

Worcestershire Minerals Local Plan Background Document

Building Stone in Worcestershire Background Document September 2018

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1. Executive summary

- 1.1 Worcestershire contains many building stone quarries that were formerly worked to provide building stones for local towns and villages and, in some cases, for important buildings further afield. These quarries provided a supply of stone that contributed to the local character of Worcestershire by giving its unique and varied geology physical expression in the county's walls, paving stones, homes, bridges, churches, and monuments. These quarries have now all ceased operation – in some cases they have not been worked for decades. There have been no new applications for building stone workings in the county since at least 1990.
- 1.2 Nationally, there are concerns about ensuring the continued supply of natural local building stone for the appropriate restoration and repair of historic buildings. Economically, increasing competition from imported stone and other man-made stone products can bring the viability of small extraction sites into question.
- 1.3 Minerals, including building stones, can only be extracted where they are found. Geological features that contain high-quality building stones are often co-located with designated areas, such as Areas of Outstanding Natural Beauty.
- 1.4 Building stone quarries normally operate at a much smaller scale – often orders of magnitude smaller – than crushed rock or aggregate quarries, and are worked much more slowly over a longer period of time. This means that the magnitude of the potential impacts from any new building stone workings (including traffic, emissions, amenity, and restoration and conservation potential) is likely to be correspondingly smaller than at larger mineral working sites, but may also be felt for longer.

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2. Introduction to building stone

Building stone in the UK

- 2.1 Building in stone has a long and illustrious history. The oldest stone building in the UK, the Knap of Howar in Orkney, Scotland, dates from 3700 BC¹ and stands in remarkable condition, a testament to both the skill of its ancient builders and the quality of the local Old Red Sandstone as a building material. This legacy has continued through the chambered tombs of Prehistory, through the forts and baths of Roman Britain, the churches and cathedrals of the Middle Ages, the fine stone buildings of the Renaissance, the functional and efficient buildings of the industrial revolution, and the modern stone houses that contribute to Britain's picturesque landscape.
- 2.2 Evidence of quarrying in the UK also dates from well before Roman times, and some ancient quarries also form part of the historical landscape of Britain.
- 2.3 The UK's remarkable geological diversity provides a fertile platform for building in stone:

*"the diversity of local stone sources, often coupled with local masons employing their own styles, has made a fundamental contribution to England's highly variable and locally distinctive built heritage over many centuries"*².
- 2.4 The importance of preserving access to local stone resources for conservation, repair, maintenance and improvement of historic buildings cannot be understated. In fact local character is at risk in many areas from "a reduction in the number and variety of accessible building and roofing stone sources"³ as well as the encroachment of modern building materials and techniques.
- 2.5 Building stone includes stones intended for structural, roofing and decorative applications, and is sometimes referred to as 'dimension stone' to distinguish it from aggregate or crushed stone. Many quarries are able to produce both building stone and aggregates, though the extraction of crushed rock is often much more intensive.
- 2.6 Dimension stone can be taken to mean "any rock that is extracted for use largely in its natural state, i.e. without crushing, screening, washing or similar treatment. It covers building, walling, flooring and paving stone as well as a range of materials used for roofing purposes. It includes

¹ Ritchie, A. (1990) *The Prehistory of Orkney: BC4000 – 1000AD*, Edinburgh University Press, Edinburgh.

² English Heritage (2008) *Mineral Extraction and the Historic Environment* English Heritage Publications, p.12.

³ English Heritage (2008) *Mineral Extraction and the Historic Environment* English Heritage Publications, p.12.

monumental stone and material worked for “high end” architectural uses such as cladding buildings⁴. Building stone is a broader definition that can include stone quarried for paving, rubble walls and other uses.

- 2.7 Quarrying is a localised activity: stone can only be extracted from where it occurs naturally due to the underlying geology. The geology of the UK is therefore very strongly linked to both the diverse landscapes and local character of a region.
- 2.8 The modern building stone industry is remarkably diverse, with hundreds of quarries across the country producing a variety of stones for new buildings and conservation purposes, using a combination of modern and traditional quarrying methods⁵. The natural products from these quarries can survive for centuries, giving historical buildings a tangible link to the landscapes that produced them. The use of indigenous stone is often dictated by planning requirements in sensitive or conservation areas, which helps support local producers⁶.

