

# DERBYSHIRE AND DERBY MINERALS LOCAL PLAN

## INDUSTRIAL LIMESTONE SUPPORTING PAPER

FEBRUARY 2015



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## **1. Introduction and Background**

1.1 Limestone is often described as the world's most versatile mineral. In terms of the number of quarries and the scale of tonnage produced, around 10 million tonnes annually in recent years (average annual production 2007-2012<sup>1</sup>), it is by far the most significant mineral quarried within the Plan area.

1.2 Limestone is mainly quarried for use in the construction industry where its physical properties have made it the principal source of crushed rock aggregate for use as fill material, road stone and in the manufacture of concrete. A separate paper has been produced on the working of Limestone for aggregate uses.

1.3 Limestone is also a very important 'industrial' mineral where its chemical properties make it a valuable mineral for a wide range of industrial/manufacturing uses; recently<sup>2</sup> around 3 million tonnes has been quarried annually in the Plan area for this purpose. This paper is about 'industrial limestone', the term given to the mineral when it is used for manufacturing and industrial processes. A separate supporting paper has been produced about the specific use of industrial limestone in the manufacture of cement.

1.4 Limestone is also used on a very small scale along with sandstone as building stone. The availability of local stone to conserve the character of the Plan area's historic built environment is of local importance. A separate paper has been produced on the working of Limestone for building stone.

### **1.5 End uses**

Industrial minerals serve as essential raw materials to the manufacturing industry, where the added value can be several times the cost of the mineral used. Industrial limestone is an important raw material in cement manufacture, glass making, sugar refining and flue gas desulphurisation. Other processes use limestone that has been

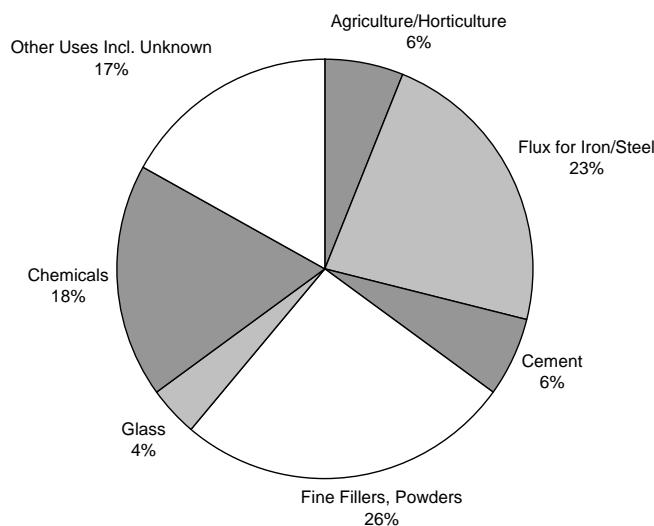
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<sup>1</sup> East Midlands Regional Aggregates Working Party Reports (2007-2012)

<sup>2</sup> East Midlands Regional Aggregates Working Party Reports (2007-2012)

burnt (calcined) to produce lime, including iron and steel making, water and effluent treatment, chemical industry, agriculture and food products and construction and building projects. Limestone is also ground to make a fine white powder. The powders are extensively used as fillers in a diverse range of products such as paints, plastics, paper, rubber, sealants, toothpaste etc. Most markets for industrial limestone are mature markets or are shrinking due to the decline in UK manufacturing. One growth area is limestone used for environmental applications and, in particular, for flue gas desulphurisation. Figure 1 shows the end uses of industrial limestone in the Plan area at 2010.

**Figure 1: End Use of Industrial Limestone Produced in the Plan area 2010<sup>3</sup>**



Source: East Midlands Regional Aggregate Working Party Report, 2010

## 2. National and Local Policy

### 2.1 National policy

The National Planning Policy Framework (NPPF) recognises that minerals are essential to support sustainable economic growth and our quality of life and that it is important, therefore, that there is a sufficient supply of material to provide the

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<sup>3</sup> EMAWP Annual Report 2010

infrastructure, buildings, energy and goods that the country needs. It also recognises that minerals are a finite resource so it is important to make best use of them to secure their long term conservation.

There are no national demand targets for industrial minerals. Paragraph 146 states that Mineral Planning Authorities (MPAs) e.g. Derbyshire County Council and Derby City Council should plan for a steady and adequate supply of industrial minerals by cooperating with neighbouring and more distant authorities to coordinate the planning of industrial minerals to ensure adequate provision is made to support their likely use in industrial and manufacturing processes. Safeguarding or stockpiling should also be encouraged to ensure the minerals remain available for future use.

Additionally for particular uses, such as cement manufacture, the NPPF requires that MPAs should make provision for a stock (landbank) of permitted reserves of limestone to support the level of actual and proposed investment required to maintain or improve an existing plant or to provide a new kiln. For the maintenance and improvement of existing plant the landbank should be at least 15 years for primary cement materials (chalk and limestone) and secondary cement materials (clay and shale). To support a new kiln the landbank should be 25 years. These figures apply to individual sites or feeder sites rather than the whole Plan area.

NPPF, paragraph 163, requires that, in preparing local plans, MPAs should develop and maintain an understanding of the extent and location of mineral resources in their area and assess the projected demand for their use taking into account any opportunities to replace the need for primary minerals. NPPF, paragraph 182 sets out the need for plans to be positively prepared based on a strategy which meets objectively assessed development requirements, including unmet requirements from neighbouring authorities where it is reasonable to do so and consistent with achieving sustainable development.

