

DERBYSHIRE AND DERBY MINERALS LOCAL PLAN

**Towards a Minerals Local Plan:
Spring 2018 Consultation**

**Background Paper
Coal**

December 2017

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1 Introduction and Background

- 1.1 Coal is a very important mineral resource in the UK and has played a major role in the development of the country. It has been mined for several centuries to utilise the energy that can be obtained from its combustion and other forms of processing. That energy has been harnessed to fuel industrial development and it has also been one of the main sources of domestic heating. The abundance of coal resources in Derbyshire has shaped the way the county now looks and operates. Although the mining industry in Derbyshire has declined significantly over the last forty years the area still contains substantial resources of coal and it is possible that circumstances could once again lead to a demand for that coal. Where those resources could be worked and how they would be extracted will be major issues for the new Minerals Local Plan (MLP). Whilst the MLP covers the City of Derby and the rest of the County Derbyshire (excluding the Peak District National Park area) there are no coal resources within the Derby City area. All references in this paper to Derbyshire are therefore to the Plan area outside Derby.
- 1.2 Coal is a combustible sedimentary rock made of lithified plant remains. It consists of ‘macerals’ (organic equivalent of minerals), minerals and water. A coal seam (layer) is formed by the alteration of dead plant material. Initially, this material accumulates as a deposit of peat at the surface, which is then buried beneath layers of younger sediment. As the temperature rises due to increasing depth of burial, the peat is sequentially altered by the process of ‘coalification’ through ‘brown coals’, which include lignite and sub-bituminous coal, to ‘black coals’ or ‘hard coals’ that comprise bituminous coal, semi-anthracite and anthracite. All the coals produced in, and imported to Britain, are bituminous coal and anthracite. As a result of subsequent faulting and folding of coal-bearing strata, coal seams occur at varying depths from the surface. In Britain coal seams vary in thickness from a few centimetres up to 3.5 metres, although exceptionally thicker (5 metres) seams may occur.
- 1.3 The coalification process involves the loss of water and volatile components in the form of carbon dioxide and methane. This results in an increase in carbon

content, from about 60% in peat to more than 90% in anthracite, which is often described as 'low-volatile coal'.

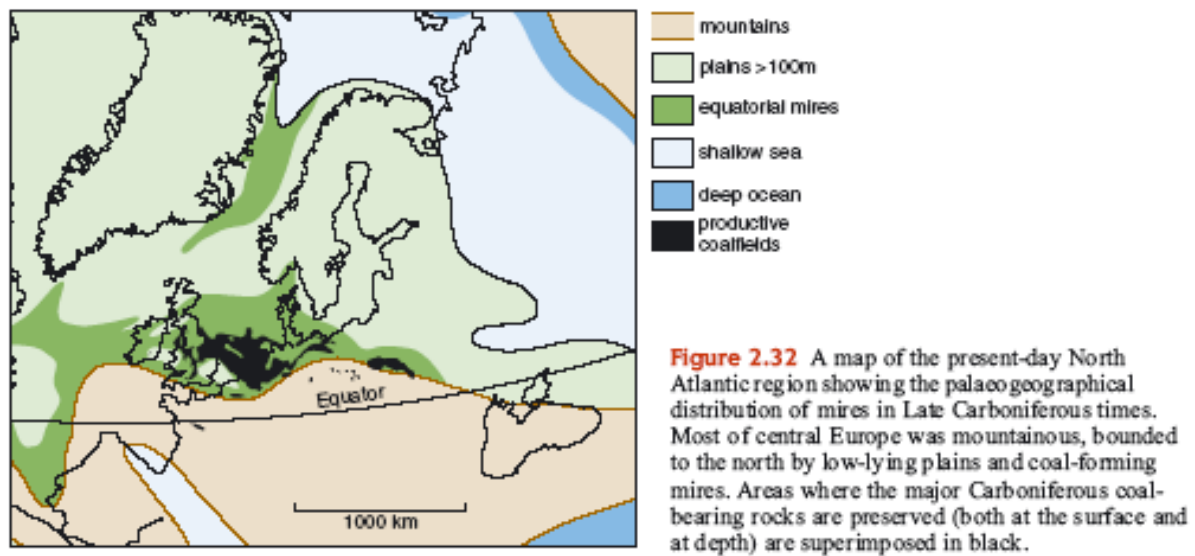
- 1.4 The physical and chemical qualities of coal, often referred to as coal quality, determine whether a coal can be used commercially, either on its own or after processing or blending with other coals to improve coal quality. Calorific value (CV) is one of the main quality criteria used by coal consumers. It is the heat energy given off by the combustion of a unit quantity of fuel. It increases from peat, through to brown coal and then to more in bituminous coal and anthracite.
- 1.5 The fundamental division of bituminous coal by end-use, and thus also by trade category, is into thermal or steam coal, used for burning in power stations and in other industrial and domestic uses, and coking or metallurgical coal, used in the steel industry to de-oxidise iron ore in the blast furnace. Coal quality is important as it affects the operation of the plant in which it is used, and thus the costs of generating power, through increased costs of both maintenance and conformity with environmental legislation. For example, the presence of chlorine is detrimental in coal as it causes corrosion in boilers as well as causing pollution. Sulphur is another serious impurity in coal, causing both corrosion and atmospheric pollution. When released as sulphur dioxide it causes acid rain. The sulphur content of English coals is relatively high compared to other world traded coals and coal from Wales and Scotland.
- 1.6 There are two principal methods of extracting coal. Where coal seams are at shallow depths below the surface, i.e. within the 'exposed coalfield' area, the coal can be extracted by surface mining methods. Where the seams are deeper, underground methods are employed. The Coal Authority defines shallow mining as extraction at depths of less than 30 metres but surface mining can take place at much greater depths.
- 1.7 Small scale mining of surface deposits dates back thousands of years. It is known that the Romans were exploiting all major coalfields (except for north and south Staffordshire) by the late 2nd century. Much of its use remained local,

but a lively trade developed along the North Sea coast supplying coal to Yorkshire and London. Deep mining developed alongside the Industrial Revolution, where the coal was often used to power steam engines. The oldest coalfields are those in Newcastle and Durham, South Wales, the central belt of Scotland and the Midlands. Prior to the 1880s coal was mined from underground using pick and shovel. Coal-cutting machines invented at the time increased the rate at which coal could be extracted.

2 Geology

- 2.1 The coal measures in Britain comprise a series of sedimentary rocks which were deposited around 300 - 330 million years ago during the Upper Carboniferous period (see Figure 1 below). Carboniferous Britain and northern Europe formed a low-lying plain backed by newly formed mountains to the south and a shallow sea to the north, beyond present day Scandinavia. Tropical waterlogged mires developed across Britain and Ireland, and whilst coal formed across the whole area, uplift due to tectonic activity and erosion has removed much of the coal bearing sequence.
- 2.2 In England and Wales coal-bearing rocks are almost entirely confined to the Pennine and South Wales coal measures groups of the Upper Carboniferous (Westphalian) age. Coal seams occur at fairly regular intervals, interbedded mainly with claystones, siltstones and sandstones. In parts of northern England, and notably in the Midland Valley of Scotland, older coals also occur in strata beneath Westphalian aged successions. In Scotland these occur principally in Limestone Coal and Upper Limestone formations, with locally thick coals present in the Passage Formation.
- 2.3 Coal-bearing strata occur at the surface in a number of discrete 'exposed coalfields' but also dip beneath younger rocks to form 'concealed coalfields'. Despite a long history of coal mining in Great Britain, considerable resources remain at depths readily accessible by underground mining methods and closer to the surface where they can be obtained by surface mining.

