coal, with activity being confined to the exposed Lower and Middle Coal Measures. The main concentration of coals of economic interest occurring between the Bottom Marshall Green coal seam at the base and the High Main coal seam at the top (this has been used by the British Geological Survey to define the principal surface mined or opencast coal resource). Locally a few thin seams have been worked below the Bottom Marshall Green coal seam. The escarpment of the overlying Permian deposits is taken as the limit of the surface mined or opencast coal resource that is the exposed coalfield, although some coal has been recovered from the floors of large dolomite quarries. BGS information identifies two resource areas the:

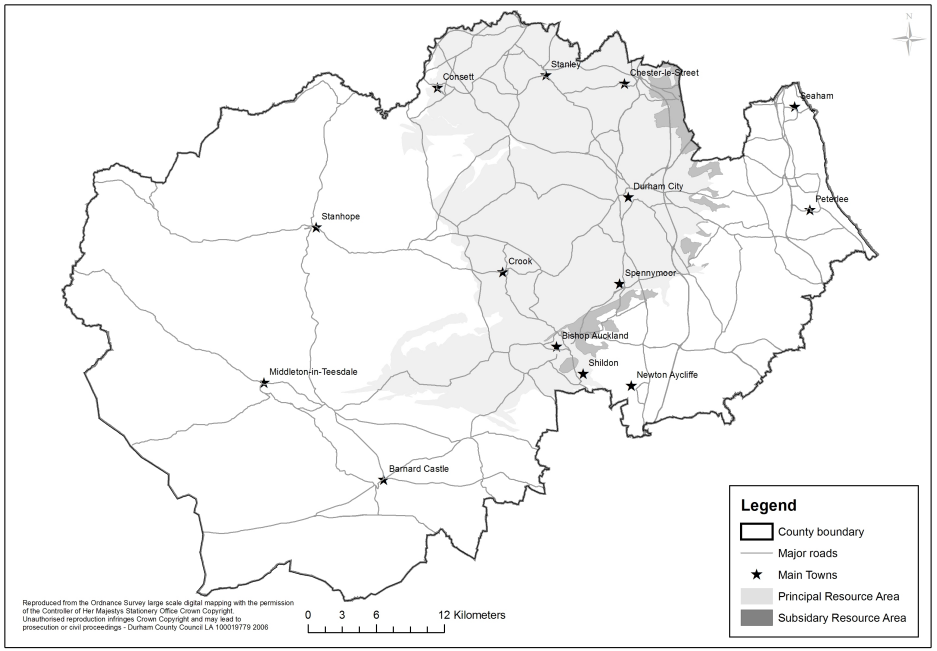
- 'Principal Resource Area' consisting of thick, closely spaced coals; and
- Subsidiary Resource Area' consisting of widely spaced coals.

'Opencast coal/Surface mined production in County Durham'

5.73 Opencast coal/surface mined coal extraction, started during the 2nd world war and is believed to have reached its peak in the early 1990's. The exposed coalfield covers approximately 715km^2 (30% of the County). Over the years, approximately 120km^2 of land has been worked or had approval for working. The pattern of historic mining in Durham, with large numbers of relatively small sites, and some re-working of areas has led in the past to the widespread loss of traditional landscape features and associated wildlife. This has had a significant impact on the area, with the loss of subtle landscapes developed over centuries. Modern restoration schemes have increasingly taken into account landscape and biodiversity considerations and successful habitat schemes have been undertaken. In recent years Durham County Council has recognised the step change in restoration schemes in the County and has awarded UK Coal Mining five restoration

awards including the 1998/99 Environment Award at Ryehill, 2001 Environmental Award at Woodside Drift Mine, 2004 Environment Award at Eldon Deep and 2006 Environment Award at Southfield.

Figure 10 The extent of the principal and subsidiary coal resource area



5.74 In 2000 DETR published a report entitled 'Mineral Resource Information for Development Plans, Durham and the Tees Valley Resources and Constraints'. This report indicated that:

- Future commercial interest in coal extraction in County Durham is likely to be confined to sites suitable only for surface mined extraction.
- The extensive nature of former surface mined sites does not imply that the coal resource has been exhausted.
- The economics of coal extraction have changed with time, allowing coals with higher overburden ratios to be extracted. Some sites, or parts of sites, have been worked on more than one occasion and may be worked for deeper coal in the future. However, modern sites worked within the last 25 years are likely to have exhausted the economically recoverable coal resources.

5.75 In the last ten years since 2004 only three surface coal mined sites have been worked in County Durham. Southfield (south of Bishop Auckland - between 2002 and 2005), Stony Heap (near Leadgate - between 2006 and 2007) and a third site called Park Wall North (near Tow Law - between 2010 and 2013).

Table 24 Worked surface mined coal sites 2004 to 2013

Site name	Nearest Settlement	Site Area and quantity of mineral permitted to be worked
Southfield	South of Bishop Auckland	99ha in extent - 520,000 tonnes of coal
Stoney Heap	Near Leadgate	49ha in extent - 270,000 tonnes of coal
Park Wall North	Tow Law	126ha in extent 1,274,500 tonnes of coal and 500,000 tonnes of fireclay

Recent Opencast coal/Surface Mined Coal Production

5.76 Sales of coal from surface mined coal sites in County Durham, the North East of England and England as a whole are set out below. This indicates that County Durham has remained a small but important source of surface mined coal over the last twelve years. In total 1.8 million tonnes of coal have been won from surface mined coal sites in County Durham

over the last ten years. This figure can be compared to the overall North East of England total of 18,417,256 tonnes and the overall England total of 30,226,120 tonnes. As can be seen production in County Durham fell below 100,000 tonnes in both 2005 and 2006, with no production occurring in 2008 and 2009. Production in both 2011 and 2012 being significantly higher than in any of the preceding eight years. Nonetheless recent production levels in County Durham can be compared unfavourably with historic production levels which in 1991/1992 were 1,469,000 tonnes of coal.

Table 25 Opencast coal production 2003 - 2008 (tonnes)

	2003	2004	2005	2006	2007	2008
County Durham	192,003	270,142	97,353	82,353	142,752	0
North East of England	1,296,315	1,268,087	788,922	867,631	1,413,991	1,223,333
England	4,068,264	3,037,396	1,456,569	966,387	1,619,209	2,138,568

Sources: Opencast Coal Statistics, BGS, various years 2003-2014.

Table 26 Opencast coal production 2009 - 2014 (tonnes).

	2009	2010	2011	2012	2013	2014
County Durham	0	106,361	369,093	341,082	210,598	0
North East of England	1,000,110	1,488,116	2,089,476	2,389,810	2,474,351	2,117,114
England	2,137,568	2,599,941	2,948,997	2,956,331	3,411,955	2,884,935

Sources: Opencast Coal Statistics, BGS, various years 2003-2014.

5.77 Information on permitted reserves of surface mined coal are set out below. The table indicates that only a small proportion of permitted reserves of surface mined coal in 2013 lay within County Durham and none in 2014. The majority of permitted reserves within the North East and England lying with Northumberland and Newcastle upon Tyne. In addition the table shows the relative importance of County Durham and the North East to the supply of surface mined coal in relation to Wales, Scotland and Great Britain as a whole.

Table 27 Permitted Reserves of Surface Mined Coal in the North East, England, Wales, Scotland and Great Britain.

	2013	Operational Sites	2014	Operational Sites
County Durham	247,372	1	0	1
Newcastle upon Tyne	1,187,634	2	840,636	2
Northumberland	1,814,745	3	455,336	4
North East of England	3,249,751	4	1,285,972	7
England	4,496,001	8	1,907,612	12
Wales	14,502,955	8	12,875,722	8
Scotland	10,411,092	16	11,362,562	12
Great Britain Total	29,410,048	32	26,145,896	32

Source: Opencast Coal Statistics 2013 and 2014. Note operational sites include sites in restoration.