Economics of building stone

- 2.9 Although there was a large drop in the UK stone market during the recession, the industry recovered and, while there was some hesitation in the industry at the time of the Brexit referendum, confidence seems to have returned to the market⁷.
- 2.10 The value of the stone market in the UK is currently unknown because "the sector is considered too small for figures about its value to be published as it is felt it would be commercially sensitive"⁸. The Mineral Products Association states that "the value of this sector to the UK economy is difficult to estimate but it was thought to be worth at least £350 million in 2010"⁹, although 2010 is seen as an exceptional year when sales were around twice their usual level¹⁰.
- 2.11 Stone imports represent around 75-80% of the UK market¹¹, and the value of stone imports has been growing, with more than half of UK imports coming from India¹². Further competition in the market comes from man-made alternatives including reconstituted stone, tile, bricks and other modern materials¹³.
- 2.12 The industry is also remarkably fragmented, with the Mineral Products Association stating that "There are currently about 395 active dimension

⁴ Mineral Products Association (2015) Dimension Stone: An essential UK industry

⁵ Lott, G. (Unknown) *Britain's Building Stone Industry: Can it be Sustained?* British Geological Survey Resources.

⁶ Natural Stone Show (2006) State of Trade: The UK Stone Market Natural Stone Specialist

⁷ 'Stone Specialist' website (July 2018) [The growth of the stone market in the UK.](#)

⁸ 'Stone Specialist' website (July 2018) [The growth of the stone market in the UK.](#)

⁹ Mineral Products Association (2015) Dimension Stone: An essential UK industry

¹⁰ 'Stone Specialist' website (July 2018) [The growth of the stone market in the UK.](#)

¹¹ 'Stone Specialist' website (July 2018) [The growth of the stone market in the UK.](#)

¹² 'Stone Specialist' website (July 2018) [The growth of the stone market in the UK.](#)

¹³ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London.

stone quarries and mines in Great Britain. Amongst them are a number of very small operations (around 0.5ha) including some which produce only around 100 cubic metres of material each year to serve specialist and local markets. It is not uncommon for such sites to have only one or two employees and to be worked intermittently as needs arise"¹⁴. Other operations can be large, and 2004 data shows that the 22 largest companies (about 10%) are responsible for 72% of the total building stone production in the UK, with more than half of all production being done by the nine largest producers¹⁵.

- 2.13 Building stone quarries are also often small in physical size compared to aggregate quarries, with most below three hectares in area, and even the larger ones rarely larger than 10 hectares¹⁶. Small quarry operations frequently have just two or three employees. Many small-scale operations are worked intermittently on a part-time basis alongside other businesses¹⁷.

COMPARING THE SCALE OF BUILDING STONE QUARRIES WITH OTHER TYPES OF QUARRY

Although there is broad policy support at all levels for small-scale quarrying, defining "small scale" is difficult, as there is no clear definition in current national policy or guidance.

One means of measuring the size of quarries is by annual output. A definition of "small-scale" by this measure does exist and was endorsed by the English Stone Forum. Building upon the Minerals Practice Guide which accompanied the now superseded Mineral Planning Statement 1, and upon the findings of a 2004 report into planning for building stone¹, the English Stone Forum concluded that "a small-scale building and roofing stone quarry is one that produces less than 2,000m³ of product per year"¹ [approximately 5,200 tpa¹].

- 2.14 The majority of people employed in the building stone industry work in secondary processing of the stones. This activity often takes place at a different location to the extraction of the stone.
- 2.15 Demand for natural building stone products is variable and difficult to quantify, as the industry supplies a large range of end products to several market sectors. Customers for these products range from individuals to major house builders¹⁸.

¹⁴ Mineral Products Association (2015) Dimension Stone: An essential UK industry

¹⁵ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London.

¹⁶ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London.

¹⁷ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London.

¹⁸ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London.