Figure 1; Source: Open University 2008

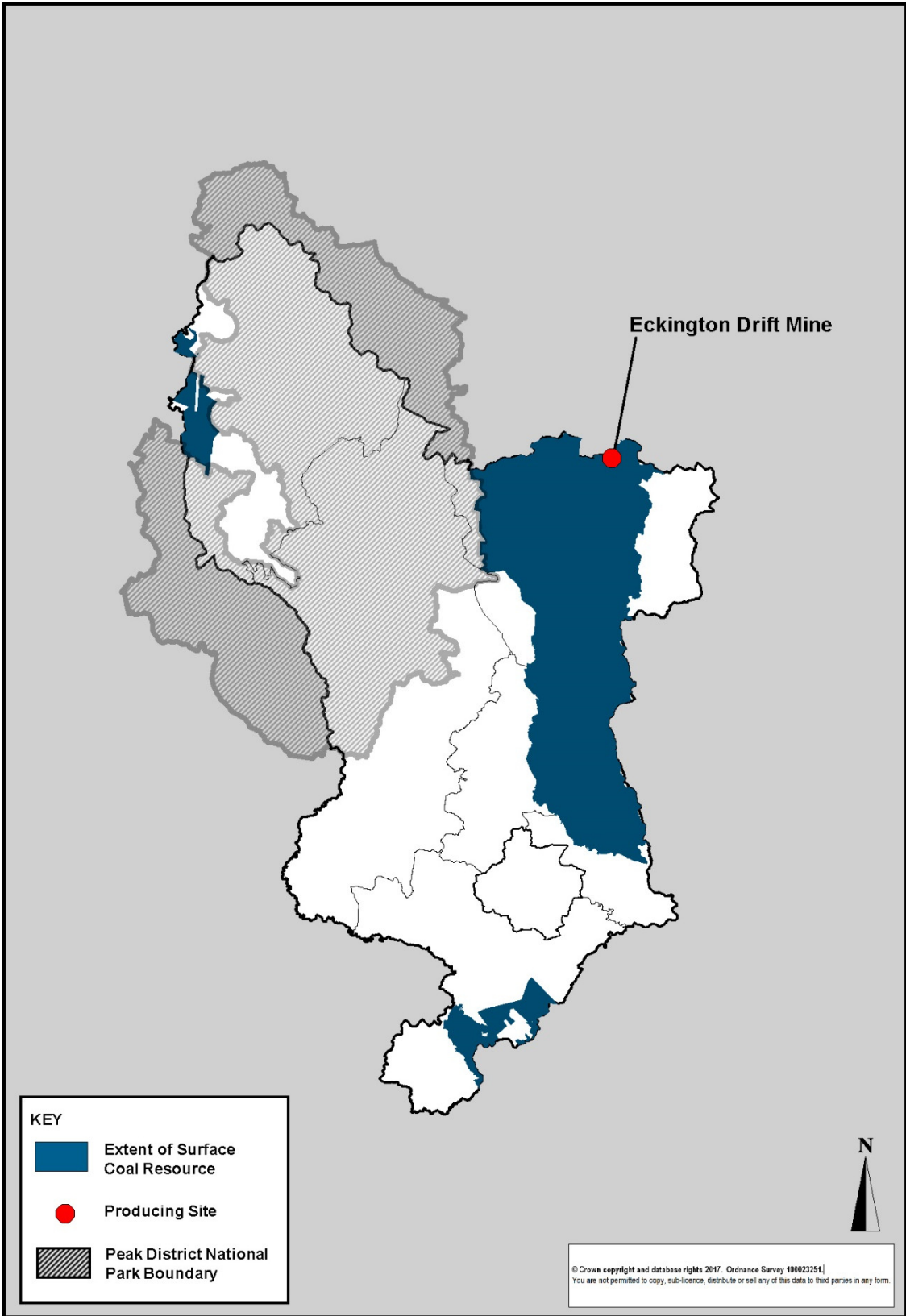


2.4 There are two coalfield areas within Derbyshire (see Figure 2 below). The North Derbyshire Coalfield is the southern part of the much wider Yorkshire/ Nottinghamshire/ Derbyshire Coalfield stretching from southern Leeds in the north to the Nottingham area in the south. The South Derbyshire Coalfield is part of the Midlands Coalfield, which extends from Staffordshire in the west through southern Derbyshire into Leicestershire. The coal seams vary in thickness up to several metres and, in Derbyshire around 30 seams in all are substantial enough to be worked commercially.

2.5 The South Derbyshire Coalfield is a north-west to south-east trending coalfield located to the south-east of Burton-on-Trent. It covers an area of 36km², and is contiguous to the west, beyond the Neverseal fault, with the East Staffordshire area of concealed coal measures. It is connected to the adjacent Leicestershire Coalfield to the east by the north-west trending Ashby anticline. Coals are known from the Lower, Middle and Upper Coal Measures. The main seams are the Upper Kilburn, Block, Little, Little Kilburn, (Over & Nether) Main, Little Woodfield, Lower Main, Woodfield, Stockings, Eureka, Stanhope, Kilburn, Fireclay and Yard. The seams in the South Derbyshire Coalfield are mainly high volatile and non-caking. There is very little variation in rank across the coalfield. Seams in the South Derbyshire Coalfield are fairly shallow, typically less than 450m in the deepest parts of the coalfield.

- 2.6 Within Derbyshire, the shallow coal measures occur in a substantial tract of the County in the area around Chesterfield, between Bolsover in the east and the Peak District National Park in the west, extending southwards, east of a line from Holymoorside to Belper, as far west as Ilkeston. Around Swadlincote, shallow coal deposits occur in the area from Burton-on-Trent and Repton Common in the north to Measham, in Leicestershire, in the south. Shallow coal deposits also occur in the north-west of the County, mainly outside the National Park boundaries between Charlesworth and Whaley Bridge, but these are not, generally, of commercial quality.
- 2.7 There is also the underground coal resource; located to the east of the main Derbyshire shallow coal measures, below an area of Permian Limestone. Whilst there is no potential for surface extraction in this area (the thickness of the limestone beds would make this uneconomic), there may be some potential for either underground mining or alternative extraction methods such as coal gasification or coal bed methane extraction.
- 2.8 For more information about the sourcing of gas from coal measures please see the Derbyshire and Derby Joint Minerals Local Plan – Towards a Minerals Local Plan Supporting Paper, Gas from Coal, December 2017.

Figure 2: Derbyshire Surface Coal Resource and Operating Sites (December 2017)



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3 Exploration, Working and Reclamation

- 3.1 Information about the geological formation of the UK has been researched and mapped by the British Geological Survey. This information identifies the extent of different minerals, including the extent of coalfields. The extent of coal resources and how much of that resource is potentially available for working in a commercially viable manner is determined through further exploration activities. The process usually involves carrying out geochemical and geophysical surveys, followed by explorative drilling. This allows an accurate picture of the area to be built up. The prospective developer will only seek to progress their plans if the results indicate that the resource is large enough and of sufficient quality such that the coal can be economically recovered. Would-be developers then need to obtain a further planning permission from the mineral planning authority and a licence from the Coal Authority before mining operations begin.
- 3.2 The choice of mining method is largely determined by the geology of the coal deposit.