## 2.2 National Planning Practice Guidance

The National Planning Practice Guidance (NPPG) sets out guidance on how MPAs should plan for the steady and adequate supply of minerals (in order of priority):

- designating Specific Sites – where viable resources are known to exist, landowners are supportive of minerals development and the proposal is likely to be acceptable in planning terms. Such sites may also include essential operations associated with mineral extraction
- designating Preferred Areas, which are areas of known resources where planning permission might reasonably be anticipated. Such areas may also include essential operations associated with mineral extraction, and/or
- designating Areas of Search – areas where knowledge of mineral resources may be less certain but within which planning permission may be granted, particularly if there is a potential shortfall in supply.

National Planning Practice Guidance (NPPG) provides additional advice on how MPAs should plan for industrial minerals. It suggests that recognition should be given to any marked differences in geology, physical and chemical properties, markets and supply and demand between different industrial minerals, which can have different implications for their extraction. Such differences include:

- geology influencing the size of a resource, how it may be extracted and the amount of mineral waste generated
- the market demand for minerals to be of consistent physical and/or chemical properties, resulting in the fact that industrial minerals are often not interchangeable in use
- the potential for the quality of a mineral extracted from a single site varying considerably
- the economic importance of the mineral as a raw material for a wide range of downstream manufacturing industries
- some industries are dependent on several industrial minerals and the loss of supply of one mineral may jeopardise the whole manufacturing process.



The NPPG also provides advice on the purpose of stocks (landbanks) of permitted reserves and how and when the required stock of permitted reserves for industrial minerals should be calculated. Stocks of permitted reserves should be used as an indicator to assess when further permitted reserves are required at an industrial minerals site. They should be calculated when a planning application is submitted to extract the mineral (through either a site extension or a new site) or when new capital investment is proposed. The overall amount required should be directly linked to the scale of capital investment to construct and operate the required facility (such as a cement plant or brick factory).

The NPPG includes guidance on the 'Duty to Co-operate' regime which requires local planning authorities, County Councils and public bodies to engage constructively, actively and on an on-going basis on strategic cross boundary matters.

### **3. Method of Working/Processing/Transportation/Restoration**

3.1 Almost all Industrial Limestone in the UK is worked from surface quarries. The potential for the quality of the mineral extracted from a single site may vary considerably. This may require multiple extraction faces within one quarry, or supplies of specific feedstock from several different quarries, to enable blending of lower specification material with that of a higher grade. Alternatively, it may result in only a small proportion being suitable for specific industrial end uses, with remaining minerals being used for alternative purposes such as aggregates.

3.2 Processing of limestone can simply be divided into crushing/grinding, sizing and storage prior to loading and transportation. Chemical stone is sold as lime or lumpstone of specified particle size. Lime is produced by burning the stone in a kiln, the residue of calcium oxide or 'quicklime' is then sold as lump lime, pulverised lime or is hydrated and sold as hydrated lime to meet specific customer requirements. Limestone powders for use as fillers are produced by grinding the limestone to a fine powder.

- 3.3 The price of an industrial limestone product is largely governed by the cost of extraction, processing and transportation. The processing plants associated with industrial minerals are generally large and require high capital investment, particularly for cement and lime manufacture.<sup>4</sup> This has led to the development of large quarries that can produce large outputs over long periods of time. Because transport costs may exceed production costs, it is important for the quarry to have good road, rail and/or water transport links and for the most appropriate form of transportation to be used.<sup>5</sup> Limestone, for both industrial and aggregate purposes, is currently the only mineral quarried within the Plan area where the scale of working has made it cost effective to transport the mineral product to market by rail.
- 3.4 The scale of the limestone quarries and the often relatively small quantities of waste material generated compared to the rock taken out means that it is not generally possible to restore land to its original levels following completion of working. Final restoration depends to a large extent on the depth of the quarry and level of the water table. Natural regeneration incorporating water is usually appropriate for deep quarries and, in such cases, they can become important areas for wildlife and natural history. In cases where the depth is not too great, the quarry floor can be restored for agriculture or informal leisure uses.

## **4. Industrial Limestone Resources**

- 4.1 Although limestones occur widely in England, many are unsuitable for industrial use because of their chemical and/or physical properties. The Carboniferous Limestone and Cretaceous-age Chalk are the main important resources of industrial limestone in England.<sup>6</sup>
- 4.2 Within the Plan area, the three main areas of Industrial Limestone production are the Buxton and Wirksworth areas of the Carboniferous Limestone, bordering the Peak District National Park, and the Permian Limestone area around Whitwell.

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<sup>4</sup> BGS & ODPM, Industrial Minerals: Issues for Planning, 2004, p12

<sup>5</sup> BGS & ODPM, Industrial Minerals: Issues for Planning, 2004; p174

<sup>6</sup> BGS & DoE, Mineral Resource Information for Development Plans, 1995; p7

### 4.3 Carboniferous limestones

The Carboniferous limestones of the Plan area are noted for their thick, uniform beds over wide areas and for their very high chemical purity and consistency of certain beds which are highly valued for a range of industrial uses.

Carboniferous limestones in Derbyshire (geographical area) are generally pale coloured, massive (no bedding planes) or thickly bedded limestones which were deposited in a relatively shallow water environment. They are uniform in composition over wide areas and are often of very high purity (>98% Calcium Carbonate). The carboniferous limestone is also a resource of good quality aggregate materials<sup>7</sup>.