- 2.16 There are three main subdivisions within the market:
- Repair and maintenance of historic buildings and structures
 - Maintaining vernacular styles in new construction
 - Contemporary design requirements for new buildings¹⁹
- 2.17 Repair and maintenance is a relatively small but important aspect of the market. Demand is often for very specific stones from specific areas.
- 2.18 Maintaining vernacular styles is a larger and expanding sector, "driven by a growing recognition [...] of the importance of maintaining distinctive vernacular styles and a 'sense of place' in the built environment, especially in rural villages but increasingly in town centres²⁰".
- 2.19 Finally, the requirements of the new build sector is the least constrained of the three, and is driven more by technical specifications, aesthetic requirements, and marketing. Imports represent a large portion of this market, which is placing further pressure on the economic viability of indigenous building and roofing stone quarries²¹.
- 2.20 There is no specific information available about the demand for local building stone within Worcestershire. However, restoration and repair works on important stone buildings throughout the county have been carried out using stones imported from other parts of the UK that are considered an acceptable match for the original stone²². Buildings and structures that have been repaired in this way include the quayside in Bewdley, which was originally constructed with Holt Stone and Alveley Stone and was recently repaired using a similar sandstone from Cumbria. Worcester Cathedral, Hartlebury Castle and several parish churches have been restored using red and grey Hollington Stone from Staffordshire, which is considered an acceptable match for the original Bromsgrove Sandstone²³.

¹⁹ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London.

²⁰ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London p.14.

²¹ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London.

²² Oliver, P., and Lott, G. (Ed.) (2012) *Strategic Stone Study: A Building Stone Atlas of Worcestershire* English Heritage.

²³ Oliver, P., and Lott, G. (Ed.) (2012) *Strategic Stone Study: A Building Stone Atlas of Worcestershire* English Heritage.

3. Building stone resources in Worcestershire

- 3.1 Worcestershire has a very diverse underlying geology which contributes to its celebrated landscapes and provides the stones that account for the appearance of many of its important buildings.

Geological context

- 3.2 Rocks can be classed as one of three types: Igneous, Metamorphic or Sedimentary. Igneous rock is formed of solidified magma. Metamorphic rock has been altered by intense heat or pressure, usually deep underground. Sedimentary rock is formed from eroded grains of igneous or metamorphic rock that has been deposited by water courses and then solidified²⁴.
- 3.3 Over 1,000 different building and decorative stones which have been quarried and used in Britain have been identified and catalogued by the British Geological Survey²⁵.
- 3.4 In Worcestershire, there is evidence of the local quarrying and use of at least 21 different building stones²⁶.
- 3.5 The Malvern Hills contain Precambrian granites and diorites that are among the oldest rocks in England. The Wyre Forest Coalfield contains younger sandstones and mudstones amongst its coal seams. In the Clent and Lickey Hills, Triassic sandstones and mudstones sit near Permian breccias and quartzites, and to the south of Redditch, the Arden Sandstone Escarpment (also of the Triassic age) forms a resistant geological feature marked by small escarpments. Toward Gloucestershire, the Jurassic limestones of the Cotswold Escarpment crop out at Bredon Hill. Distinctive red sandstones underlie most of the low ground in the north of the county, changing to mudstones in the east and subsequently to the Blue Lias limestone which winds south toward the Severn Estuary. The effects of glaciation and subsequent melt in more recent eras is made evident in the river valleys of the Severn, Teme and Stour in the form of sandy and gravelly terraces rising up from the river bottoms²⁷.

²⁴ Engering, S. (2002) *Building in Stone: Information for Teachers* English Heritage.

²⁵ Lott, G. (2000) 'The Search for Stone: Identifying, Sourcing and Matching Britain's Building Stones. In: *Historic Churches: Conservation and repair of ecclesiastical buildings* Cathedral Communications

²⁶ Oliver, P., and Lott, G. (Ed.) (2012) *Strategic Stone Study: A Building Stone Atlas of Worcestershire* English Heritage.

²⁷ Oliver, P., and Lott, G. (Ed.) (2012) *Strategic Stone Study: A Building Stone Atlas of Worcestershire* English Heritage.