3.3 Surface Mining

After carrying out preparatory works (for example fencing and vegetation clearance), the operator begins excavation with the stripping and stocking of top soil and sub-soil. These have to be kept separate and in good condition for use in the restoration of the site. The storage mounds are often used to form embankments on the edge of the extraction site to screen it and to provide noise attenuation baffles. Although referred to as surface mining, the coal reserve is usually several metres below the surface and it is therefore necessary to remove the materials lying between the soils and the coal. This is referred to as overburden and the depth of overburden is a factor in the overall cost and viability of a surface mine development. The overburden is also stored for use in restoration.

- 3.4 Where possible, extraction is then normally phased so that only part of the whole site is disturbed at any one time, which in turn enables phased restoration to be undertaken. This reduces the need for the long term storage of the soil resource as this can be detrimental to its quality. As part of the phased approach, coal is extracted in a series of 'benches'. Where seams of coal are contained within a host rock, blasting is sometimes required to loosen it. The coal is normally loaded onto lorries (sometimes via rail where available) and taken either to the nearest coal disposal point for grading or direct to the customer. There are no operational disposal points in the county at the present time.
- 3.5 The economics of a surface coal mine are largely determined by the market for coal and geological conditions within the site. Economic sites are typically worked at a maximum overburden-to-coal ratio of between 10 to 1 and 15 to 1. Consequently, the surface mining of coal involves using large engineering plant and machinery in order to remove relatively small quantities of coal, and the impact of a surface coal operation on the environment can therefore be significant. Although surface mining is essentially a temporary use of land, lasting anything from 18 months to 10 years, some of its effects can remain for a period after working has ceased. For example, it can take several years for a restored site, including the landscaping, to fully mature to a point where the site has been fully assimilated into the surrounding landscape and the footprint is no longer discernible.
- 3.6 These effects can be ameliorated to some extent by careful pre-development planning and the effective monitoring of operations. The large amounts of overburden that have to be removed mean that, through sympathetic and well-managed restoration, original landforms can be recreated or more attractive ones produced over time. Furthermore, as the volume of coal extracted is relatively small in comparison to the surface area, sites can be restored to original levels. Some restoration schemes can provide important local environmental benefits, including the creation of additional ecological features and wildlife habitats. Other surface mining developments have, in the past, enabled areas of despoiled and derelict land to be reclaimed or have involved

the removal of problems arising from underground workings such as subsidence and dangerous emissions of methane gas.

3.7 Underground Mining

There are two main methods of underground mining: pillar-and-stall and longwall mining. In pillar-and-stall mining, coal deposits are mined leaving behind 'pillars' of coal to support the roof of the mine. Longwall mining involves the full extraction of coal and the mined-out areas are allowed to undergo controlled collapse as mining proceeds. All large, deep mines in Great Britain used the longwall method where a 'panel' of coal (a defined area of the seam) is accessed by driving parallel tunnels (called gates) within the seam along two sides of the panel, about 250 to 350 metres apart. These are joined by a further cut at right angles that becomes the working face. A coal cutting machine called a shearer then cuts coal by repeated passes along the face, which either advances into areas of virgin coal ('longwall advance') or retreats towards the main roadways within the mine ('longwall retreat'). Coal is removed by conveyor belt along the gates. The roof strata along the coal face are supported by hydraulic roof supports that are moved sequentially, allowing the roof strata to collapse behind. It is this action that may result in subsidence being evident at the surface.

3.8 Depending on seam thickness, practically all the coal in a panel may be removed by this method, but for technical reasons, typically only 50% of the available coal in an underground mine is recovered.

3.9 The underground working of coal at major collieries creates large volumes of waste or 'spoil', the disposal of which is one of the main potential causes of environmental impacts. Greater mechanisation has resulted in large increases in the production of spoil, and despite the cessation of large-scale deep mine production in Derbyshire, the remaining spoil tips are part of the legacy of the mining industry. Some of the tips have been completely removed as part of redevelopment schemes whilst many others have been restored and landscaped. These restoration schemes often involve re-profiling of the tips

rather than complete removal but this, in combination with the landscape planting, reduces the appearance of the tips and helps them be assimilated into the surrounding area. Some of the materials which were previously placed in the tips as unwanted and unusable waste materials now have a commercial use and several tips have been reworked to extract this previously discarded resource. This includes red shale but can also include quantities of coal which is now recoverable due to the availability of improved processing equipment. The most widespread impact of underground working, however, is caused by subsidence at the surface. A 1989 survey commissioned by ten Local Authorities in Derbyshire and Nottinghamshire (undertaken by Trent Polytechnic) revealed that 33,000 houses in the two counties had been affected by mining subsidence.

3.10 The environmental impact of smaller drift mines can be much less significant. In particular the problems of waste disposal and subsidence can virtually be avoided where the extraction of coal is not highly mechanised but is selective and limited through the use of a pillar and stall system. The waste that is produced can sometimes be deposited in the remaining void following extraction of the coal. This usually offers a satisfactory solution provided its impact on water resources is acceptable.

3.11 Ancillary Minerals

The geological conditions which gave rise to the creation of coal also support the presence of clay and there is a strong correlation between the respective industries. In Derbyshire, clay has been extracted almost exclusively from the coal measures of the exposed coalfield covering the area of the northern, eastern and southern Derbyshire. A wider range of clay types and qualities has been exploited supporting a variety of industries, including brick, pipes, refractories, sanitary ware, art and tableware. Brick clay occurs widely in Derbyshire and was supplied to a small number of brick manufactures, all of which have now closed. The southern part of Derbyshire is an important source of fireclays (used to make buff and pale facing bricks for example). Fireclays are sedimentary mudstones which underlie almost all seams and the close

association with coal means that the supply is highly dependent on surface coal mining operations, although only a small proportion of sites produce fireclay, either because they do not contain fireclay of suitable quality or because of planning restrictions.

Further, more detailed information regarding Fireclay and Brick Clay is available in the Brick and Fireclay Supporting Paper, December 2017.

3.12 Hybrid Method

Augering is a mechanical form of underground mining and its usage is relatively new in the UK. It can be carried out within the excavation of a surface mine or, where the coal seams are close to the surface, by 'trenching'. It involves boring along the coal seams adjacent to the excavation or trench by an Auger, which is a large drill bit with a threaded, corkscrew shank which pushes the coal out behind the advancing drill. This method leaves supporting pillars of coal within the seam to minimise the risk of subsidence. Augering can enable additional coal to be removed, which may not otherwise be extracted due to economic or environmental constraints.

3.13 Coal Preparation

Coal straight from the ground, known as run-of-mine (ROM) coal, often contains unwanted impurities such as rock and shale and comes in a mixture of different-sized fragments. However, coal users need coal of a consistent quality and sometimes a consistent size. Coal preparation – also known as coal beneficiation or coal washing – refers to the treatment of ROM coal to ensure a consistent quality and to enhance its suitability for particular end-uses. Screening equipment separates the coal into similar size pieces. Many of the collieries and some of the surface mining sites in Derbyshire incorporated coal preparation facilities within the development.

3.14 Coal Transportation

The movement or transport of coal involves two separate stages; the first is within the excavation or mining site and the second is onwards from the

extraction site to its ultimate destination. Within an underground mine coal is mostly transported to the mine shaft by conveyors from where it is brought to the surface. For short distances within surface mining sites excavated coal will be moved by dump truck or conveyor. These methods will also be employed at large user sites such as power stations where large quantities are kept available for use.