Commercial Interest in new Surface Mined Coal Working in County Durham

5.78 As of 1 April 2015 three surface mined coal planning applications remained to be determined by the Council. These potential sites were:

- The Bradley surface mined coal site was submitted to the Council by UK Coal Mining Ltd in December 2006. This planning application proposed the extraction of 550,000 tonnes of coal from a 67.8ha site near Leadgate. This scheme was refused planning permission by the Council in February 2011. The refusal was then upheld at appeal on 23 February 2012. Following a high court challenge against the Inspector's appeal decision, on Friday 19th July 2013 the High Court quashed the inspector's decision on the grounds that he had misunderstood the Government's planning guidance. The appeal was subsequently heard in October 2014 and the appeal Inspector determined that planning permission should be granted on 3 June 2015. Coaling started at Bradley in 2018.

- The Marley Hill surface mined coal site was submitted to Durham County Council and Gateshead Council by UK Mining Ltd in December 2012. It proposed the extraction of approximately 1,0672,252 tonnes of coal and 175,000 tonnes of fireclay from a 119.6ha site, 80.5ha of which lies in Gateshead and 39.1 ha lies in County Durham. The planning application was approved by Gateshead Council in July 2014 but was subsequently refused by Durham County Council in February 2015. The applicant has not appealed against the refusal of planning permission.

- The Field House surface mined coal site was submitted to the Council by Hargreaves Surface Mining Ltd in August 2013. It proposed the extraction of 514,000 tonnes of coal and 83,000 tonnes of fireclay from a 55.9ha site on land to the north of Low Pittington. This planning application was refused planning permission by the Council in June 2014. The appeal was subsequently heard in September/October 2015 and the appeal Inspector determined that planning permission should be granted on 5 January 2016. Coaling started at Field House in 2018.

5.79 In addition to the proposed Bradley, Marley Hill and Field House surface mined coal sites, which were originally proposed to the Council as potential allocations following a call for sites in 2005 and 2009, UK Coal Mining Ltd had also previously expressed an interest in the working of a number of other sites as potential allocations to the County Durham Plan. These potential site were:

- A site to be known as Randolph near Evenwood in Teesdale. It was proposed that this 138 ha site would involve the extraction of 475,000 tonnes of coal over a 4 year working period; and

- A site to be known as Castle Dene/Hurbuck near Lanchester. It was proposed that this 156 ha site would involve the extraction of 645,000 tonnes of coal over a 4 year working period in total.

5.80 A second company ATH Resources had also previously expressed an interest in the working of three sites:

- Eldon Blue House on land between Shildon and Coundon. It was proposed that this 216 ha site would involve the extraction of 1.1 million tonnes of coal, fireclay and a limited amount of aggregate;

- Land to the North of High Pittington (also known as Pittington North) . It was proposed that this 1.6 km^2 site would involve the extraction of 2.5 million tonnes of coal over a 5.5 year working period; and

- Pittington South on land to the west of High Pittington. It was proposed that this 0.9 km^2 site would involve the extraction of 800,000 tonnes of coal over a 3.5 year working period.

5.81 ATH Resources went into liquidation in 2013 and that Hargreaves Mining Limited have secured some of the companies assets. As stated above Hargreaves Surface Mining Ltd submitted a planning application to

work the site know as Field House which encompassed part of the Pittington South site and that following a refusal of planning permission and appeal, planning permission was granted in January 2016.

5.82 In addition to the above sites, the Council has also been approached by developers for three other sites. These sites range in size from 25 ha to 65 ha, with estimated coal reserves of 620,000 tonnes of coal in total. However, to date no planning applications have been submitted for any of these sites. These proposals confirm the continued interest in surface mined coal extraction in County Durham and illustrate that it is impractical to plan solely for further extraction through a planned programme of allocations within the County Durham Plan or the Minerals and Waste Policies and Allocations Document.

Conventional and un-conventional Oil and Gas

5.83 The exploration, appraisal and production phases of hydrocarbon extraction can only take place in areas where the Department of Energy and Climate Change (DECC) have issued a Petroleum Exploration and Development Licence (PEDL) under the Petroleum Act 1998. Normally new licencing rounds occur every two years:

- The 13th Onshore Oil and Gas Licensing Round was launched in November 2007 and on the 28 May 2008 the Secretary of State agreed to offer 93 Petroleum Exploration and Development Licences to the oil and gas industry. None of the licence blocks which emanated from the 13th onshore licensing round lay within County Durham.

- The 14th Onshore Oil and Gas Licensing Round was launched on the 28 July 2014 and on the 18 August 2015 the Oil & Gas Authority (OGA) – the UK's oil and gas regulator – announced that 27 onshore blocks from the 14th Onshore Oil and Gas Licensing Round would be formally offered to companies. It was also announced on the 18 August that a second group of 132 further blocks has been subjected to detailed assessment under the Conservation of Habitats and Species Regulations 2010. These blocks were later offered to companies on 17 December 2015. None of the 159 licence blocks referred to above emanating from the 14th onshore licensing round lie within County Durham.

Conventional Hydrocarbons - Oil and Gas

5.84 It is not currently known whether commercially exploitable reserves of oil and gas exist in County Durham. There is no known history of exploration within the County and only limited past exploration within the North East as a whole. The BGS report 'Mineral Resources for Development Plans - Durham and the Tees Valley Mineral Resources and Constraints' reports that fifteen exploration wells have been drilled within the area, all of which lie within the Tees Valley. The BGS report explains that the majority of the drilled wells either did not encounter any oil or gas or where gas and oil was found it was only found in non-commercial quantities. The nearest well which was drilled near to County Durham was at Brafferton in Darlington Borough in 1989, but this was plugged and abandoned dry.

5.85 In practice the uncertainty over the potential for conventional oil and gas extraction in County Durham prevents the County Durham Plan from explicitly stating the potential for oil and gas production in either either quantitative or spatial terms. Should further information become available in the future, the Minerals and Waste Policies and Allocations document may be able to be more explicit, otherwise this document will only set out the decision making framework to determine planning applications for conventional oil and gas exploration, appraisal and production.

Coal Mine Methane, Abandoned Mine Methane and Coalbed Methane

5.86 Methane exists in all coal seams. It is created during the process of coal formation when gases are produced which are either absorbed into the coal or dispersed into voids around the coal seam. The gas is a potential source of energy. Methane can be exploited in three ways:

- Extraction from operational mines prior to it entering the mine air stream (coal mine methane (CMM));
- Methane extracted from abandoned mines (abandoned mine methane (AMM)); and
- Extraction from un-mined coal thicker than more than 0.4 metres at depths of below 200 and 1200 metres from surface boreholes (coalbed methane (CBM)).

5.87 We are not aware of any potential interest in any of these processes of methane extraction in County Durham. CMM is not a prospect due to the previous closure of all of County Durham's deep coal mines over twenty years ago. Similarly, it is understood that AMM or CBM may not be a prospect either. The British Geological Survey Report 'Mineral Resource Information for Development Plans: Durham and the Tees Valley: Resources and constraints', (2000) provides information on the methane content of the Durham/Northumberland Coalfield. The report indicates that:

- The average methane content of seams in the Durham/Northumberland coalfield is 1.3 m^3/t (Creedy, 1991);
- That most commercially extracted coalbed methane comes from seams with more than 7 m^3/t of coal; and
- These low gas contents, together with intensive past underground working of coal makes the Durham coalfield unattractive for coalbed methane exploitation.

Underground Coal Gasification

5.88 Underground Coal Gasification (UCG) is the in situ conversion of un-mineable coal into the combustible gases hydrogen, carbon monoxide and methane. It takes place by the interaction of the coal with oxygen and water/steam after ignition under pressure. The technique has the potential to provide a clean and convenient source of energy from coal seams where traditional mining methods are impossible or uneconomic. The technology is proven and the potential economic benefits are substantial. It also has the potential to be linked with carbon capture and storage (CCS) technology which is currently being developed in the United Kingdom and elsewhere, which would ensure carbon is not emitted to the atmosphere.