3.6 Divisions of Geological time and corresponding Worcestershire Building Stones

Million Years Ago	Eon	Era	Period	Formation or Group	Worcestershire Building Stone
1.8	Phanerozoic	Cenozoic	Quaternary	Avon and Severn Valley formations	Tufa
5.2 – 65			Tertiary*		
145		Mesozoic	Cretaceous*		
199			Jurassic	Inferior Oolite Group	Salperton, Aston and Birdlip Limestones. Cotswold Stone
				Lias Group	Marlstone Rock, Blue Lias
251			Triassic	Penarth Group	
				Mercia Mudstone Group	Arden Sandstone. Inkberrow and Pendock Stone
				Sherwood Sandstone Group	Bromsgrove and Kidderminster Sandstone. Hadley, Holt, Ombersley and Tardebigge stones
299		Paleozoic	Permian	Bridgnorth Sandstone	Bridgnorth Sandstone
359			Carboniferous	Warwickshire Group	Clent Breccias
				Salop Formation	Alveley Stone, Hexton's Stone
				Halesowen Formation	Highley Sandstone
416			Devonian	Lower Red Sandstone	St Maughans Formation
444			Silurian	Pridoli Series	Raglan Mudstone, Downton Castle
				Wenlock Series	Much Wenlock Limestone
				Llandovery Series	May Hill Sandstone, Cowleigh Park
488			Ordovician	Bronsil Shale	Lickey Quartzite
542	Cambrian			Hollybush Sandstone and Malvern Quartzite	
2500	Proterozoic		Precambrian	Warren House Formation	Warren House
			Malvern Hills Complex	Malvern Stone	
4600	Archean				

* There are no surface rocks in Worcestershire dating from between the Quaternary and Jurassic periods.
Colours in table correspond to the legend in the Worcestershire Bedrock Geology map on p.12