3.15 The method of transport of coal off-site depends on the distance to be covered and the facilities available at or near to the mine. The main method is usually by heavy goods lorries. Most former deep-mine collieries in Derbyshire were long-term sites and had dedicated rail connections enabling the movement of coal by train, often directly to the receiving power station. Some recent surface mine operations (for example Renishaw and Forge and Monument) have also used rail as the main method of transport, taking advantage of the proximity to main railway lines. The high cost of connecting to the rail network however, has meant that most other surface mine sites have relied on road transport, particularly so for those smaller sites of limited duration. In the early part of the last century some mines were able to utilise canal systems to transport coal but the closure of the canals means that this is no longer an alternative for sites in Derbyshire. In some circumstances coal can be mixed with water to form coal slurry and transported through a pipeline. Coal transportation can be very expensive – in some instances it accounts for up to 70% of the delivered cost of coal.

3.16 **By-products**

Methane gas is frequently released by coal mining operations and in some cases it can be recovered and used as a process fuel on site. Methane also collects in abandoned coal mines, sometimes in sufficient volumes for it to be extracted and used to generate electricity.

3.17 Colliery spoil is produced at all deep-mine operations and consists mainly of mudstone and siltstone. These materials may be used as a low-grade aggregate, for example, as bulk engineering fill. In 2001, 783,000 tonnes was

used for fill in England and Wales out of total arisings of 8 million tonnes. Old colliery spoil is also used on a small scale in brick making, and at one site in North Wales it is used as the clay feedstock for cement manufacture. The tips at old collieries often contain a proportion of coal due to the inefficiencies of the screening equipment used at the time. Some of the former colliery tips have been reworked to recover this remaining coal.

4 Coal Authority

4.1 Following the privatisation of the coal industry in 1994, the Coal Authority owns, on behalf of the country, the vast majority of the coal resource in Great Britain. It is a non-departmental public body sponsored by the Department for Energy and Climate Change, and was established by Parliament in 1994. It undertakes specific statutory responsibilities associated with:

- licensing coal mining operations
- administering coal mining subsidence claims
- dealing with property and historic liability issues
- providing access to information on coal mining.

4.2 The main function of the Coal Authority is to manage the coal resources of the country. It seeks to encourage economically viable operations to work these resources whilst working to protect the public and the environment in coal mining areas.

5 Production, Consumption and Reserves of Coal

5.1 Global

In 2016, global coal production was 7460 million tonnes, a decline of 6% compared to the previous year and of 10% since the record high in 2013. China continues to supply the largest amount of coal with production at 3411 million tonnes in 2016 (46% of the total). Other major suppliers were USA (9%), India (9%), Indonesia (6%), Australia (7%) and Russia (5%). In comparison the UK contributed just over 0.06% of total world coal production.

- 5.2 Total proved reserves are estimated to be (at end of 2016) 1.140 trillion tonnes, equivalent to 153 years of current production. This is split into 0.816 trillion tonnes of anthracite and bituminous coal and 0.323 trillion tonnes of sub-bituminous and lignite coal.
- 5.3 Worldwide, coal is the major fuel used for generating electricity. In 2016 (According to the International Energy Agency) coal was used to generate 40% of the world's electricity and a third of all energy used worldwide. Coal also plays a crucial role in industries such as iron and steel.
- 5.4 The quantity of coal that is traded is a significant proportion of the amount consumed, but many of the largest producers use the majority of the coal they produce. Around 25% of global coal consumption was traded in 2014. Transportation costs account for a large share of the total delivered price of coal, therefore international trade in steam coal is effectively divided into two regional markets (the Atlantic market and the Pacific market).

5.5 National

Production of coal in the UK peaked in 1913 at 290 million tonnes. Thereafter, output declined, due in part to the loss of export markets during and subsequent to the First World War and also in part to competition from oil and other fuels. However, the UK remained a net exporter of coal until the early 1980s.

- 5.6 Following the oil crisis in the early 1970s it was perceived that the world could no longer count on the long-term supply of cheap oil. The *Plan For Coal*, published in 1974, envisaged that UK coal output would increase to about 150 million tonnes by 1990, based on the concept of '300 years of reserves'. UK coal production reached only 108 million tonnes in 1990 and on a downward decline which accelerated due to the increasing use of natural gas in electricity generation (the 'dash for gas'). This followed increasing concerns about carbon emissions and climate change, the exhaustion of reserves in many older pits and the lack of the considerable investment required to develop new ones.

Following the miners' strike in 1984 the UK became a net importer of coal, a trend that has continued, and imports of coal at 36 million tonnes exceeded that of 32 million tonnes for the UK for the first time in 2001.

- 5.7 Since it was privatised in 1994, the British coal industry continued to face difficult market and technical conditions. From a position in 1995 where 32 operational mines produced 53 million tonnes of underground sourced coal, production fell to only 17 million tonnes from 8 operational mines in 2007. By the end of 2015 the UK deep mine coal industry had effectively ceased.
- 5.8 Surface mined coal, which began as a wartime emergency in 1942, has proved to be a more cost-effective source of coal. Production increased to a peak of 18.6 million tonnes in 1991, and although has since declined, surface mined coal has contributed an increasing proportion to the UK coal output, particularly in Scotland, overtaking deep mined coal for the first time in 2007. In 2012 surface mined coal production was 10.1 million tonnes compared to 6.2 million tonnes from deep-mined coal. The latest figures continue to show a decline in production. The total amount of coal produced in the UK in 2016, from both surface and underground sources, fell to 4.2 million tonnes.
- 5.9 In 2012, Coal Authority estimates of the remaining level of coal reserves and resources in the country were 3,685 million tonnes of underground coal, of which 1,675 million tonnes were covered by current licences (including closed mines still in licence). For surface mining sources the comparable figures were 890 million tonnes, of which 115 million tonnes were covered by current licences. To set this in context, the total quantity of coal production from surface mined sites between 1942 and 2011 was 830 million tonnes.
- 5.10 Whilst UK coal production has fallen sharply, consumption has remained comparatively steady in recent years. Current consumption is well below the high levels seen in the 1980s and early 1990s, but since 1999 consumption has been slightly above or below the 60 million tonnes mark. In 2012, for example, consumption was 64.3 million tonnes, with net imports contributing 44 million tonnes. To set this in context, imports in 1995 were 16 million tonnes out of a

total consumption figure of 77 million tonnes. The main sources of imports are Russia (40%), South Africa (30%), Australia (10%) and Columbia (7.5%). The recent development of the shale gas industry in the USA means that increasing quantities of coal from there are now being traded on the world market.

5.11 The largest use of coal within the UK is for electricity generation, consuming approximately 84% of the UK's supply. Other notable uses include coke manufacture (9.4%) and blast furnaces (2.0%). Domestic heating uses approximately 1.1%. In 2016, about 9% of the UK's electricity was generated from coal, a significant decrease from 2011 when coal produced about 30%. This rose to nearly 50% during the cold weather in early 2013. This was partly due to the fall in world coal prices caused by the shift from coal to shale gas in US electricity generation.

5.12 Derbyshire

As can be seen from Figure 3, production of coal in Derbyshire has fallen from over 2.6 million tonnes per annum in 1996 to about 15,000 tonnes in 2016, a decline of over 99%. Following the closure of the Lodge House surface mining site the only operative coal extraction site is the drift mine at Eckington, currently producing about 16,000 tonnes a year.