5.89 The potential scale of the role UCG may play in County Durham or the North East in the future is currently uncertain. While a number of conditional licences have been granted, none of the licences have yet to be unconditioned:

- Four conditional licences were awarded to 'Five Quarter' on the 25 March 2011 offshore at Longhouton, Lynemouth, Blyth and Tynemouth. These licences all expired on the 25 March 2014 and the licencee has applied to extend the term of each licence[(xxix)].
- Two additional conditional licences were awarded to 'Five Quarter' on 16 December 2013 offshore at Amble and at Sunderland. It is understood that both licences will expire on 16 December 2016[(xxx)].
- Two conditional licences were awarded to 'Cluff Natural Resources Plc' in August 2014 off the Durham Coast. It is understood that no progress has made to de-condition either of these licences and to date no discussions have been undertaken with the Durham County Council as Mineral Planning Authority with regard to the landward implications of either of these licences.

xxix Five Quarter subsequently ceased trading on 1 March 2016. This was due to the company being unable to secure investment.
xxx Five Quarter subsequently ceased trading on 1 March 2016. This was due to the company being unable to secure investment.

5.90 In practice this uncertainty currently prevents the County Durham Plan or the Minerals and Waste Policies and Allocations document from explicitly stating the potential for UCG in either either quantitative terms or spatial terms.

Shale Gas

5.91 There is no clear indication as to whether County Durham or the North East of England as a whole, does or does not contain commercially viable deposits of shale gas. To date BGS have only published a comprehensive study of the Bowland Shale of the Pennine Basin in the North of England[(xxxi)]. This area lies to the south of County Durham. The Department of Energy and Climate Change (DECC) have advised that other areas with relevant shale rock include the Kimmeridge Clay of the Weald Basin in Surrey and Sussex, and the Oil-Shale Group of the Midland Valley, or central belt, of Scotland. The BGS is currently conducting a study of the Kimmeridge Clay of the Weald Basin in Surrey and Sussex and plans to do so in the Midland Valley or central belt, of Scotland. The BGS does not currently have any plans to undertake a comprehensive study of shale gas potential in the North East of England.

5.92 The BGS suggest the areas with most potential for shale gas exploration are where existing conventional gas has been found. As discussed above, while in the past there has been exploration for conventional gas in the North East of England and 15 wells have been previously been drilled only minor shows of gas were recorded. However, it is understood that the North East does contain geological strata which may be of interest for exploration. A study published by the Department of Energy and Climate Change in 2010 (The Unconventional Hydrocarbon Resources of Britain's Onshore Basins - Shale Gas)[(xxxii)] indicates that the Namurian Millstone Grit Outcrop is a potential area of interest. However, there are currently no proposals in County Durham. In practice this uncertainty currently prevents the County Durham Plan or the Minerals and Waste Policies and Allocations document from explicitly stating the potential for shale gas in either either quantitative terms or spatial terms.

Vein Minerals

The North Pennines Orefield

5.93 County Durham contains a major part of the North Pennines ore-field which also extends into Northumberland and Cumbria. The area has had a long history of working metal ores. The most of important of these were lead (galena - PbS) and iron, with some byproduct silver and zinc and vein minerals including witherite, barytes and fluorspar.

5.94 The height of mineral extraction for metal ores occurred in the 18th and 19th centuries when County Durham was one of the world's largest producers of lead, with extraction ending in the late 1930's. The second half of the 20th century represented the height of mineral extraction of fluorspar with County Durham playing an important role in the development of the British fluorspar industry. At one time is was reported that some 30% of the England reserves of fluorspar were located within the Durham area.

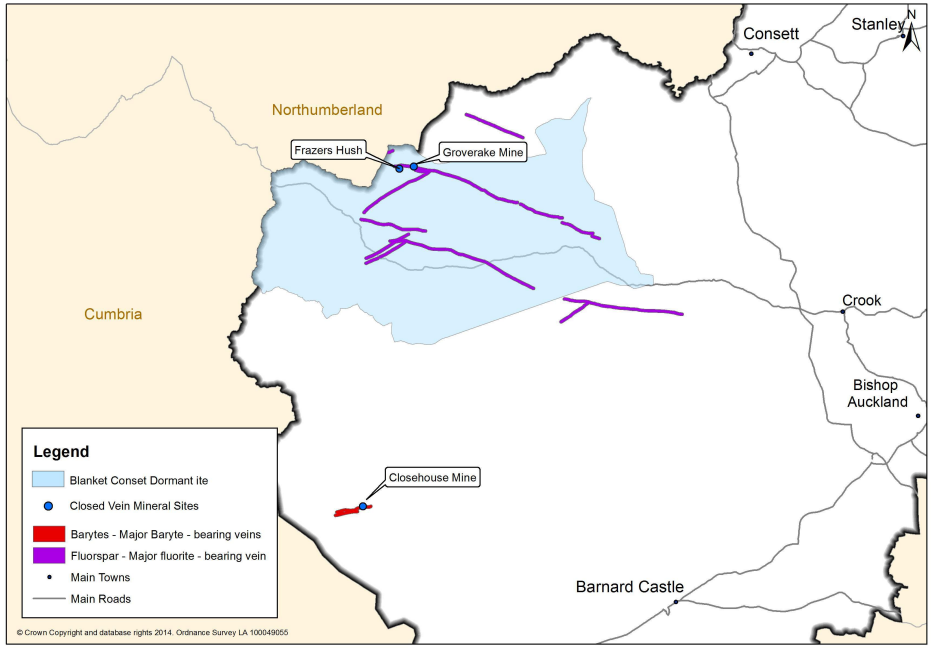
Fluorspar

5.95 Fluorspar is the commercial term for the mineral fluorite (calcium fluoride, CaF_2) which is the most important, and only, United Kingdom source of the element fluorine (F). Fluorite is principally valued for its chemical properties and most fluorspar ore is produced for the manufacture of acid-grade fluorspar which is used in the manufacture of hydrofluoric acid, the starting point for the production of a wide range of fluorine based chemicals.

xxxi https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226874/BGS_DECC_BowlandShaleGasReport_MAIN_REPORT.pdf
xxxii www.ogauthority.co.uk/media/1693/shalegas_uk.pdf

5.96 In terms of total production of fluorspar the British Geological Survey have estimated that large tonnages in the order of 2 million tonnes having been raised from mines in County Durham. However, following the closure of the last two commercial fluorspar mines in the County, Frazers Hush and Groverake Mine, near Rookhope which closed in 1999,production of fluorspar from County Durham has now ceased. Since this date and despite three calls for new mineral sites, undertaken in 2005, 2009 and 2016, no interest has been expressed by any mineral operator in any further commercial fluorspar working in County Durham. The only remaining fluorspar mine in County Durham is now Rogerley Mine which only works for a short period each year to produce specimen crystals. No information on output is available, although production is assumed to be very low.

Figure 11 The extent of the North Pennines Orefield.



5.97 In terms of the possibility of future working. There are a large number of old dormant fluorspar permissions including one consent known as the "General Blanket Consent" in upper Weardale & Rookhope area which covers twenty-five fluorspar mines, however, many of the old vein mineral mines have not been worked for many years. Information from the British Geological Survey suggests that the scope for future commercial working is very limited. The BGS report, Mineral Resource Information for Development Plans indicates that underground mining has now removed the most accessible deeper reserves and all known fluorspar-rich spoil dumps and backfill in old workings have now been reworked. In terms of future commercial working the British Geological Survey advise that future fluorspar production depends upon identifying and accessing downward extensions of major orebodies and perhaps on locating new orebodies in poorly exposed ground on lateral extremities of major vein structures.

5.98 The British Geological Survey Fluorspar Mineral Planning Fact Sheet (March 2010) indicates that remaining reserves of fluorspar reside in a small number of planning permissions for open-pit and underground extraction within the Peak District National Park. It indicates that as of October 2009 a total of 1,215,000 tonnes of ore are accessible by open pit working at Tearsall, Peak Pasture and High Rake. It indicates that about 3 million tonnes of fluorspar ore are accessible from underground mines at Milldam and Watershaw West and that planning consent was being sought to allow reworking of up to 420,00 tonnes of tailings at Cavendish Mill. The United Kingdom Year Book 2014 estimates that sales of fluorspar in the UK were 25,000 tonnes in 2014.