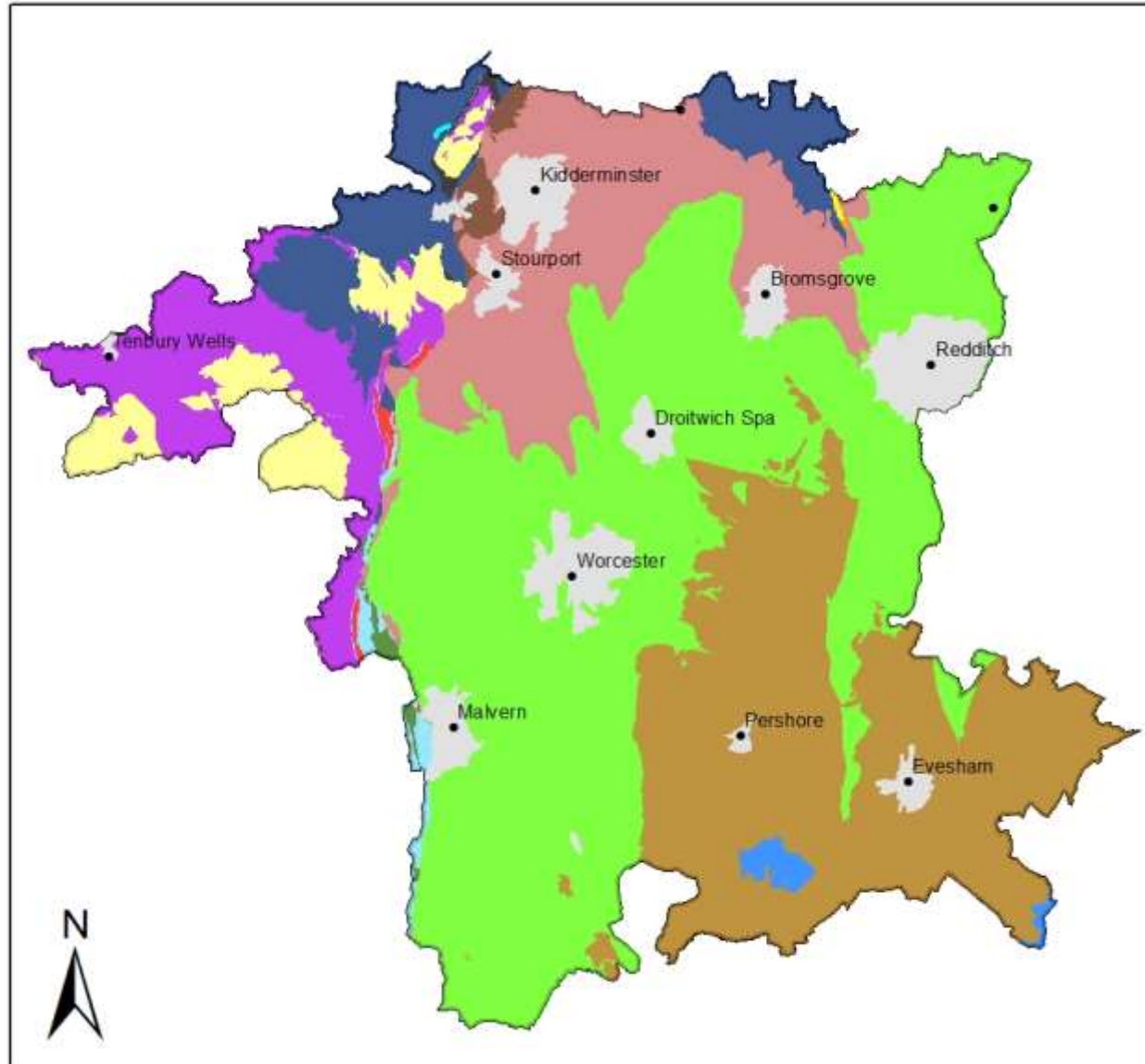
- 3.7 The majority of the building stones in use in the UK are limestones and sandstones and this is also true of Worcestershire. The best-known examples of these include Wenlock Limestone, Highley Sandstone, Alveley Stone (or Hexton's Stone), Bridgnorth Sandstone, Bromsgrove Sandstone (which is also known locally by several other names), Arden Sandstone, Blue Lias Limestone and Cotswold Stone. Limestones and Sandstones are both sedimentary rocks. Slate, which is commonly used as a roofing material, is a metamorphosed sedimentary rock.
- 3.8 In Worcestershire, Malvern Stone has also been used extensively as a building stone in the towns near the Malvern Hills. Malvern Stone is a pinkish coarse-grained granite.
- 3.9 In some parts of the county indigenous stones from old buildings and structures have been - and continue to be - re-used in new ones. However, the supply of building stone from this source is limited and unreliable. Some new developments in the county have been required to source stones from elsewhere in order to maintain the local character of the area. Recently, stones from the Forest of Dean have been used as a passable but not ideal alternative for Malvern Stone.
- 3.10 Neighbouring counties also produce building stone that can occasionally be considered an appropriate match for Worcestershire stones. Warwickshire hosts a Triassic succession that is the source of most of the building stone in that county. This includes the Bromsgrove Sandstone formation that is also present in Worcestershire, though only one quarry in Warwickshire appears to be currently producing this stone²⁸. The use of local stone in Shropshire reflects the county's geological diversity with a large number of building stones used and several active building stone quarries. However, these quarries do not appear to be producing stone that is a good match for Worcestershire stones²⁹. Gloucestershire also has several active quarries producing Cotswold stone, but the use of this stone in Worcestershire is limited to areas around Bredon Hill and Broadway. As previously mentioned, some Forest of Dean stone can also be considered a reasonable match for Worcestershire stones under certain circumstances. In Herefordshire, several quarries are actively producing old red sandstone that corresponds with the St Maughan's Formation (Devonian age) stone available in Worcestershire³⁰, but production levels are unknown.

²⁸ Jones, H. (2012) *Strategic Stone Study: A Building Stone Atlas of Warwickshire* English Heritage.

²⁹ Jenkinson, A. (2012) *Strategic Stone Study: A Building Stone Atlas of Shropshire* English Heritage.