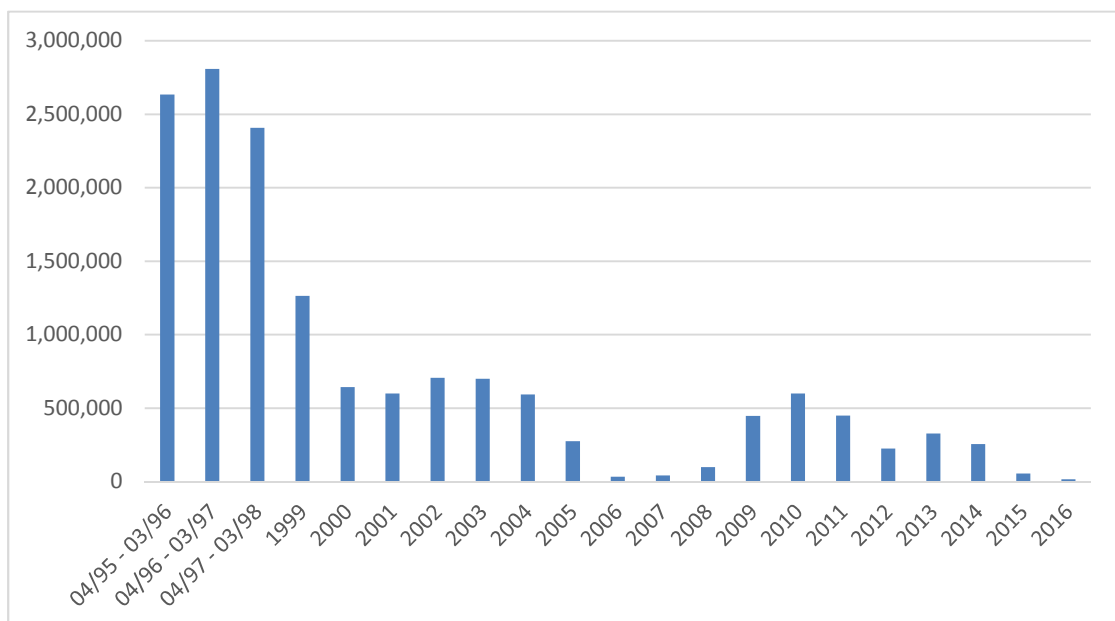


Figure 3: Derbyshire coal production (tpa)

5.13 Surface Coal Mining

The working of coal near to the surface, by modern methods, began in Derbyshire in the 1940s, as in other coalfields, as an emergency measure to help supply the country's war time energy needs. Since that time a large proportion of the area of the shallow coalfield has been exploited. Annual output reached a peak of 2.7 million tonnes in 1956. Thereafter output has varied between 1 and 2 million tonnes per year, and in recent years, following the completion of working at several sites, output has declined significantly. At present there are no operational surface coal mines in Derbyshire; the Lodge House site at Smalley operated by UK Coal ceased production in 2015. The County Council resolved to grant planning permission (December 2012) to another site, also in Smalley (George Farm) for the extraction of 375,000 tonnes of coal by surface mining methods but formal permission has not been issued due to delays in completing of a legal agreement (a Section 106 Agreement).

5.14 There are areas within the Derbyshire coalfields where coal seams close to the surface have not yet been exploited and which could potentially be subject to future working. In the absence of detailed investigation it is not possible to estimate accurately the extent of these resources. It is considered likely however, that proposals for further surface workings will be developed and put forward during the Minerals Local Plan period to 2030. Each case will be considered on its merits against national policy and the framework that will be established in the new minerals plan, so it is not possible to predict the level of future output.

5.15 Underground Coal Mining

Underground coal mining activity in Derbyshire declined in line with the national picture. Fifty years ago around 60,000 people were employed in over fifty Derbyshire collieries, but this figure declined as the older mines working the shallower seams closed and working became concentrated on the newer mines to the east, working the deeper, more profitable seams. The decline of

the Derbyshire mining industry continued throughout the 1970s and 80s and the last operational colliery in the South Derbyshire Coalfield area at Cadley Hill (near Swadlincote), closed in 1988. The last three remaining British Coal collieries in the northern area at Bolsover, Markham and Shirebrook closed in 1993. The last remaining underground coal mine in Derbyshire still in production is the Eckington Drift Mine operated by the Eckington Coal Partnership. This mine has planning permission which authorises mining until 2023 at an estimated rate of extraction of approximately 20,000 tonnes per year. The mine employs about 30 staff and supplies coal to Ratcliffe-on-Soar Power Station and also to some local coal merchants.

- 5.16 Whilst deep lying coal resources still remain, the high cost of the investment set against the fluctuating price of coal and the availability of supplies from other sources means that it is unlikely there will be proposals for major new colliery developments in Derbyshire in the foreseeable future, although there is some potential, so it remains an issue for the Minerals Local Plan.

6 Economics

- 6.1 The trading price of coal is a very important issue for the coal extraction industry and relatively small fluctuations can determine whether or not operations are economically viable. Fluctuations in prices affect the ability of the industry to make long term plans. The following review indicates how the price of coal has varied in recent years.

6.2 International Trade

In 2016 the NW Europe price averaged \$59.87 per tonne of coal, a 50% drop in price since the high in 2011 although slightly up on the price in 2015 of \$56.79 per tonne.

- 6.3 Most coal from both surface and deep mines in the UK is produced and delivered to the rail networks at costs that are competitive with imports. The Government expects that if UK producers can obtain world market equivalent

prices, profits can be generated for investment in existing deep mines and in new surface mines. Prices would have to rise considerably, however, for the development of new deep mines to be economic in the UK, given the current investment climate in the industry.

6.4 Coal Quality Issues

Most UK produced coal falls in the high sulphur band between 1.4-2.2%, with the average around 1.7-1.8%. There is little prospect of this being significantly lowered given the lack of accessible low sulphur reserves in the UK and the high costs of washing fines to remove sulphur.

6.5 In the current international market most coal that is traded has sulphur levels in the range 0.6% to 0.85% on a weight basis. A small proportion of coal is traded with sulphur levels close to UK norms (1.7%), and these coals tend to be traded at a discount to standard grades. There are larger tonnages of very low sulphur coals, primarily from Indonesia, which attract a premium.

6.6 The implication for UK mined coals is that sulphur levels are going to impact negatively on the price that they can achieve in the market place. The extent to which this happens will depend on the value of low sulphur coal in the UK and international markets and the supply of low sulphur coals, and the extent to which the retro-fitting of flue gas desulphurisation equipment onto more power stations expands the number of sites able to burn coal mined in the UK.

6.7 The Potential for Coal Exports

The DTI suggests that there is little prospect of the UK being able to export coal, due to the lack of purpose-built coal export capacity, the high sulphur and ash content, low calorific value and the expectation that UK coal prices will be too high.

7 Coal Related Policy

7.1 National Planning Policy Framework

National policy for the extraction of coal and the disposal of colliery waste is set out in the National Planning Policy Framework, which replaced most previous policy guidance and statements, specifically that in Mineral Planning Guidance Note 3: Coal Mining and Colliery Spoil Disposal, 1999.

7.2 In general terms, the NPPF states that, "Minerals are essential to support sustainable economic growth and our quality of life. It is therefore important that there is a sufficient supply of material to provide the infrastructure, buildings, energy and goods that the country needs. However, since minerals are a finite natural resource and can only be worked where they are found, it is important to make best use of them to secure their long-term conservation."