Barytes

5.99 Within England bartyes (barium sulphate, $BaSO_4$) occurs on the margins of the North Pennine ore field and also in the South Pennines. Barytes is a mineral largely used (77% of it) as a weighting agent for drilling fluids in oil and gas exploration. It is an essential component and there is no substitute that has all of its properties. In this regard Barytes is regarded as vital to the north sea oil and gas industry. In addition other uses of barite

are value-added applications, such as: fillers in paint and plastics; sound reduction in engine compartments; friction products for automobiles and trucks;radiation-shielding concrete e.g. for X-ray rooms; glass ceramics; and medical applications e.g. a barium meal before a CAT scan.

5.100 For many years Bartyes was produced from a number of sites in both England and Scotland. However, following the closure of two open pit Barytes workings in the Northern Pennines Orefield, at Close House, Lunedale in County Durham and Silverband in Cumbria in 2002, production in England is now confined to the Southern Pennine Orefield in the Peak District where it is produced by British Fluorpsar as a by-product of Fluorspar processing at Cavendish Mill, near Stoney Middleton and in Scotland where it has been extracted by M-I Swaco[(xxxiii)] as the sole mineral from the Foss Mine near Aberfeldy.

5.101 Following the closure of Close House Mine in County Durham in 2002, Viaton Industries the former operator of Close House Mine advised the Council that they have no interest in any further working at Close House Mine. Since this date no further interest has been expressed by any operator in any further commercial working in County Durham.

5.102 The United Kingdom Year Book 2015 indicates that in 2014 44,000 tonnes of this mineral were produced in the UK. Production in 2015 is estimated at 40,000 tonnes. The United Kingdom Year Book 2015 also indicates that the UK is a net importer with 75,984 tonnes imported in 2014.

5.103 In September 2016 it was reported that M-I Swaco proposals to develop a new Barytes mining operation at Duntalich, north of Aberfeldy in Perthshire were approved by Perth and Kinross Council. Once developed this mine, which contains an estimated 7.5 million tonnes of Barytes will be a replacement for the Foss Mine. It is understood that once production starts in 2018 that the new mine will be able to supply the whole of the UK's requirements for 50 years at planned production rates.

Peat

5.104 Within County Durham, peat deposits including blanket bogs and peat basins occur. The peat bogs occur in the uplands in the western parts of the County and the peat basins occupy hollow depressions in glacial drift or ice eroded bed rock and are found in isolated patches in the central and eastern parts of the County. Generally the blanket bogs in County Durham are up to 2 metres thick whereas basin peat may be locally much thicker.

5.105 It is understood that the blanket bogs and basin peats in County Durham are commercially unattractive in respect of peat extraction when compared with the raised bogs elsewhere in the Country. In addition many of the areas of blanket bogs lie within the North Pennines Area of Outstanding National Beauty or lie within designated Internationally important Special Protection Areas and Special Protection Areas and form part of the Natura 2000 network or nationally designated Sites of Special Scientific Interest. There are no commercial peat extraction sites in County Durham.

xxxiii M-I SWACO is a leading supplier of drilling fluid systems. In August 2010 the company became part of Schlumberger, the world's largest oilfield services company.

A Saved Minerals Local Plan Policies

A.1 This appendix sets out which policies of the County Durham Minerals Local Plan (December 2000) are currently saved.

County Durham Minerals Local Plan

A.2 Following application by the County Council for a direction under paragraph 1(3) of Schedule 8 to the Planning and Compulsory Purchase Act 2004 in March 2007 the Secretary of State for Communities and Local Government has directed that the following policies of the County Durham Minerals Local Plan are to be saved until they are replaced by the emerging policies in the County Durham Plan and the forthcoming Minerals and Waste Policies and Allocations Document.(Please note the Policies which are not listed in the Schedule (namely policies M2, M20, M21, M25, M26, M48, M49 and M53) expired on 18th April 2008.)

Table 28 County Durham Minerals Local Plan

Policy Number	Policy Name
M1	Maintenance of landbanks
M3	Extensions to mineral workings
M4	Waste and recycled materials
M5	Construction/demolition waste recycling facilities
M6	Areas of search for sand and gravel
M7	Opencast coal and fireclay
M8	Piecemeal working
M9	Drift mines
M10	Preferred areas
M11	Todhills brickworks
M12	Proposals outside identified areas
M13	Borrow pits
M14	Preventing sterilisation
M15	Extraction in advance of other development
M16	Mineral exploration
M17	Exploration outside site boundaries
M18	Conservation of high grade mineral resources
M19	Concurrent working of minerals
M22	Area of outstanding natural beauty
M23	Areas of High Landscape Value
M24	Local landscapes
M27	Locally important nature conservation sites
M28	Wildlife corridors
M29	Conservation of nature conservation value
M30	Listed buildings/conservation areas
M31	Archaeological field evaluations

Policy Number	Policy Name
M32	Archaeological remains
M33	Recording of archaeological remains
M34	Agricultural land
M35	Recreation
M36	Local amenity
M37	Stand off distances
M38	Water resources
M39	Protection of rail routes
M40	Scope for rail use in planning applications
M41	Mineral disposal points
M42	Road traffic
M43	Minimising traffic impacts
M45	Cumulative impact
M46	Restoration conditions
M47	After uses
M50	On site processing
M51	Storage
M52	Site management
M54	Magnesian Limestone Escarpment
M55	Southern extension to Thrislington Quarry

Policy Number	Policy Name
M56	Eastern extension to Thrislington Quarry

B Minerals Sites in County Durham

B.1 This appendix provides basic information on all of the mineral sites with permission for working and dormant mineral sites and Interim Development Order (IDOs) sites in County Durham.

Mineral sites with permission for working

B.2 The mineral sites with valid and up to date planning permission for mineral extraction in County Durham are shown in the table below[xxxiv]. Permitted reserves in the aggregate sites form part of the respective landbanks for crushed rock and sand and gravel. The majority of these sites are currently active although several are inactive and not currently been worked by operators. This table also includes some Interim Development Order sites (IDOs) where new scheme of conditions have been issued by the County Council.

Table 29 Mineral Sites with Planning Permission enabling working (Position at 1 January 2019).

Quarry	Location (nearest settlement)	Operator	Commodity / Minerals Extracted	Status
Eldon Quarry	Eldon	N/A	Brick shale	Inactive
Long Lane Quarry	Newfield	Wienerberger	Brick shale	Active
Broadwood Quarry	Frosterley	Breedon[xxxv]	Carboniferous Limestone	Active
Heights Quarry (including Cambokeels)	Eastgate	Aggregate Industries	Carboniferous Limestone and Fluorspar	Active
Hulands Quarry	Bowes	Aggregate Industries	Carboniferous Limestone	Active
Kilmond Wood Quarry	Bowes	Kearton Farms Ltd	Carboniferous Limestone	Active
Force Garth Quarry	Middleton -in-Teesdale	Cemex UK Materials Ltd	Dolerite	Active
Bishop Middleham Quarry	Bishop Middleham	W & M Thompson (Quarries) Ltd	Magnesian Limestone	Active
Cornforth East Quarry	Cornforth	Tarmac	Magnesian Limestone	Inactive
Cornforth West Quarry	Cornforth	Tarmac	Magnesian Limestone	Inactive
Coxhoe (Raisby)	Coxhoe	Breedon	Magnesian Limestone	Active
Witch Hill Quarry	Shadforth	Breedon	Magnesian Limestone	Inactive
Running Waters Quarry	Sherburn	Breedon	Magnesian Limestone (note new conditions	Inactive

xxxiv This table includes sites which have planning permission yet are not active including sites where working has yet to commence. The table excludes Rogerley Mine which is worked to produce ornamental specimen pieces of green fluorite. In addition this table also excludes three small borrow pits which were granted planning permission to extract very limited quantities of stone to construct estate roads in March and June 2014. Planning permission was granted in June 2014 to extract up to 10,000 tonnes to produce sandstone aggregate at Nookton Fell, Blanchland. Planning permission was granted in March 2014 to extract 8,000 tonnes of stone from Harniston Craggs Quarry for the creation of estate roads at Bollihope Common, near Frosterley. Planning permission was granted in March 2014 to extract 7,424 tonnes of sandstone from Cotherstone Moor for the creation of estate roads at Bollihope Moor near Frosterley.

xxxv In December 2016 Sherburn Stone Company Ltd was aquired by Breedon.