The Bee Low Limestones, a unit of consistently very high purity and uniform chemistry, provide most of the Carboniferous limestone quarried in Derbyshire (geographical area). The formation typically contains limestones with only small proportions of magnesium oxide (MgO), silica, alumina, iron and other impurities. The purity is locally downgraded in beds adjacent to clay bands and igneous horizons (basaltic lavas and tuffs) which are locally inter-bedded with the limestone. The zone of alteration is, however, usually less than 2m and impurities rarely total more than 5% of the rock. The Bee Low Limestones are extensively dolomitised in the Matlock-Wirksworth area, containing high levels of magnesium oxide, mostly in the range 18.0-20.5% MgO. In the past, they have been valued for their MgO content and between 1963 and 1966 were used for the extraction of magnesium metal (Mg). They are not currently worked for this purpose.<sup>8</sup>

The Bee Low Limestones generally produce strong, low porosity, aggregate materials, although where dolomitised in the Matlock-Wirksworth area they are relatively porous and weak. However, even the poorest quality limestone aggregate from Derbyshire (geographical area) is harder and less porous than, for instance, most Jurassic limestone or chalk aggregates. The Bee Low Limestones are also the most

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<sup>7</sup> BGS & DoE, Mineral Resource Information for Development Plans, 1995; p7

<sup>8</sup> BGS & DoE, Mineral Resource Information for Development Plans, 1995; p8

important source of industrial limestone with a range of applications, including lime production, soda ash manufacture, flue gas desulphurisation, glassmaking and as filler in paint, rubber and plastics.<sup>9</sup>

The beds immediately beneath the Bee Low Limestones, termed the Woo Dale Limestones are not widely exposed, although they are worked in several quarries. The Woo Dale beds are also of high purity and together the two formations (Bee Low and Woo Dale) comprise over 300m (thickness) of industrial limestone resources. The Woo Dale Limestones are slightly dolomitised in the Buxton area, but MgO values are generally less than 1%. Purity remains high throughout the uppermost 100m of strata but, lower in the sequence, the unexposed beds contain higher silica, alumina, iron and sulphur contents.<sup>10</sup>

The limestone sequence above the Bee Low is much more varied chemically and somewhat less pure. The Monsal Dale and Eyam Limestones both contain cherty and shaly beds and the Monsal Dale Limestones also contain several volcanic (lavas and tuffs) units which make up a large proportion of the total thickness in the Matlock-Ashover area. Both limestone formations produce good quality aggregates, and are used in concrete and road construction (except road surfacing). The resource potential of the Derbyshire limestones is locally affected by the presence of other minerals. Fluorspar, barytes and lead are confined mostly to veins and replacement bodies in the Matlock-Ashover-Wirksworth area. However, the effects are localised and restricted generally to the width of the mineral vein or body.<sup>11</sup> A separate Paper has been produced on Vein Minerals within the Plan area.

#### 4.4 Permian limestones

Where there is a significant content of calcium magnesium carbonate, or magnesium carbonate, the mineral is known as 'dolomite'. The Permian Limestone is the main source of dolomite in Britain. It extends in a narrow belt, almost continuously from

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<sup>9</sup> BGS & DoE, Mineral Resource Information for Development Plans, 1995; p8

<sup>10</sup> BGS & DoE, Mineral Resource Information for Development Plans, 1995; p8

<sup>11</sup> BGS & DoE, Mineral Resource Information for Development Plans, 1995; p8

Durham to Nottinghamshire. A small part of the outcrop (the Cadeby Formation) occurs in the north-east of the county, to the east of Bolsover.<sup>12</sup>

The Permian Limestone is highly variable, both regionally and locally, in its physical, mechanical and chemical properties and thus its suitability for particular applications. The formation is quarried for a range of construction uses, mostly for fill and sub-base material, and, less commonly, for concrete aggregate and coated roadstone. Some is used for block making and for building stone. It is inferior to Carboniferous limestones as a source of aggregate because of its variable character, and generally lower strength and higher porosity. Impurities such as silica, iron and alumina are a prime consideration in the selection of dolomite for its various industrial applications. At Whitwell Quarry, the upper part of the dolomite has a sufficiently low silica and iron oxide content for it to be used, after processing, as a refractory raw material and as a flux for steelmaking. The underlying dolomite is utilised for a range of construction applications.<sup>13</sup>

#### 4.5 Relationship with aggregate limestone

In the excavation of high grade industrial limestone rock of all grades will necessarily be produced<sup>14</sup> and most producers of industrial limestone also produce aggregates in order to obtain sales from all of the grades of limestone excavated. There are no fundamental reasons why, in terms of the mechanical structure of the rock, industrial quality limestone cannot be used for aggregate purposes. However, in view of the relative limited occurrence of 'industrial' limestone it is important to make the best use of this scarce resource and therefore minimise the use of this material for aggregate purposes.

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<sup>12</sup> BGS & DoE, Mineral Resource Information for Development Plans, 1995; p8

<sup>13</sup> BGS & DoE, Mineral Resource Information for Development Plans, 1995; p9

<sup>14</sup> BGS & ODPM, Industrial minerals: Issues for Planning, Annex B, p100, 2004

#### 4.6 **Safeguarding**

Since minerals are a finite resource it is important to ensure that non minerals development does not needlessly prevent the extraction of known mineral resources of local and national importance. One way of achieving this is through the inclusion of resources within Mineral Safeguarding Areas. The Carboniferous and Permian Limestones are important industrial limestone resources within the Plan area. In preparing the Minerals Local Plan we will need to assess which limestone resources and how they should be safeguarded. More detailed information is available in the Paper, Towards a Strategy for safeguarding mineral resources, November 2014 and in its accompanying supporting Paper on Minerals Safeguarding, November 2014.

### 5. **Specification**

5.1 In seeking to identify limestone as being fit for particular industrial applications there are many different qualities of the mineral which need to be taken into account. Limestone consists principally of calcium carbonate; with an increase in magnesium carbonate limestone grades into dolomite. Most limestones contain varying amounts of impurities in the form of sand, clay and iron bearing materials. These impurities are usually present in small proportions in 'industrial' limestones which are generally valued for their 'high purity' (greater than 96-97% calcium carbonate defining high purity limestone and greater than 98-98.5% being very high purity limestone). For many applications, however, it is the level, or absence, of the specific impurities present or the consistency or colour of the limestone which are of paramount importance, rather than the absolute values for calcium carbonate. For this reason, the Plan uses the term 'industrial' limestone rather than 'high purity' limestone.