7.3 The NPPF includes advice on the need to balance the need for minerals with appropriate environmental considerations and sets out the broad approach to mineral plan making and procedures. Specifically in regard to coal it states at paragraph 147 that minerals planning authorities should "indicate any areas where coal extraction and the disposal of colliery spoil may be acceptable". Further guidance is provided at paragraph 149 relating to the extraction of coal which states that, "Permission should not be given for the extraction of coal unless the proposal is environmentally acceptable, or can be made so by planning conditions or obligations; or if not, it provides national, local or community benefits which clearly outweigh the likely impacts to justify the grant of planning permission."

7.4 The main changes from MPG3 are the removal of the requirement to identify coal constraint areas, the omission of any specific mention of coal extraction in green belts and the addition of 'national' benefits to the consideration of coal extraction proposals. The NPPF does not contain any Government target for coal production, either from underground sources or by surface mining. It states that decisions on the supply of energy derived from different fuels are matters for the markets, reinforced by long term policy measures.

7.5 National Planning Practice Guidance, 2014

The National Planning Practice Guidance states that “The environmental impacts of coal extraction should be considered in the same way as for other minerals. However, both coal operators and mineral planning authorities must have regard to the environmental duty placed on them under section 53 of the Coal Industry Act 1994 when preparing and determining planning applications.”

7.6 In addition it states that underground mining can raise additional issues to surface coal mining which mineral planning authorities may wish to take into consideration. These are identified as; the potential effects of subsidence, including potential hazards of old mine workings; the treatment and pumping of underground water; monitoring and preventative measures for potential gas emissions; and the method of disposal of colliery spoil.

7.7 National Energy Policy

The Government position on national energy policy is now changing and evolving quickly in comparison to the situation in the last century. With its abundant reserves, indigenous coal was previously a very important element of the energy infrastructure of the United Kingdom. Whilst coal is still an important element, it is now one of many options for energy production and of the coal that we do use, the proportion obtained from outside the UK has risen significantly in the years since the large-scale colliery closures of the 1980s. Issues about how we will produce energy in the future and how reliant on external sources of fuel we will be to produce that energy are matters of increasing importance. The Government has identified two long-term energy challenges which bring into question the role that coal will play in the medium term over the Plan period and thereafter:

- Tackling climate change by reducing carbon dioxide emissions both within the UK and abroad as part of wider EU initiatives; and

- Ensuring secure, clean and affordable energy as we become increasingly dependent on imported fuels.

7.8 There have been several important stages in the evolution of current national energy policy. The Department of Trade and Industry paper, Meeting the Energy Challenge, 2007 states that England, Wales and Scotland's substantial remaining coal reserves have the potential not only to help meet our national demand for coal and to reduce our dependence on imported primary fuels, but also to contribute to the economic vitality and skills base of the regions where they are found. However, the position of coal is also influenced by other external forces.

7.9 Industry responses to the Large Combustion Plant Directive indicates that the number of coal-fired power stations in the UK is set to decline throughout the Plan period and beyond as some have decided not to invest in the emission reduction features required for longer-term use. In the short term (originally up to 2015) the operators of 75% of UK coal-fired capacity have opted to fit flue gas desulphurisation equipment (FGD) to enable their power stations to operate up to that date, which is higher than originally expected. Several operators have also announced interest in building new coal-fired plant, not only with state of the art cleaner burn technology from the outset but have also indicated a willingness to retrofit future enhancements as they come to the market. This confirms the continued position of coal for the short-term. Irrespective of other energy decisions, as the planning, construction and commissioning of energy generation facilities take many years it is likely that coal will have to continue to play a role, albeit on a reducing scale, until sufficient capacity from alternatives are available.

7.10 The draft National Policy Statement for Energy, published in 2009, builds on the 2007 Energy White Paper. Together they form an evolving international and domestic energy strategy in response to the changing circumstances in global energy markets. They set out to address the long-term energy challenges of security of supply, whilst acknowledging the implications of climate change. Whilst emphasis is on the development of renewable energy supplies the

Government recognises the important and continuing role that coal will play in meeting national energy requirements. It is seen as a flexible source of energy generation, an alternative to an over dependence on gas and as a back-up to intermittent renewable energy supplies.

7.11 These issues were highlighted in Government statements leading up to the publication of the 2009 Energy statement. In a written reply to the House of Commons on 18 November 2008 Mike O'Brien, Minister of State for Energy and Climate Change stated that "coal needs to remain an important part of our energy mix. It provides the most flexible generation (increasingly needed as back up as the percentage of intermittent renewables increases in the overall mix) and an alternative to over dependence on gas. We are supporting development of clean coal technologies including carbon capture and storage, higher efficiency processes, and co-firing with biomass. Our ambition is to see CCS commercially deployable by 2020. The extent of coal's future use will depend on decisions by operators and technological development".

7.12 This policy is set against the background of recent changes in the sources of supply of the raw materials used to meet our energy requirements and as an aid to the understanding of this situation this paper includes a summary of these changes. By 2004 the United Kingdom became a net importer of natural gas and a net importer of oil in 2010. By 2020, it is estimated that the UK is likely to be importing about three-quarters of its energy supplies. The level of coal production in the UK has fallen sharply, whereas consumption has remained comparatively steady. As a result, the UK now imports about three-quarters of the coal it consumes. Whilst many of the collieries were considered to be uneconomic in the 1980s the UK still has substantial reserves of coal available in the ground. At the end of 2010, it was estimated to have reserves of approximately 290 million tonnes of anthracite and bituminous coal. Around a fifth of the electricity generating capacity available in 2011 is set to close over the coming decade. At the same time, demand for electricity is expected to double from its current level by 2050 as a result of population increase and particularly from the expected electrification of heating and transport.

7.13 The Government envisages that future development of coal should be based on collaboration between stakeholders in the coal and power industries and the Government to secure the long-term future of coal fired power generation, to optimise the use of national coal reserves where recovery is economic. The Government has stated that it does not propose to set targets for the share of energy or electricity supply to be met by different fuels but in this context, it is clear that the Government continues to consider there to be a need to maintain a supply of indigenous coal as a national resource.

Energy Act 2013

7.14 The Energy Act received final assent on 18 December 2013. The Act has several objectives and in relation to hydrocarbons it seeks to make provision for the setting of a decarbonisation target range and duties in relation to it; or in connection with reforms to the electricity market for purposes of encouraging low carbon electricity generation, or ensuring security of supply. It is also about the designation of a strategy and policy statement concerning domestic supplies of gas and electricity. It does not actually proscribe a new strategy or policy at this stage but instead sets the procedural requirements for doing so. It is likely however that future policy and strategy will reflect the overall objective of the Act to reduce our carbon footprint and in turn this will affect the future demand for fossil fuels, including coal.

8 Coal and Climate Change

8.1 The UK is moving towards a low carbon economy and that will affect all sectors, including the mineral industry and those industries which use minerals, either extracted from within the country or imported from overseas. This is in response to concerns about the production of greenhouse gases and their contribution to global warming. Most of the greenhouse gas produced in the UK is carbon dioxide (about 85% for the UK economy as a whole). Successive Governments have been committed to reducing carbon dioxide emissions. This has now been developed into a statutory target established by the UK Climate Change Act 2008 which seeks to reduce emissions by 80% (from a 1990

baseline) by 2050. This is already having an effect, and will continue to have an effect in the long term, on the UK mineral industry, particularly on those industries involved in the use of fossil fuels for electricity generation. Future demand for coal will depend increasingly on the viability of commercial-scale carbon capture and storage (CCS) and any other financial disincentives to the use of coal. Although the UK Department of Energy and Climate Change has initiated a competition to design and build a commercial-scale post-combustion CCS scheme associated with a coal-fired power plant by 2014, considerable uncertainties remain regarding costs.