Quarry	Location (nearest settlement)	Operator	Commodity / Minerals Extracted	Status
			issued but site not operating under new conditions).	
Crime Rigg Quarry	Shadforth	Breedon	Magnesian Limestone and Basal Permian Sand	Active
Thrislington Quarry West	Cornforth	Tarmac	Magnesian Limestone and Basal Permian sand.	Active
Thrislington Quarry East(1).	Cornforth	Tarmac	Magnesian Limestone and High Grade Dolomite	Active
Low Harperley	Wolsingham	Breedon	Sand and Gravel	Active
Hummerbeck	West Auckland	Hall Construction	Sand and Gravel	Inactive
Old Quarrington and Cold Knuckles Quarry	Old Quarrington	Tarmac	Magnesian Limestone and Basal Permian Sand	Active
Cat Castle Quarry	Lartington	Dunhouse Quarry Co Ltd	Sandstone	Active
Dunhouse Quarry and Extension	Staindrop	Dunhouse Quarry Co Ltd	Sandstone	Active
Lingberry Quarry	Staindrop	Border Stone Quarries Ltd	Sandstone	Active
Shipley Banks	Marwood, Barnard Castle	Shipley Quarries	Sandstone	Active
Stainton Quary	Stainton	Stainton Quarry Ltd	Sandstone	Active
Windy Hill Quarry	Marwood, Barnard Castle	Windy Hill Quarry Construction Co	Sandstone	Active
Harthope Head Quarry	St Johns Chapel	Mr R Scott	Ganister	Active
Field House	Pittington	Hargreaves	Coal	Active
Bradley	Leadgate	Banks	Coal and fireclay	Active
Weather Hill Quarry	Stanhope	Hobson Brothers	Moulding Sand	Inactive

1. Note: Through a legal agreement as part of the extension of Thrislington Quarry to the east of the A1(M), Rough Furze Quarry will be rendered inoperative and no quarrying, extraction of minerals or associated activated shall be carried out in Rough Furze.

Dormant Mineral Sites

B.3 Records show that there are 46 dormant sites in County Durham. Basic details of these sites are set out in the table below. Please note while some of these sites are recorded as dormant they have been restored via landfill i.e. sites 37 and 38, Coxhoe (including Joint Stocks) and John O'Tooles (Leasingthorn Quarry).

Table 30 Dormant Mineral Sites (Position at 1 January 2018).

No	Site Name and Location.	Mineral.
1	Lunehead, Teesdale	Barytes
2	St Bedes, Birtley, Chester-le-Street.	Brick Clay (restored landfill)
3	Cobey Carr (Todhills) Newfield	Brick shale (restored by landfill)
4	Lumley Brickworks, Fencehouses, Chester-le-Street.	Brick shale (restored landfill)
5	Bollihope (Jopler Sykes), Frosterley, Wear Valley.	Carboniferous Limestone
6	Bollihope L20, Frosterley, Wear Valley.	Carboniferous Limestone
7	Bollihope L21, Frosterley, Wear Valley.	Carboniferous Limestone
8	Carriers Hill, Killhope, Wear Valley.	Carboniferous Limestone
9	Greenfield, Lanehead, Wear Valley.	Carboniferous Limestone
10	Parson Byers, Stanhope, Wear Valley.	Carboniferous Limestone
11	Puddingthorn. Lanehead, Wear Valley	Carboniferous Limestone
12	Scutterhill, Westgate, Wear Valley	Carboniferous Limestone
13	Side Head, Westgate, Wear Valley	Carboniferous Limestone
14	White Hills, Ireshopeburn, Wear Valley	Carboniferous Limestone
15	Cockfield, Teesdale	Dolerite
16	Crossthwaite, Holwick, Teesdale	Dolerite
17	Greenfoot, Stanhope, Wear Valley	Dolerite
18	Middleton, Holwick, Teesdale	Dolerite
19	Park End, Holwick, Teesdale	Dolerite
20	Stotsfieldburn, Rookhope, Wear Valley.	Fluorpsar
21	Bollihope (Harnisha Burn & Yew Tree), Frosterley, Wear Valley.	Fluorspar
22	Burtree Pasture, Cowshill, Wear Valley.	Fluorspar
23	Sedling Mine, Cowshill, Wear Valley.	Fluorspar
24	Slitt Pasture, Westgate, Wear Valley.	Fluorspar
25	West Blackdene, Ireshopeburn, Wear Valley	Fluorspar
26	Castleside, Castleside.	Ganister
27	Cat Crag, Lanehead, Wear Valley.	Ganister
28	Doctors Gate, Wolsingham, Wear Valley/Teesdale.	Ganister

No	Site Name and Location.	Mineral.
29	Harthope West, St John's Chapel, Wear Valley	Ganister
30	Howden Burn, Frosterley, Wear Valley.	Ganister
31	Lintzgarth, Rookhope, Wear Valley.	Ganister
32	Muggleswick Common, Stanhope, Derwentside.	Ganister
33	Redmires, Wolsingham, Wear Valley.	Ganister
34	Roundhill, Rogerley, Wear Valley.	Ganister
35	Blanket Consent (Upper Weardale & Rookhope), Wear Valley.	Lead Ore, Zinc Ore & Fluorspar
36	Tuthill Quarry, Haswell, Easington	Magnesian Limestone
37	Coxhoe (including Joint Stocks), Coxhoe, Durham City	Magnesian Limestone (now in process of being restored through the importation of inert material).
38	John O'Tooles (Leasingthorn Quarry), Bishop Auckland, Wear Valley.	Magnesian Limestone (site also partially landfilled)
39	Houselop Beck, Wolsingham, Wear Valley	Moulding Sand
40	Hummerbeck, West Auckland, Teesdale	Sand & Gravel
41	Page Bank, Byers Green, Wear Valley	Sand & Gravel
42	Roger Hill, Derwent Bridge Wear Valley	Sand & Gravel
43	Wolsingham, Wear Valley	Sand & Gravel
44	Berry Bank, Edmondbyers ,Wear Valley	Sandstone
45	Viewly Hill, High Stoop Quarry, Wolsingham, Wear Valley	Sandstone
46	Wharnley Burn Farm, Castleside, Derwentside.	Sandstone

Interim Development Orders in County Durham.

B.4 Records show that there are 14 dormant sites in County Durham. Basic details of these sites are set out in the table below.

Table 31 Interim Development Order's in County Durham.

Site Name	Mineral	New scheme of conditions issued	Site operating under new conditions	Operator/Landowner
Land at Eldon Brickworks (known as Eldon Quarry)	Brickshale/ coal	Yes	Yes	Rt Hon Earl of Eldon (landowner)
Broadwood Quarry (IDO 3/3/1)	Carboniferous Limestone	Yes	Yes	Breedon

Site Name	Mineral	New scheme of conditions issued	Site operating under new conditions	Operator/Landowner
Harrowbank (IDO/3/1)(1)	Carboniferous Limestone	No	No	Tarmac
Force Garth (IDO/6/1/1)	Dolerite	Yes	Yes	Cemex Ltd
Aycliffe East Quarry (IDO/7/82)(2)	Magnesian Limestone	Yes	Yes	Stonegrave Aggregates
Running Waters (IDO/4/1/1)(3)	Magnesian Limestone	Yes	No	Breedon
Cornforth (east and west) (IDO/7/5/1) (IDO/7/5/1)(4)	Magnesian Limestone	Yes	Yes	Tarmac
Aycliffe West Quarry (IDO/7/8/1)(5)	Magnesian Limestone	Yes	Yes	Stonegrave Aggregates
Hawthorn (IDO/5/1)(6)	Magnesian Limestone	No	No	Tarmac
Witch Hill Quarry (IDO4/2(1)1	Magnesian Limestone	Yes	Yes	Breedon
Old Town (also known as Middridge Quarry) (IDO/7/7)(7)	Magnesian Limestone	No	No	Tarmac
Chilton (IDO/7/4)(8)	Magnesian Limestone and sand	No	No	Tarmac
Gypsy Lane (IDO/7/6)(9)	Sand	No	No	Rt Hon Earl of Eldon (landowner)
Land south of Gladstone Terrace, Chilton Quarry (IDO7/3/1)(10)	Sand and gravel	Yes	Yes	Tarmac