5.2 Industrial limestone is consumed in a wide range of end uses based on its diverse physical and/or chemical properties. In some cases, it is valued solely as a source of specific chemical elements, or compounds, for example for use as chemical feedstocks, in cement making or as plant nutrients. For others it is a combination of physical properties, such as particle size and shape, natural and fired brightness (whiteness), plasticity, viscosity in suspension and density that form the basis for

commercial exploitation. However, in many cases it is a combination of physical and chemical properties that are desired.

5.3 The different markets for specific industrial limestone demand different combinations of properties. Subtle differences in their properties can make the performance of a specific industrial mineral quite different from one deposit to another. Consequently, individual deposits may be aimed at particular products or markets and as a result some specifications for particular products or markets are written around specific deposits. This means that specific individual deposits of industrial minerals are often not interchangeable in their use.

#### 5.4 **Chemical stone**

Limestone is used in a number of industries where its chemical properties as a basic oxide, flux, neutralising agent or source of calcium are important. Glassmaking, sugar refining, cement manufacture and flue gas desulphurisation use raw limestone, but most other processes use limestone that has been burnt (calcined) to produce lime. These include iron and steel making, water and effluent treatment, chemical industry, agriculture and food products and construction and building projects.

#### 5.5 **Limestone powders**

Limestone is relatively soft and easy to grind to a fine powder. This is non-toxic and usually white in colour. These properties ensure that limestone powders are extensively used as fillers in a diverse range of products where the primary purpose is to add low cost bulk. Some limestone powders also make use of the chemical properties of the stone. Examples include acting as a source of calcium in animal feeds and as an acidity regulator in some agricultural and pharmaceutical products.

Many high volume applications of limestone powders (such as agricultural lime, carpet backing and asphalt manufacture) do not require 'high purity' limestone and are sourced from a variety of quarries across the UK. In contrast, powders used in applications such as pharmaceuticals and food must be of very 'high purity'. Limestone powders used as fillers in paper, plastics and high quality paints typically

require particle sizes within a closely defined range, along with high brightness (whiteness), good rheological (fluid) properties and low oil absorption. Particle sizes range from relatively coarse grades, with 90% less than 50 microns to fine grades with material less than 5 microns. Figure 2 sets out the different grades of limestone powders for filler applications.

**Figure 2: Limestone powders for filler applications**

Coarse fillers (generally low value); 75 micron to several millimetres	<ul style="list-style-type: none"> <li>- agricultural lime</li> <li>- animal feedstuffs</li> <li>- asphalt</li> <li>- fertilisers</li> </ul>
Medium fillers (generally medium value); Less than 50 microns	<ul style="list-style-type: none"> <li>- carpet backing</li> <li>- floor tiles</li> <li>- sealants</li> <li>- adhesives and putties</li> </ul>
Fine fillers (generally medium value); Maximum particle size 50 microns; 50% less than 2 microns	<ul style="list-style-type: none"> <li>- paper fillers</li> <li>- rubbers and plastics</li> <li>- cheaper paints</li> </ul>
Very fine fillers and pigments (generally high value); maximum particle size 10 microns; 90% less than 2 microns	<ul style="list-style-type: none"> <li>- paper coatings</li> <li>- paints</li> <li>- rubbers and plastics</li> </ul>

Source: Industrial Minerals Issues for Planning, BGS, 2004, p174

## 6. Demand

6.1 There are no national demand figures for industrial limestone production. The industry is market led and production is closely related to demands in the manufacturing industries; indeed some industrial mineral producers are also major manufacturers. Of the total production of industrial mineral approximately 50%<sup>15</sup> is

<sup>15</sup> BGS, Industrial Minerals: Issues for Planning, 2004



not sold on the open market but used capively in the manufacture of value-added products.

6.2 Most of the markets for industrial carbonates are mature, or in decline, due to the decline of UK manufacturing, particularly iron and steel production. However, flue gas desulphurisation has emerged as a major market for limestone since 1994, although this market is tied to the future of coal-fired power generation in the UK.<sup>16</sup>

### 6.3 **Alternatives/recycling**

The fact that industrial limestone is valued for its physical and/or chemical properties means that opportunities for its substitution and recycling are limited. Additionally, the intrinsic properties of industrial minerals are often changed irreversibly in the manufacturing process making them difficult to be reused or recycled. However, calcium carbonate is recovered from the sugar refining process and sold for agricultural purposes.

Limestone and chalk powders used as fillers compete with other minerals such as kaolin or talc. Because limestone and chalk powders tend to be of lower cost relative to those other minerals, limestone has tended to increase its market share relative to many other minerals in the filler market. Recycling of paper and some plastics allows the mineral component to be recovered. Recycling glass also recycles lime and soda ash used in their manufacture.<sup>17</sup>

### 6.4 **Economic importance**

In terms of wealth created by United Kingdom minerals production, figures show that at 2012, the construction and industrial minerals sector contributed just 7 % of total wealth compared to the oil and gas sector's 90%<sup>18</sup>. However, the importance of construction and industrial minerals as essential inputs to downstream industries, mainly within the manufacturing and construction sectors, needs to be recognised.