8.2 One Government measure intended to help deliver the targeted reduction is the Carbon Price Floor (CPF), which is a tax on carbon dioxide emissions. In the presentation “Budget 2014 Representation from the Association of UK Coal Producers ‘CoalPro’, February 2014, the group contend that there should be a freeze on and a review of the Carbon Price Floor at 2014 levels (£9.55t/CO₂) on the basis that it was already at the absolute maximum that could be absorbed without significant detrimental impacts to the country’s electricity supply industry and markets. The group acknowledge the original purpose of CPF was to stimulate investment in low carbon technologies, but now consider that, set on an upward price trajectory, and diverging from EU carbon prices, it will result in the early closure of UK coal plant, risk UK energy security, cause carbon leakage and drive up energy prices (increasing fuel poverty) without delivering the new low carbon technology. The position of the indigenous coal industry and existing coal plant is further discussed in “A Strategy for Coal in the UK 2013 – Managing the transition to meeting a decarbonised energy mix utilising coal with carbon capture and storage”, Coal Forum Working Group, November 2013. This also refers to the important role played by coal fired plant and the need to make sure that they are effectively managed for the rest of their lives and utilised optimally to enable the maximum contribution to the UK’s power requirements over the next decade.

8.3 In order to provide a context on this issue the section below provides information about carbon dioxide emissions attributable to the minerals industry. The data source (UK Environmental Accounts, 2013) indicates the

need for caution in the use of figures relating to changes in emissions since information was first collected in 1990. However, they indicate that the 'Mining and Quarrying industry accounted for just over 3% of UK carbon dioxide emissions on 2011, whereas electricity generation accounted for nearly 29% (of which the use of fossil fuels accounted for 70%). In addition to coal, the Mining and Quarrying sector also includes oil and gas extraction which are by far the major contributors to carbon dioxide emissions of this sector. The majority of these emissions take place offshore. Whilst the emission of carbon dioxides for the UK economy as a whole has fallen by 13% since 1990, emissions from Mining and Quarrying are still around the 1990 levels, although this masks an increase up to 2002 followed by a decline thereafter. This is believed to reflect the corresponding rise and fall in offshore oil and gas production. In contrast, emissions from the onshore section of the industry experienced a reduction in emissions of 60%. For overall greenhouse gas emissions (including methane) onshore Mining and Quarrying emissions declined by 85% during this period, largely due to the contraction in the coal industry.

- 8.4 There are many reasons for the decline in UK carbon dioxide emissions; the replacement of coal by gas in electricity generation being an important one. However, the increasing dependency on mineral imports, particularly coal and mineral based manufacturing products, means that the UK has exported a proportion of those emissions overseas, with this figure rising each year. Overall the UK's consumption-based greenhouse gas emissions (i.e. including imports and embodied carbon added through their transport to the UK) have far exceeded the UK's territorial emissions. Energy intensive, yet energy efficient sectors are increasingly citing energy costs as a reason for moving activities overseas.

9 Coal Mining Issues

- 9.1 Coal mining developments, either underground or surface mining, are major operations which can have significant economic, social and environmental impacts. The section below addresses some of the main issues which have been raised in responses by the public to publicity concerning coal mining

proposals determined by Derbyshire County Council. It is not intended to be an exhaustive list as each case is individual and any proposal may involve some issues which are not pertinent to other proposals.

Environmental Impact of Coal Mining

- 9.2 The review of remaining resources and reserves in Derbyshire indicates that the majority of future coal mining proposals are likely to be based on surface mining operations. The main potential environmental impacts of this form of coal extraction are as follows:

Visual Intrusion

- 9.3 Surface mining involves the use of extensive site areas and results in significant changes to the land, albeit for temporary periods. The removal of soils and overburden to access the coal measures below involves the removal of all or many of the surface features in the area, such as trees and hedgerows, and this can have a significant impact on the landscape and the appearance of the area. The soils and overburden have to be stored for use in the restoration of the site and the storage mounds can be substantial in extent and height. The degree of visual intrusion will be affected by the topography of the surrounding land, and this can help reduce or increase the impact on an area depending on the orientation of the site. Most surface mining sites are restored to the same or similar contours and uses as they were prior to extraction, and most restoration schemes include the planting of new trees and hedgerows which help assimilate the sites into the surrounding landscape, although it takes several years for landscape planting to mature. The retention of trees on site boundaries can help reduce the visual impact of a site and this can be enhanced where additional tree planting is undertaken well in advance of a development. Surface mining can have beneficial landscape impacts where it involves the clearance, removal and remediation of derelict buildings and land or the removal of contamination. In these cases it enables the land to be put back to a more beneficial after-use which may not have been possible without the mining operation.

- 9.4 There are a number of established techniques which are available to guide the assessment of landscape and visual impacts and these assessments are taken into account in the determination of proposals at the planning application stage.

Noise

- 9.5 Modern surface mining involves the use of large scale plant and machinery to undertake the necessary engineering works and to extract and process the coal. Similar plant and machinery is also required to restore the land after extraction works are completed. Lorries or other means of transport are required to move the coal and other materials within the site and off-site to the eventual user. All these operations generate noise and have the potential to generate noise at unacceptable levels, depending upon the proximity of receptors and the mitigating effects of any noise attenuation measures. Methods for assessing the likely level of noise to be generated by coal extraction and other mineral developments have been detailed in Government publications and the latest guidance is now available in the National Planning Practice Guidance, March 2014. This is a live publication and will be updated when any new guidance on noise or any other technical issue is available.

Dust

- 9.6 The operations which could give rise to noise emissions also have the potential to generate dust which could affect those near to an operational site. The amount and type of dust that could be generated would depend on the scale of engineering works involved, the ground conditions (soil/rock type, water table and moisture content), the presence or absence of on-site coal processing activities and the use of dust suppression measures. The extent of the area that could be affected by such emissions would depend on topography and the prevailing wind direction and strength. The significance of the impacts of dust emissions would depend on the effectiveness of the mitigation measures (such as the use of water bowsers and hard surfaces for haul roads) and the distance between the extraction area and other dust generating works and sensitive

receptors. The methods of assessment have also been the subject of specific Mineral Planning Guidance and the latest guidance on this issue is now available in the National Planning Practice Guidance.

Transport

- 9.7 Coal is a bulky material and is transported in large quantities. Surface mining developments can generate significant levels of vehicle movements which require an appropriate form of access on to the highway and an appropriate link to the wider highway network. The movement of these vehicles generates diesel emissions and can have an adverse impact on the area in terms of highway safety and air quality, especially when they pass through built-up areas. Lorry movements can also cause damage to the environment and amenity from noise, dust and vibration. These effects can be avoided or minimised by the use of alternative forms of transport such as rail, but this is not always possible. The impacts of transport are normally addressed via a formal Transport Statement or Transport Assessment. The latest guidance on this issue is now available in the National Planning Practice Guidance.