1. Harrowbank Quarry - This quarry is currently inactive and has not been worked for many years. Three extant Planning permissions exist at Harrowbank Quarry which require review under the requirements of the Planning and Compensation Act 1991 and the Environment Act 1995. The site is an 'active Phase 1' as identified under the terms of the Environment Act 1995. New planning conditions have yet to be agreed.
2. Mineral extraction at Aycliffe Quarry ceased in 2014.
3. Running Waters - Under the terms of the Planning and Compensation Act 1991 a new Schedule of conditions for Running Waters Quarry was issued by Durham County Council on 30 July 1997. The new Schedule of conditions require a scheme of working to be submitted within 6 months of the date of the conditions or prior to the recommencement of any further winning and working of minerals whichever is the later. However, the site is not currently operating and has not done so for many years. It is not operating under the new schedule of conditions.
4. Cornforth (east and west) - West Cornforth Quarry is currently inactive and has not been worked for many years (it was last worked in the 1980's). One extant Planning permission exists at West Cornforth Quarry. This is an Interim Development Order (IDO). Under the terms of the Planning and Compensation Act 1991 a new Schedule of conditions for Cornforth West Quarry was issued by Durham County Council on 14 September 1994. The new Schedule of conditions requires a working and restoration scheme to be submitted prior to the commencement of extraction within specified areas. Part of the permission area is to remain unworked. Conditions specified time scales for the submission of blasting, restoration and aftercare schemes, given that the site operator has no immediate intention of working the site these dates have been amended. East Cornforth Quarry - Under the terms of the Environment Act 1995 a new Schedule of conditions for Cornforth East Quarry was issued by Durham County Council on 10 June 1999. Through a legal agreement linked to the approval of an extension at Raisby Quarry the site operator agreed to the extinguishment of planning permission for working the northern part of the Planning Permission and to limit working in the remainder of the quarry in the period up to 2007. In addition no quarrying is to take place within that part of the permission area that lies to the west of the A1(M).
5. Aycliffe Quarry West - Site is restored and now in aftercare.
6. Hawthorn Quarry - This quarry is currently inactive and has not been worked for some time. Five extant Planning permissions exist at Hawthorn Quarry which require review under the requirements of the Planning and Compensation Act 1991 and the Environment Act 1995. The site is an 'active Phase 1' as identified under the terms of the Environment Act 1995. New planning conditions have yet to be agreed. This cannot occur until an Environmental Statement has been submitted and assessed. In July 2015, Tarmac submitted a request for a scoping

opinion in respect of the ROMP previously submitted at Hawthorn Quarry. The environmental statement which accompanied the ROMP suggested that it would be proposed to extract approximately 700,000 tonnes per annum with a view to extracting 10.5 million tonnes over a 15 year period. Of this 700,000 tonnes extracted per annum, the environmental statement indicated that approximately 400,000 tonnes would be distributed within the UK and the remainder potentially exported overseas. It is understood that Hawthorn Quarry contains 12,659,000 of magnesian limestone of which 9,537,000 is claimed as high grade. The Environment Act 1995 periodic review application was subsequently submitted in December 2017 and is currently pending consideration. The periodic review application confirmed the companies intent to extract 10.5 million tonnes of mineral and indicated that some high grade material may be exported from Seaham Harbour.

7. The quarry has not been worked for many years and is now designated as a County Geological site. In February 2010 Lafarge Tarmac (now known as Tarmac) proposed the revocation of the planning permission through legal agreement with no requirement for restoration works to be undertaken, noting that because there is a weak bridge it would be impossible for earth moving machinery to enter the site to undertake any restoration work. Tarmac also noted that the site is recolonising naturally and bare rock habitats are developing and in the past that Council officers considered that these were worthy of retention. A legal agreement under the provisions of Section 106 of the Town and Country Planning Act was signed between the the operator and the County Council in May 2012. This legal agreement has put to an end all quarrying associated with the IDO permission and removing the requirements to comply with restoration conditions or to carry out the long term maintenance of the site. The responsibility to ensure public safety however remains with Tarmac.
8. Chilton Quarry - At present the only relevant conditions relate to restoration and aftercare. The northern area of the site was restored in late 2004 by subcontractors working on behalf of the site operators. There are requirements for the operator to submit a restoration scheme for the southern part of the quarry.
9. Gypsy Lane - One extant planning permission exists at this quarry. This is an Interim Development Order (IDO) permission and no working of the site can take place until there has been a determination of new conditions by the Minerals Planning Authority under the requirements of the Planning and Compensation Act 1991.
10. Land south of Gladstone Terrace, Chilton Quarry (IDO7/3/1). This site has now been worked and restored. The Council served a notice to this effect, on owners of the land and persons with an interest in the site, under paragraph 4 of schedule 14 of the Environment Act 1995 on 19 October 2007.

C Safeguarded Relic Quarries

C.1 This appendix provides basic details of the relic sites identified by English Heritage through their Strategic Stone Study. It excludes a number of sites which are currently active mineral sites, or sites which were limestone (magnesian and carboniferous) or clay and shale sites.

Table 32 Relic sites identified by English Heritage through their Strategic Stone Study (excluding active quarries and all non sandstone, slate and ganister commodities).

Quarry Name	Commodity	Grid Reference		Geology
Redgate	Sandstone	408,235.00	538,140.00	Stainmore Formation Sandstone
Wiserley Hill	Sandstone	402,285.00	537,665.00	Stainmore Formation Sandstone
Stainton Grange	Sandstone	407,075.00	518,830.00	Stainmore Formation Sandstone
Dead Friars 1	Sandstone	397,180.00	545,185.00	Stainmore Formation Sandstone
Butsfield Quarry	Ganister	409,655.00	544,495.00	Lower Coal Measures Sandstone
Drovers Roadside Quarry	Ganister	409,437.00	542,973.00	Lower Coal Measures Sandstone
Hermitage Ganister	Ganister	409,500.00	543,250.00	Lower Coal Measures Sandstone
Salters Gate	Sandstone	406,505.00	543,525.00	Lower Coal Measures Sandstone
Hall Heads	Sandstone	425,170.00	531,845.00	Lower Coal Measures Sandstone
Hall Heads	Sandstone	425,085.00	531,865.00	Lower Coal Measures Sandstone
Quarry Houses	Sandstone	423,605.00	531,060.00	Lower Coal Measures Sandstone
Westerton	Sandstone	423,780.00	531,100.00	Lower Coal Measures Sandstone
Westerton	Sandstone	424,000.00	531,205.00	Lower Coal Measures Sandstone
Westerton	Sandstone	423,660.00	531,180.00	Lower Coal Measures Sandstone
Catty Crag	Sandstone	394,918.00	517,018.00	Stainmore Formation Sandstone
Yew Scar	Sandstone	397,375.00	519,895.00	Stainmore Formation Sandstone
West Town	Sandstone	406,305.00	517,450.00	Stainmore Formation Sandstone
Town Head	Sandstone	405,795.00	517,100.00	Stainmore Formation Sandstone
Shipley Banks	Sandstone	401,560.00	520,925.00	Stainmore Formation Sandstone
Baxtongill	Sandstone	402,530.00	520,790.00	Stainmore Formation Sandstone
High Park Wall	Sandstone	403,450.00	519,820.00	Stainmore Formation Sandstone
Hebburn Hall	Sandstone	431,410.00	564,190.00	Lower Coal Measures Sandstone

Quarry Name	Commodity	Grid Reference		Geology
Heworth	Sandstone	428,900.00	562,210.00	Grindstone Post Sandstone
White House	Sandstone	427,990.00	560,060.00	Grindstone Post Sandstone
Leam Lane	Sandstone	428,714.00	559,760.00	Grindstone Post Sandstone
Clints	Sandstone	398,350.00	513,700.00	Stainmore Formation Sandstone
Urpeth Common	Sandstone	423,120.00	553,492.00	Middle Coal Measures Sandstone
High Row	Sandstone	424,517.00	552,112.00	Middle Coal Measures Sandstone
Burnthouse Quarries	Sandstone	425,393.00	551,807.00	Middle Coal Measures Sandstone
White Hall	Sandstone	423,311.00	550,979.00	Main Post Sandstone
Congburn	Sandstone	424,776.00	550,316.00	Middle Coal Measures Sandstone
Blue House	Sandstone	423,432.00	552,847.00	Main Post Sandstone
Rabbit Hills	Sandstone	423,168.00	553,262.00	Main Post Sandstone
Smithydean Quarries	Sandstone	424,754.00	549,459.00	Middle Coal Measures Sandstone
Smithydean Quarries	Sandstone	424,550.00	549,563.00	Middle Coal Measures Sandstone
Sniperley	Sandstone	425,911.00	544,564.00	Middle Coal Measures Sandstone