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<sup>16</sup> UK Minerals Forum, Trends in UK Production of Minerals, 2014

<sup>17</sup> BGS & ODPM, Industrial Minerals: Issues for Planning, 2004; p174

<sup>18</sup> Page 9, United Kingdom Minerals Yearbook 2013, BGS Minerals and Waste Programme Open Report OR/14/036, 2014

Minerals working can provide an important source of local employment both in rural and former coal mining areas. In 2013, the most recent date that statistics are available, 1,177<sup>19</sup> people were employed in limestone and dolomite working in Derbyshire; 472 were directly employed, 89 were employed by contractors and 716 were drivers (based on an average week).

## **7. Production and Reserves**

- 7.1 Nationally, within Great Britain, the production of limestone, dolomite and chalk for agricultural uses e.g. agricultural lime has remained fairly constant within the range of 1.5 mt to 2 mt within the period 2000-2012. The production of the same minerals for industrial uses over the same period has seen a decline from around 9.8 mt in 2000 to 7.5 mt in 2012.<sup>20</sup>
- 7.2 There are no national level figures for total permitted reserves of industrial limestone, although due to the high capital investment required to process industrial minerals, most major sites command extensive reserves. There are also reserves of limestone that would be suitable for industrial use at quarries that do not produce limestone for non-aggregate purposes.<sup>21</sup>
- 7.3 The annual production of industrial limestone from the Plan area has remained fairly steady at around 3 million tonnes over the last 5 years<sup>22</sup>; in line with the national trend demand<sup>23</sup> is not expected to increase significantly over the plan period. At the end of 2013 the Plan area had total estimated reserves of some 228<sup>24</sup> million tonnes (active and inactive sites) of industrial limestone, equivalent to over 75 years of production at current rates.

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<sup>19</sup> Business Monitor PA1007, 2013, Office for National Statistics, Mineral Extraction in Great Britain

<sup>20</sup> BGS, United Kingdom Minerals Yearbook, 2013

<sup>21</sup> BGS & ODPM, Industrial Minerals: Issues for Planning, 2004; p173

<sup>22</sup> EMRAWP Annual Reports 2009-2013

<sup>23</sup> UK Minerals Forum: Trends in UK Production of Minerals Jan 2014 – 7.8 Industrial Carbonates

<sup>24</sup> EMRAWP Annual Report 2013

## 7.4 Industrial limestone quarries in the Plan area

### Active sites

In 2013, a total of nine quarries produce industrial limestone within the Plan area, their location is shown on Figure 4 and further details set out in Figure 3 below. Most of these quarries also produce limestone for aggregate use and in some cases industrial limestone production is quite low, which has been indicated on the table. Permitted reserves for industrial uses totalled some 197<sup>25</sup> million tonnes at active sites.

**Figure 3 Active Industrial Limestone Quarries, 2014<sup>26</sup>**

Quarry	Operator	Industrial mineral / product produced
Ashwood Dale Quarry, Buxton	Omya UK Ltd	Industrial Carbonate
Bone Mill Quarry (Ryder Point, Taylor's), Hopton (less than 10% industrial)	Longcliffe Quarries Ltd	Agricultural Lime
Brassington Moor Quarry (Longcliffe)	Longcliffe Quarries Ltd	Agricultural Lime Industrial Carbonate
Brierlow Quarry (Hindlow Works), Buxton	Lhoist UK Ltd	Lime Industrial Carbonate
Dove Holes Quarry, Buxton (less than 10% industrial)	CEMEX UK Ltd	Agricultural Lime
Dow Low Quarry, Buxton	Hope Construction Materials	Industrial Carbonate Agricultural Lime
Grange Mill Quarry, Wirksworth	Ben Bennet Jnr Ltd	Agricultural Lime Industrial Carbonate
Tunstead Quarry (Tunstead - Old Moor), Buxton	Lafarge Tarmac	Lime Cement Manufacture Industrial Carbonate
Whitwell Quarry, Whitwell	Lafarge Tarmac	Dolime Industrial Carbonate

Note: Source table shows Dene Quarry as active but MPA aware this site was mothballed in 2013 and therefore removed from the table

<sup>25</sup> EMAWP Annual Report 2013

<sup>26</sup> BGS, Directory of Mines and Quarries, 2014

Two quarries, Whitwell and Ashwood Dale, are anticipated to run out of permitted reserves of industrial limestone before the end of the Plan period. The quarry operators are promoting extensions to these sites which raise important 'duty to co-operate' issues. Further information is set out in the Appendix.

#### 7.5 Inactive industrial limestone quarries

In addition, a further five quarries have reserves of industrial limestone (in total around 31 million tonnes<sup>27</sup>), and would not require a new planning permission to resume extraction, but are not currently producing industrial limestone.