Water Environment

- 9.8 The disturbance to the ground arising from surface mining can affect the water environment of an area. The creation of a void significantly alters the natural drainage system over the site surface and downwards through the soils and other materials. The disposal of surplus water within the void space is an integral part of mining operations and the way in which sites are dewatered can also affect the drainage system of the area and potentially result in the pollution of water courses and underground water features. Drainage from spoil tips and processing operations are other aspects which could impact on the water environment. Knowledge and understanding of the hydrology of an area prior to the commencement of development can help the formulation of measures to be incorporated into the design of the development to minimise and mitigate these impacts.

Ecology

9.10 The removal of trees, hedgerows and other vegetation could impact on the ecology of an area, both directly on the features within a site and indirectly on areas around and connected to a surface mining site. The direct impacts would be those on the species and habitats on the site, whilst indirect impacts could include the loss of foraging areas within the mining site for birds and animals living nearby. The use of an appropriate phasing scheme may help reduce such impacts and the restoration of a site can provide the opportunity to increase the ecological value of an area in the longer term but this balance is an important factor in the assessment of the acceptability of development proposals.

Agricultural Land

9.11 Coal can only be worked where it exists and in Derbyshire much of remaining coal resource lies underneath agricultural land. The geological conditions which give rise to the presence of coal are ones which are often associated with the presence of clay and other ground conditions which are not conducive to creating high quality agricultural land (as defined in the Ministry of Agriculture, Fisheries and Food Agricultural Land Classification System). Nevertheless the impact on agricultural holdings is an important factor in the assessment of development proposals and a significant consideration in the design of restoration schemes.

Ground Stability and Subsidence

9.12 Whilst surface mining operations work the coal resource closest to the surface the excavations involved can be very deep and involve the movement of considerable volumes of materials. All the excavated materials have to be placed back into the void to recreate an acceptable landform. This has to be done in a suitable manner to create appropriate compaction rates and avoid any long term stability problems. Subsidence is only an issue for underground mine working. The factors to be taken into account in the assessment of quarry-slope stability are identified in the National Planning Practice Guidance.

Heritage and Archaeology Features

9.13 The removal of most, if not all ground level features, could impact upon the heritage assets and archaeological remains of an area. The careful design of a development could help to avoid the most important of these features, allowing them to be preserved for the benefit of future generations. In some cases the excavation of the soils could expose and allow examination of archaeological features which would not otherwise be possible. The latest advice on conserving and enhancing the historic environment is available in the National Planning Practice Guidance.

Rights of Way and Recreation Facilities

9.14 Surface mining developments could impact on existing rights of way and other recreational facilities in an area. Footpaths can be temporarily diverted and returned to their rightful course when the site has been restored but consideration also needs to be given to the impact of a development on the users of rights of way which abut or are close to an extraction area whilst the operations are taking place.

Environmental Impacts of Deep Coal Mining

9.15 The environmental impacts referred to above are also potential impacts of deep coal mining. In addition the working of coal from deep underground could give rise to other environmental impacts including:

- Impacts from the use of a large area of land for a long period (visual impacts, disruption to existing uses and potential contamination of the land)
- The need to dispose of other materials extracted along with coal resulting in the need for substantial colliery disposal tips
- Treatment and pumping of underground water
- Monitoring and prevention of gas emissions from current and former deep mines

- Hazards of old deep coal mine workings
- Subsidence and damage to land and buildings over a wide area

Social Impact of Coal Mining

9.16 The potential impacts of mining developments are not restricted to environmental issues. Social impacts can also be experienced by the community or communities who live and work close to a mining development. Impacts can be direct and physical, such as the loss of local facilities, including footpaths and recreational areas or the loss of the ability to visit and enjoy an area of countryside. Other impacts can be ones perceived by the community at large which affect the quality of life and their living experience. The perception of these impacts will be greater where the community has experienced other similar effects in the past. This relates to the issue of cumulative impacts which is addressed below.

9.17 In contrast, where mining activity has formed the main focus of an area, the sudden loss of a mine, the jobs it provided and the income it generated can have adverse social implications. Where the mine was the main reason for the existence of a settlement the impact of the loss could be profound leading to the decline of the area and deprivation.

Economic Impact of Coal Mining

9.18 There are a number of direct economic benefits which are derived from coal mining. The coal produced has a value which contributes to the national gross domestic product. Coal produced in this country contributes to our energy requirements and also reduces the amount we need to import, which helps to reduce our international trade deficit. The income derived also contributes to the profitability and viability of the operating company. Coal mining developments create a number of jobs, although for surface mining the jobs are limited in duration. Surface mining companies normally maintain a group of key staff with particular skills and knowledge who travel from site to site and not all of the employment opportunities may be available to local residents.

Nevertheless the presence of the additional income will result in an increase in spending in the area.

9.19 Mining developments can also give rise to negative economic impacts. The main issue is the potential discouraging effect on the economy of an area by the presence of mining activity. The decline of the Derbyshire coal industry left many areas suffering long-term adverse social, environmental and economic effects. Many initiatives have been brought forward during the last 40 years to help regenerate these areas. The focus has been on measures to improve the image of the area, to encourage economic regeneration and assist in alleviating economic and social deprivation. Some former colliery sites have been redeveloped as new industrial estates providing alternative employment opportunities. Observations received by the County Council in response to coal mining development proposals indicate that some people consider the introduction of further mining activities in areas where regeneration activities are in train would deter developers from moving to the area, stifling the success of such initiatives. The potential effect of further mining developments on regeneration initiatives is therefore an important element in the consideration of individual proposals.

Cumulative Impact of Coal Mining

9.20 This is a particularly important issue for the former coalfield areas of the County where the long-term cumulative effects of previous and ongoing mining and other traditional industries has reduced the capacity of the area to absorb further, similar developments. These areas have suffered from the presence of the underground and surface mines. They have suffered the visual effects of the mines and associated tips and other ancillary facilities, from the adverse impacts on the landscape, on the quality of the environment and the overall image of the area. These impacts have often been exacerbated by the simultaneous presence of other heavy industries which utilised the coal obtained from the mines. The loss of the mining industry and associated businesses has also left a legacy of environmental pollution and degradation, of

social deprivation and inequalities and profound impacts on the economies of the respective towns and villages.

9.21 The sensitivity of these areas to further adverse impacts will be an important element in the determination of future mining proposals. The ways in which the sensitivity of an area will be assessed and how cumulative impacts could be evaluated will be addressed in a separate paper.

Assessment of Benefits

9.22 The NPPF recognises that coal mining can have adverse environmental impacts which may warrant applications for proposed developments to be refused. It also states that such adverse impacts may, in some cases, be outweighed by the national, local and community benefits of such developments. It does not prescribe how those benefits will be assessed or the weight to be given to them but in the local context these benefits could include:

- The provision of coal required for the production of domestic energy
- The provision of indigenous coal in preference to imported sources
- The provision of jobs
- The provision of economic benefits to an area from the jobs and the increase in spending
- The potential removal of derelict land and buildings
- The potential removal of contamination
- The potential improvement of ground conditions
- The potential improvement to the drainage of the site
- The potential improvement to the agricultural performance of the land
- The restoration of land to other beneficial uses
- The potential improvement to rights of way
- The potential improvement to recreational facilities
- The potential improvements to the landscape and visual appearance of the land

- The potential improvement and enhancement of the ecological value of the land
- The benefits arising from any financial contribution to local community facilities and projects
- The potential benefits of any off-site improvements (such as highway improvements) which are required to enable the development to commence

9.23 The range and scope of these benefits and how they will be used in the assessment of future coal mining development proposals is an important issue for the new Minerals Local Plan to determine.

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