Quarry Name	Commodity	Grid Reference		Geology
Sniperley	Sandstone	425,227.00	544,510.00	Middle Coal Measures Sandstone
Low Brasside Moor	Sandstone	430,391.00	545,990.00	Middle Coal Measures Sandstone
Brasside Quarry	Sandstone	430,235.00	546,095.00	Middle Coal Measures Sandstone
Mallygill Quarry	Sandstone	430,663.00	545,651.00	Middle Coal Measures Sandstone
Woodwell House	Sandstone	429,860.00	545,041.00	Middle Coal Measures Sandstone
Frankland Wood	Sandstone	429,474.00	544,956.00	Middle Coal Measures Sandstone
Frankland Wood	Sandstone	429,633.00	544,873.00	Middle Coal Measures Sandstone
Kepier Wood	Sandstone	429,584.00	544,737.00	Middle Coal Measures Sandstone
Kepier Wood	Sandstone	429,411.00	544,193.00	Middle Coal Measures Sandstone
New Pittington	Sandstone	432,625.00	544,291.00	Middle Coal Measures Sandstone
Kepier Quarries	Sandstone	429,277.00	544,002.00	Middle Coal Measures Sandstone
Low Hermitage	Sandstone	409,522.00	543,196.00	Lower Coal Measures Sandstone
Drover House	Sandstone	409,375.00	542,545.00	Lower Coal Measures Sandstone

Quarry Name	Commodity	Grid Reference		Geology
Drover House	Sandstone	409,398.00	542,574.00	Lower Coal Measures Sandstone
Adelpi Plantations	Sandstone	410,311.00	542,566.00	Lower Coal Measures Sandstone
Hermitage Plantation	Sandstone	410,612.00	542,992.00	Lower Coal Measures Sandstone
Coalford Quarry	Sandstone	411,366.00	543,017.00	Lower Coal Measures Sandstone
Coalford Bridge	Sandstone	411,481.00	543,201.00	Lower Coal Measures Sandstone
Steeley Burn	Sandstone	411,077.00	542,865.00	Lower Coal Measures Sandstone
Kennel Wood	Sandstone	411,027.00	542,260.00	Lower Coal Measures Sandstone
Lodge Wood	Sandstone	411,301.00	541,695.00	Lower Coal Measures Sandstone
Hutchet Wood	Sandstone	410,453.00	541,996.00	Lower Coal Measures Sandstone
Low Hermitage	Sandstone	409,274.00	543,062.00	Lower Coal Measures Sandstone
East Brandon Wood	Sandstone	420,772.00	539,996.00	Middle Coal Measures Sandstone
Brandon Hall	Sandstone	423,243.00	539,956.00	Middle Coal Measures Sandstone
Littleburn	Sandstone	425,802.00	539,965.00	Middle Coal Measures Sandstone

Quarry Name	Commodity	Grid Reference		Geology
Borehole Wood	Sandstone	425,905.00	539,956.00	Middle Coal Measures Sandstone
Rabbit Hill Plantation	Sandstone	420,842.00	539,158.00	Middle Coal Measures Sandstone
Little Burn	Sandstone	425,879.00	538,733.00	Middle Coal Measures Sandstone
Rabbit Hill Plantation	Sandstone	420,924.00	539,154.00	Middle Coal Measures Sandstone
Brandon Colliery	Sandstone	424,213.00	539,587.00	Middle Coal Measures Sandstone
Cascade Walk	Sandstone	425,828.00	538,792.00	Middle Coal Measures Sandstone
Long Hill	Sandstone	420,327.00	540,751.00	Middle Coal Measures Sandstone
Pit Cottage	Sandstone	427,346.00	543,091.00	Middle Coal Measures Sandstone
Crook Hill	Sandstone	427,436.00	543,191.00	Middle Coal Measures Sandstone
Green Hill	Slate	384,791.00	529,570.00	Slate
Rackwood Hill	Sandstone	409,105.00	529,905.00	Lower Coal Measures Sandstone
Cockfield Fell	Sandstone	412,169.00	524,629.00	Lower Coal Measures Sandstone
Cockfield Fell	Sandstone	412,333.00	524,589.00	Lower Coal Measures Sandstone
Butterknowle Farm	Sandstone	412,983.00	525,083.00	Lower Coal Measures Sandstone

Quarry Name	Commodity	Grid Reference		Geology
Low Lands	Sandstone	413,291.00	524,997.00	Lower Coal Measures Sandstone
Low Lands	Sandstone	413,475.00	524,883.00	Lower Coal Measures Sandstone
Charley Pasture Quarry	Sandstone	411,914.00	524,342.00	Lower Coal Measures Sandstone
Peathrow East	Sandstone	410,822.00	524,316.00	Lower Coal Measures Sandstone
Oaky Bank Quarry	Sandstone	409,939.00	524,383.00	Lower Coal Measures Sandstone
Lower West Garth	Sandstone	411,043.00	524,574.00	Lower Coal Measures Sandstone
Cockfield Fell	Sandstone	412,028.00	525,483.00	Lower Coal Measures Sandstone
Cockfield Fell	Sandstone	412,061.00	525,427.00	Lower Coal Measures Sandstone
Cockfield Fell	Sandstone	412,721.00	525,153.00	Lower Coal Measures Sandstone
Wilson House	Sandstone	408,203.00	511,868.00	Alston Formation Sandstone
Adam Hill	Sandstone	409,039.00	510,028.00	Alston Formation Sandstone
Birk Hill	Sandstone	408,223.00	509,602.00	Alston Formation Sandstone
Langbrough	Sandstone	407,383.00	509,524.00	Alston Formation Sandstone

Quarry Name	Commodity	Grid Reference		Geology
Langbrough	Sandstone	407,461.00	509,524.00	Alston Formation Sandstone
East Langbrough	Sandstone	407,277.00	509,402.00	Alston Formation Sandstone
Standards	Sandstone	385,580.00	522,280.00	Alston Formation Sandstone
Bail Hill Quarries	Sandstone	396,901.00	522,220.00	Stainmore Formation Sandstone
Bail Hill Quarries	Sandstone	397,058.00	522,260.00	Stainmore Formation Sandstone
Grange Hill	Sandstone	423,152.00	528,920.00	Middle Coal Measures Sandstone
Brusselton Wood	Sandstone	419,658.00	525,275.00	Lower Coal Measures Sandstone
Brusselton Quarry	Sandstone	420,166.00	525,068.00	Lower Coal Measures Sandstone
Brusselton Wood	Sandstone	420,305.00	525,089.00	Lower Coal Measures Sandstone
Brusselton	Sandstone	419,266.00	525,362.00	Lower Coal Measures Sandstone
Brusselton	Sandstone	420,627.00	525,040.00	Lower Coal Measures Sandstone
Latterington Hall	Sandstone	418,873.00	524,432.00	Lower Coal Measures Sandstone
Sewell Wood	Sandstone	421,991.00	529,800.00	Middle Coal Measures Sandstone