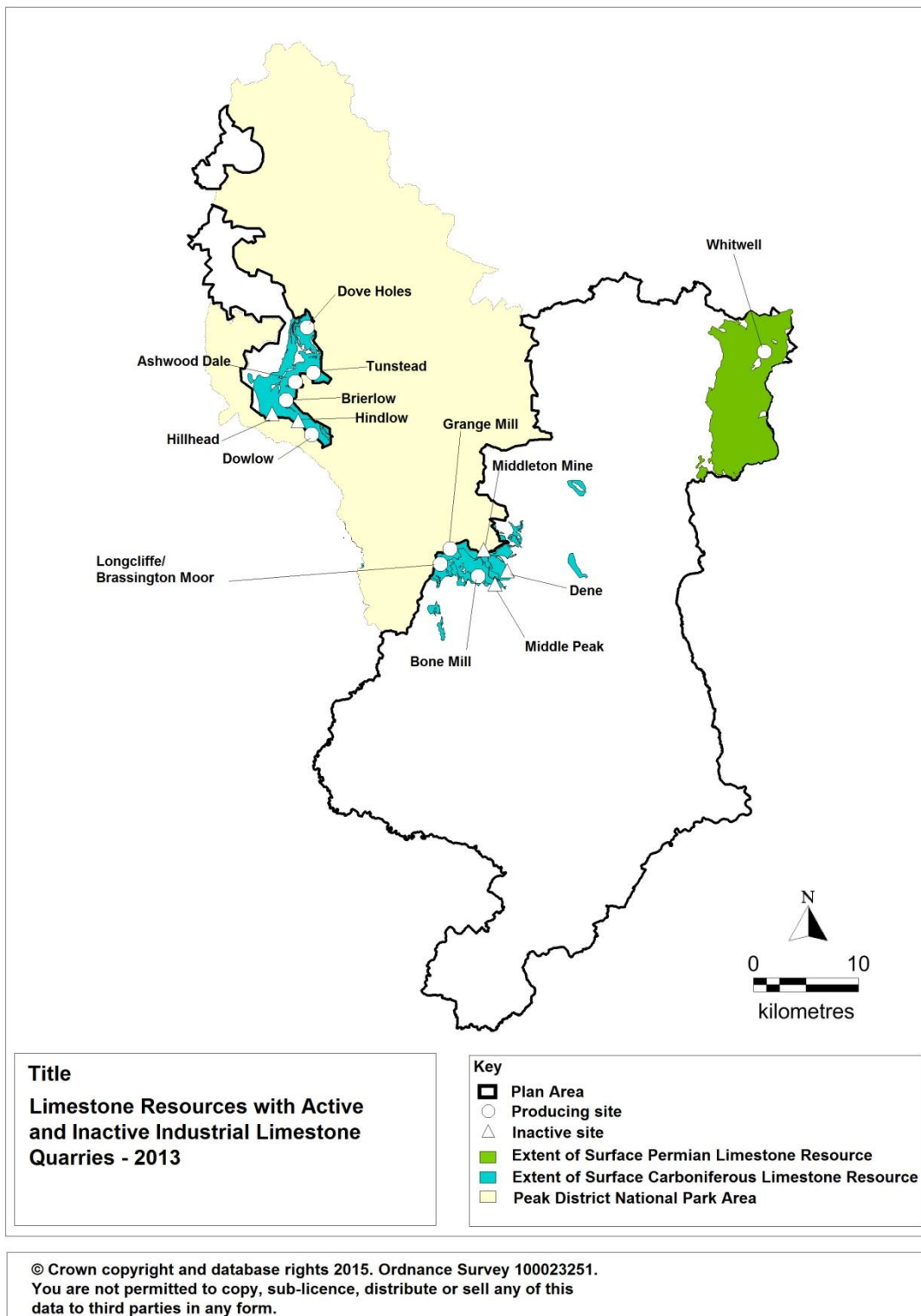
- Hillhead Quarry, Buxton (Lafarge Tarmac) - Working is temporarily suspended as operator has sufficient reserves at other sites.
- Hindlow Quarry, Buxton (Lafarge Tarmac) - No quarrying since 1988, limestone is imported from Tunstead by rail and processed at the plant at Hindlow Quarry. The operators have stated that the considerable reserves at Hindlow form an integral part of the company's long term resources and a resumption of quarrying will take place in the future.
- Middle Peak, Wirksworth (Lafarge Tarmac) – No production since 2005.
- Middleton Mine, Wirksworth (Lafarge Tarmac) – No production since 2005.
- Dene Quarry, (Lafarge Tarmac) – Site has been mothballed for operational reasons.

Ongoing work will be required to establish the contribution that individual quarries (particularly inactive sites) are likely to make to the supply of industrial limestone over the Plan period.

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<sup>27</sup> EMRAWP Annual Report 2013

Figure 4: Active and inactive industrial limestone quarries within the Plan area – 2013



## **8. Conclusions**

- 8.1 Given the overall level of permitted reserves of industrial limestone and the anticipation that levels of output will not increase greatly during the Plan period, there is on the face of it no need in overall numerical terms to allow for additional industrial limestone working. However, because of the wide diversity of industrial limestone markets and the chemical variability within some deposits, as discussed in this Paper, shortages in the availability of some particular qualities of mineral may occur which would result in the need for additional reserves. It is important therefore that our policy approach is flexible to allow the working of additional industrial limestone in such cases.
  
- 8.2 Where we know at the outset that there is a need for additional reserves to be worked over the Plan period then the Plan needs to decide whether to make provision for additional working, in those circumstances, through the specific allocation of sites or through a criteria based approach. For example, Nottinghamshire County Council has allocated an extension to the industrial limestone quarry at Whitwell in its Minerals Plan (preferred approach stage - winter 2013).
  
- 8.3 Additionally, because the need for very particular chemical specifications may require selective working of the mineral, this can result in an increase in the production of non-industrial grade stone. The Plan therefore needs to guard against the use of high specification materials for uses that do not require those specifications, in accordance with the principle of making the most sustainable and efficient use of mineral resources.

## **Appendix**

### **Sites promoted by mineral operators for allocation in the Minerals Local Plan**

#### **Whitwell Quarry**

Dolomites with sufficiently low levels of impurities for industrial uses are comparatively scarce in the UK.<sup>28</sup> Whitwell, operated by Lafarge/Tarmac, is only one of three active quarries in the UK mining 'industrial Dolomite' and is therefore of national importance. The quarried mineral feeds the adjacent kilns, operated by Lhoist, to produce calcined dolomite that is used in the manufacture of refractory products that are sold worldwide.

The chemical variations of the deposit, combined with variations on kiln feed demand; require that different areas of the quarry have to be worked at the same time. It is this flexibility that helps to conserve the scarce high grade materials for high grade use and enables the company to produce a range of products which assists their competitiveness in the market.

In 2002 planning permission was granted to extend the quarry in five separate areas; these sites were allocated in the adopted Minerals Local Plan, 2000. Information from the operator estimates that the current annual production of industrial grade limestone from Whitwell is around 500,000 tonnes. Reserves of industrial grade limestone at the end of 2012 totalled some 6.3 million tonnes, according to the operator, which, if current production is maintained would be exhausted by 2025 i.e. before the end of the Plan period. The company has put forward five possible extension areas to Whitwell Quarry (one site is in Nottinghamshire), shown the map. The promoted sites lying within the Plan area would generate an additional 4.3 mt of industrial grade limestone; the site in Nottinghamshire would generate approximately 10 mt.

Lying immediately south of the quarry and north of the proposed site in Nottinghamshire is Creswell Crags which is an enclosed limestone gorge, where a cave complex preserves internationally unique evidence demonstrating how early prehistoric populations lived at the extreme northern limits of their territory during the Ice Age (Late Pleistocene). The

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<sup>28</sup> British Geological Survey, Mineral Planning Factsheet Dolomite, p5, 2006

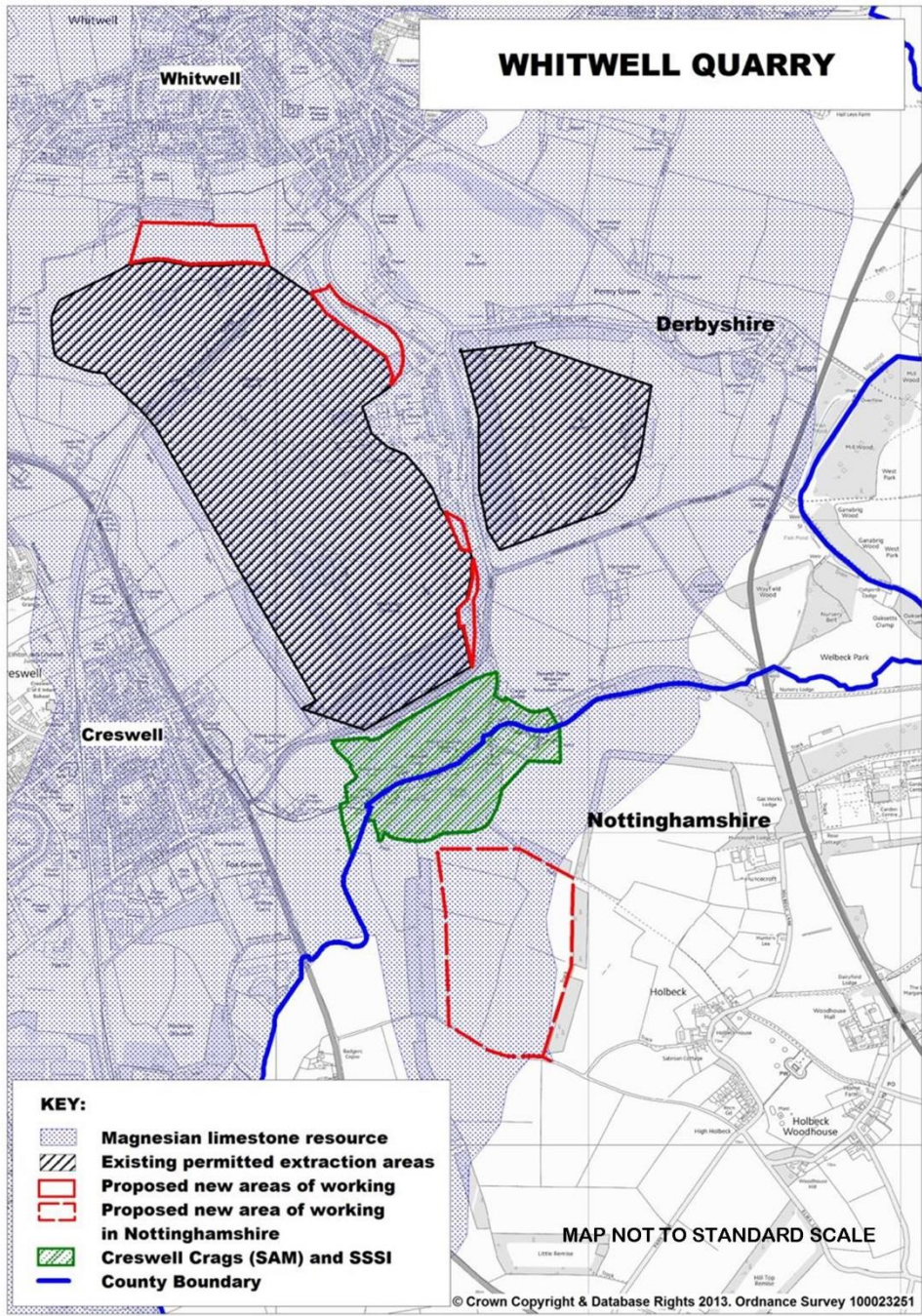
Craggs is designated as a Scheduled Ancient Monument (SAM) and Site of Special Scientific Interest (SSSI); it is also on the tentative list for possible nomination as a World Heritage Site recognising its international importance. Current planning conditions and agreements are in place to protect the caves from any impacts from quarrying, which are chiefly, risks of damage and nuisance caused by blasting and any adverse impact on the setting of the Craggs. Any proposals for future working would need to ensure the same level of protection.

### **Duty to cooperate**

In view of the fact that, the resource straddles the county boundary with Nottinghamshire and the Operator is promoting extensions to Whitwell quarry in both MPA areas, we are working closely with Nottinghamshire CC to develop a joint approach to the future development of the quarry. Nottinghamshire CC has published its Minerals Plan (preferred approach stage - winter 2013) in which an extension to the quarry is proposed, in order to contribute to the supply of industrial dolomite. Our Plan will need to take into account where this site fits in the overall future development of Whitwell quarry together with the sites being promoted by the operator for working in the Derbyshire and Derby Plan area.