Quarry Name	Commodity	Grid Reference		Geology
Shawbrow Hill	Sandstone	422,154.00	527,336.00	Middle Coal Measures Sandstone
Howe Gill Quarries	Sandstone	402,696.00	522,418.00	Stainmore Formation Sandstone
Howe Gill Quarries	Sandstone	402,565.00	522,389.00	Stainmore Formation Sandstone
Moss Close	Sandstone	402,493.00	521,791.00	Stainmore Formation Sandstone
Shipley Banks Quarries	Sandstone	402,198.00	520,978.00	Stainmore Formation Sandstone
Shipley Banks Quarries	Sandstone	401,481.00	521,165.00	Stainmore Formation Sandstone
Shipley Banks Quarries	Sandstone	401,500.00	521,078.00	Stainmore Formation Sandstone
Belle Vue	Sandstone	404,484.00	519,358.00	Stainmore Formation Sandstone
Knot Hill	Sandstone	403,794.00	519,225.00	Stainmore Formation Sandstone
Knot Hill	Sandstone	403,740.00	519,269.00	Stainmore Formation Sandstone
Knot Hill	Sandstone	404,199.00	518,884.00	Stainmore Formation Sandstone
Towler Hill	Sandstone	403,760.00	517,656.00	Stainmore Formation Sandstone
Bowes Dunn House Quarry	Sandstone	411,195.00	519,308.00	Stainmore Formation Sandstone

Quarry Name	Commodity	Grid Reference		Geology
Dunn House Quarry	Sandstone	411,133.00	519,256.00	Stainmore Formation Sandstone
Dunn House Quarries	Sandstone	411,153.00	519,170.00	Stainmore Formation Sandstone
North Wood	Sandstone	411,459.00	523,718.00	Lower Coal Measures Sandstone
West View	Sandstone	405,295.00	515,794.00	Stainmore Formation Sandstone
Sealgill Quarries	Sandstone	397,357.00	513,208.00	Stainmore Formation Sandstone
Brignall Banks	Sandstone	404,270.00	511,583.00	Alston Formation Sandstone
Ling Plantation	Sandstone	403,809.00	511,917.00	Alston Formation Sandstone
Brignall Quarries	Sandstone	404,031.00	511,635.00	Alston Formation Sandstone
Moor House Farm	Sandstone	405,214.00	511,768.00	Alston Formation Sandstone
Brignall Banks	Sandstone	405,415.00	511,300.00	Alston Formation Sandstone
Lily Hill	Sandstone	406,026.00	511,812.00	Alston Formation Sandstone
Lily Hill	Sandstone	406,063.00	512,111.00	Alston Formation Sandstone
Westwick Moor	Sandstone	408,707.00	517,205.00	Stainmore Formation Sandstone

Quarry Name	Commodity	Grid Reference		Geology
Tinklers Quarry	Sandstone	396,977.00	517,837.00	Stainmore Formation Sandstone
Barningham Moor	Sandstone	404,866.00	507,975.00	Alston Formation Sandstone

D Glossary of Terms

Minerals Glossary

After-care: Steps necessary to bring restored land up to the required standard for the intended after-use.

After-use: The ultimate use, after mineral workings are restored.

Aggregates: Sand, gravel, crushed rock and other bulk materials, used by the construction industry.

AWP Aggregates Working Party (AWP). A working group consisting of local authority officers, representatives of the aggregates industry and central government established to consider the supply and demand or aggregate minerals.

Ancillary Operations: Those activities associated with the winning and working of minerals e.g. processing plant.

Aquifer: A water bearing geological formation.

Area of Search: A broad area of mineral resources within which some mineral extraction may be acceptable, subject to detailed consideration.

Borrow Pit: A temporary mineral working to supply material for a specific construction project.

Bulk Fill: Filling material of low economic value used in construction projects.

Bund: Artificial embankment to screen mineral development or contain tipped materials.

Carboniferous: The period of geological time between 345 and 290 million years ago.

Contaminated Land: Any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land that:

d. significant harm is being caused or there is a possibility of such harm being caused; or
e. ollution of controlled waters* is being, or is likely to be caused. (* controlled waters include the sea, up to 3 miles offshore, estuaries, water contained in underground strata, and most lakes, ponds, reservoirs, rivers and other watercourses)

Derelict Land: Land so damaged by industrial or other development that it is incapable of beneficial use without treatment. This covers disused or abandoned land requiring restoration works to bring it into use or to improve its appearance. It does not include land which might have a derelict appearance from natural causes such as marshland, mud flats or sand dunes, neglected woods or farmland, waste land, generally land formerly affected by development but which, with time, has blended into the landscape.

Disposal Point: Location for the loading, unloading or transhipment of minerals or mineral products on, from or between transport modes.

Dolomite (mineral): A double carbonate of calcium and magnesium (chemical formula Ca Mg $(CO^3)^2$) occurring as crystals in dolomite rock.

Dolomite (rock): Technically a rock containing in excess of 90% of mineral dolomite, but commonly applied to rock containing in excess of 15% of mineral dolomite.

Dormant Site: A site with planning permission on which mineral operations have temporarily or permanently ceased. New conditions are required to be agreed and issued by the local planning authority prior to working be resumed.

Energy Minerals: Coal, oil and gas.

Established need: Established need is a need for a mineral when assessed against existing permitted reserves of suitable material e.g. sand and gravel. Calculation of established need takes into account any sub-regional apportionments, local forecasts and existing permitted reserves.

Export Terminal: Central collection point for final distribution for oil or gas from a productive field.

Fines: Silt and clay sized fraction of a deposit finer than 60 microns.

Geo-diversity: Variety of geological environments, phenomena and processes.

Geo-diversity Action Plan: A plan for the promotion of geo-diversity on a county-wide or local scale.

Hard Rock: Consolidated rock such as limestone and granite.

High Grade Dolomite: Dolomite rock which has few impurities, particularly iron oxide, silica and alumina, so that when it is used for the production of magnesia, as a steel flux, as an iron sinter, or in the glass making industry such impurities do not impair the quality of the subsequent product.

Interim Development Order: Interim Development Order (IDO). A permission granted under the Town and Country Planning (General Interim Development) Order 1946.

Igneous: Rocks originating from a molten state which are characteristically of crystalline composition.

Landbank: A stock of mineral reserves with planning permission for their winning and working.

MPA: Mineral planning authority.

Magnesian Limestone: Technically a limestone containing between 5 and 15% of the mineral dolomite, the remaining part being largely the mineral calcite. The term is also used to identify Permian age limestone and dolomite features in eastern England.

Mineral: Minerals are defined in section 336 of the Town & Country Planning Act 1990 as ‘all substances of a kind ordinarily worked for removal by underground or surface working, except that it does not include peat cut for sale’.

Minerals of local and national importance: Minerals which are necessary to meet society’s needs, including aggregates, brickclay (especially Etruria Marl and fireclay), silica sand (including high grade silica sands), cement raw materials, gypsum, salt, fluorspar, shallow and deep-mined coal, oil and gas (including hydrocarbons), tungsten, kaolin, ball clay, potash and local minerals of importance to heritage assets and local distinctiveness.

Mineral Safeguarding Area: An area designated by Minerals Planning Authorities which covers known deposits of minerals which are desired to be kept safeguarded from unnecessary sterilisation by non-mineral development.

Mineral Development: Any activity related to the exploration for or winning and working of minerals, including tipping of spoil and ancillary operations such as the use of processing plant.

Opencast Working: A form of surface mining to win minerals, where the overburden is literally 'cast' from the working face to the rear as the mineral is exposed.

Overburden: Soil and other material that overlays a mineral deposit which has to be excavated and either tipped or stockpiled to gain access to the underlying mineral.

Planning Conditions: Planning conditions are attached to a planning permission in order to regulate and control the development.

Preferred Area: An area of mineral resources where there is a strong presumption in favour of extraction.

Primary Aggregates: Naturally occurring sand, gravel and crushed rock used for construction purposes.

Permian: The period of geological time between 290 and 248 million years ago.

Recycled Aggregates: Aggregates produced from recycled construction waste such as crushed concrete, planings from tarmac roads, etc.

Restoration: Operations associated with the winning and working of minerals designed to return the area to an acceptable environmental state, whether for the resumption of the former land use or for a new use. Restoration includes events which take place before and during mineral extraction, such as soil handling, and later operations such as filling and contouring, or the creation of planned water areas and after-care.

Secondary Aggregates: By-product waste, synthetic materials and soft rock used with or without processing.

Sterilisation: When a change of use, or the development, of land prevents possible mineral exploitation in the future.

Tonnes: Metric weight, equivalent to 1000kg, 2204 pounds or 0.984 tons.