The extensions also lie on either side of Creswell Craggs; given its importance as a scheduled monument, site of special scientific interest and a potential world heritage site, we are together with Nottinghamshire CC jointly liaising with appropriate bodies, including English Heritage, to ensure the continued protection of the Craggs from any future mineral working.





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## **Ashwood Dale Quarry**

Ashwood Dale Quarry lies within the Carboniferous Limestone resource around the Buxton area. Limestone is extracted for both industrial and aggregate purposes; information from the operator<sup>29</sup> indicates that estimated annual future production rates amount to 135,000 tonnes of limestone for industrial purposes and 65,000 tonnes for aggregate uses. All stone processing occurs at Ashwood where the stone is crushed and milled; a small amount of product is taken to Dowlow quarry to be bagged.

The quarry produces industrial limestone products which are high purity, fine powders with exacting colour requirements and impurity constraints. Sales of industrial limestone products from Ashwood Dale are made up of 60% of various industrial powders, 20% animal feeds and 20% agricultural lime. The industrial powders are used in the following markets: ceramic tiles and refractories, glass production, adhesives and sealants, and resin polymers and fillers. Omya UK Ltd is particularly known for its industrial powders. The quarry supplies both local and national markets with industrial minerals.

The colour and chemical purity of the limestone are critical for the sale of industrial products. The quarry contains two types of limestone the lighter coloured high quality industrial stone and the darker aggregate stone. The light stone is capable of producing industrial products without blending, however the darker stone cannot produce industrial products unless it is blended with the lighter stone. The actual amount of blending depends on the level of calcium carbonate and colour within the working faces at any particular time. Blends of up to 50% of each material have been historically possible but often the blends require more than 50% of the lighter stone. In recent years it has not been possible to carry out any blending but it is the intention to do this again to maximise the amount of industrial mineral.

The current permitted reserves total approximately 15.0 million tonnes in total. Approximately 1.6 mt are light coloured stone suitable for industrial products and 13.4 mt are dark coloured stone suitable for aggregates. At the proposed production rates the

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<sup>29</sup> Ashwood Dale Quarry, Request for a Regulation 13 Scoping Opinion, Omya UK Ltd, October 2014

permitted reserves of light coloured stone will last for less than 12 years and therefore run out during the Plan period; the dark limestone would last for more than 200 years. This does not allow for blending of materials to increase the amount of industrial limestone products.

The Company's proposed extension area would yield approximately 4.8 mt of predominantly light stone although the dark stone here is of better quality than the dark stone in the existing quarry. It is proposed to blend the light and dark stone within the extension area at a ratio of 71%/29% in order to maximise the amount of industrial stone produced. All the stone from the extension area would be used for industrial products.

Additionally, the Company do not propose to extract the three quarry benches below the current quarry floor, the permitted areas along the northern boundary of the existing quarry with Cuningdale or the eastern most area of consented reserves. Planning permission to extract in these areas, amounting to 10 mt of dark stone, would be relinquished as part of the extension proposals. This could be a benefit for the adjoining Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) in so far that it should help avoid any hydrological impacts on the SAC/SSSI system.

The proposed development of the quarry and extension areas would yield a total of 9.8 million tonnes comprising 6.4 mt of light coloured limestone and 3.4 mt of dark coloured stone. This compares to the current 15.0 million tonnes of permitted within the existing site.

### **Duty to cooperate**

An important issue has arisen in relation to the High Peak Local Plan Submission (April 2014) which proposes a housing site (B8) to the west of Tongue Lane, Buxton, the boundary of which adjoins the quarry extension proposal in part. The proposed housing site and the quarry extension put forward by the operator are shown on the Map. This situation raises a potential conflict of interest between the expansion of the quarry and the development of the potential housing site. The proximity of the working quarry and its potential expansion may have an unacceptable impact on residential amenity and prejudice delivery of the housing site whilst developing the housing may lead to sterilisation of part of the mineral and prejudice the delivery of potential mineral development. In view of this, in July 2014,

the County and City Councils lodged a holding objection to the housing proposal in the Submission Plan.

High Peak Borough Council's Submission Plan is currently (February 2015) under examination by an Inspector (appointed by the Planning Inspectorate) who will, amongst other things, assess whether the Plan has been prepared in accordance with the duty to cooperate requirements and take into account any representations made on the Plan at the Submission stage.

In line with the Duty to Cooperate regime the MPAs, HPBC and the quarry operator Omya UK Ltd have worked together to produce a 'Statement of Common Ground'<sup>30</sup> which has been submitted to the Inspector. The Statement sets out a mutually agreed solution to the issue which would enable both developments to proceed with modifications to the Submission Plan that would satisfy the duly made objections. The solution proposes a modest relinquishment of mineral resources, approximately 200,000 tonnes which equates to 1.6 years supply of industrial grade stone, and a reduction in the area and scale of the proposed housing allocation.

Following the hearing session in January and February 2015 the Inspector will now prepare a Report for HPBC with his conclusions on compliance with the duty to cooperate, legal compliance and soundness. In accordance with legislation<sup>31</sup> HPBC has requested the Inspector to recommend any main modifications to the Submission Plan to make it sound and legally compliant. These include modifications in relation to the matters in the Statement of Common Ground. The Inspector's Report is expected later in 2015.

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<sup>30</sup> High Peak Local Plan Examination 2015, Statement of Common Ground agreed between HPBC, DCC (and on behalf of DC) and Omya UK Ltd, December 2014

<sup>31</sup> Section 20(7C) of the 2004 Planning and Compulsory Purchase Act