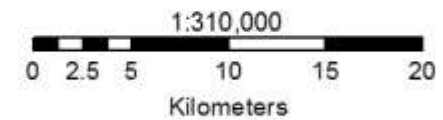
³⁰ Strategic Stone Study (2012) Hereford Building Stone Quarries data sheet

Worcestershire Bedrock Geology



Legend

- Urban Areas
- Principal Urban Areas
- Quaternary - Barnt Green Volcanic Tufa
- Jurassic - Inferior Oolite - Cotswold
- Jurassic - Lias - Marlstone, Blue Lias
- Triassic - Arden, Inkberrow, Pendock
- Triassic - Bromsgrove, Kidderminster
- Permian - Bridgnorth Sandstone
- Carboniferous - Warwickshire - Breccias
- Carboniferous - Pennine Coal Measures
- Devonian - Lower Red Sandstone
- Silurian - Downton, Pridoli, Raglan
- Silurian - Lower Ludlow shales
- Silurian - Llandovery - May Hill
- Ordovician - Lickey Quartzite
- Precambrian - Malvern Stone



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Amended British Geological Survey © NERC

Quarrying

- 3.11 Minerals are only able to be worked where they are found and those locations are predetermined by the underlying geology. This means that quarry locations are fixed, and stone reserves are limited.
- 3.12 The term 'quarry' comes from the Latin *quadrare*, which means 'to make square'. This definition relates to traditional quarrying methods, and the term quarry should therefore technically only be applied to dimension stone quarries. Over time, the term has come to refer to all rock excavations and crushed rock aggregate production. This definition drift is problematic because the public perception of the environmental impacts of these large-scale operations has obscured the substantial differences between these and the generally much smaller-scale shallow building or roofing stone workings³¹.
- 3.13 Building stone quarries are selected based on the quality of stones they contain – colour, texture, pattern, durability and surface finish are important considerations. The strength and durability of a stone is determined by various geological factors.
- 3.14 Quarrying building stone is a fairly delicate process as the characteristics of the stone must be preserved. Quarrying can take place at a surface outcrop or underground (or some combination of the two). At most building stone quarries, stone is extracted directly from the exposed quarry face.
- 3.15 The precise method of extraction differs depending on the type of stone being quarried and its properties, and a combination of traditional and modern methods may be used. The primary concern is to avoid damaging the stone in any way that would make it unusable.
- 3.16 The basic principles of extraction are as follows:
- Cut out relatively large blocks of stone
 - Divide them into several smaller pieces or slices
- 3.17 The extraction process usually generates some aggregate production as well, and this takes place at most active building stone quarries, though on a much smaller scale than in dedicated hard rock aggregate quarries³².
- 3.18 For harder stones such as granites, techniques may include drilling, bursting (using wedges), diamond wire saws and, in exceptional cases, limited and controlled use of small explosives. The use of high explosive blasting is "almost never used in the production of building or roofing stone" as this can irreparably damage the stones by shattering them or introducing micro fractures that reduce their quality³³.

³¹ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London.

³² Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London.

³³ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London p.95.

3.19 For softer stones including many limestones and sandstones, extraction may involve cutting vertically or horizontally into the rock with a chainsaw-like machine or levering stone out by hand. Many stones contain natural features such as jointing, cleaving or bedding, and best practice excavations take advantage of these natural lines of weakness to make initial extraction easier³⁴.



Image 2: Limestone quarrying operations at Fish Hill Quarry near Broadway, Worcestershire. This quarry produced Cotswold Stone.

3.20 Modern building methods have led to the demand for new types of natural stone, including thinly slabbed stones used for cladding on prefabricated structural frames. Although the needs of the building industry have changed over the years and the machinery has been modernised, building stone quarrying techniques have remained largely traditional³⁵.

3.21 After the building stone has been extracted, it typically undergoes some processing which can occur on site at the quarry or off site at another facility.

³⁴ English Stone Forum (2010) *Building Stone Industry in Britain* [online] [Weblink to Building Stone Industry in Britain](#) accessed 10.09.2018

³⁵ English Stone Forum (2010) *Building Stone Industry in Britain* [online] [Weblink to Building Stone Industry in Britain](#) accessed 10.09.2018

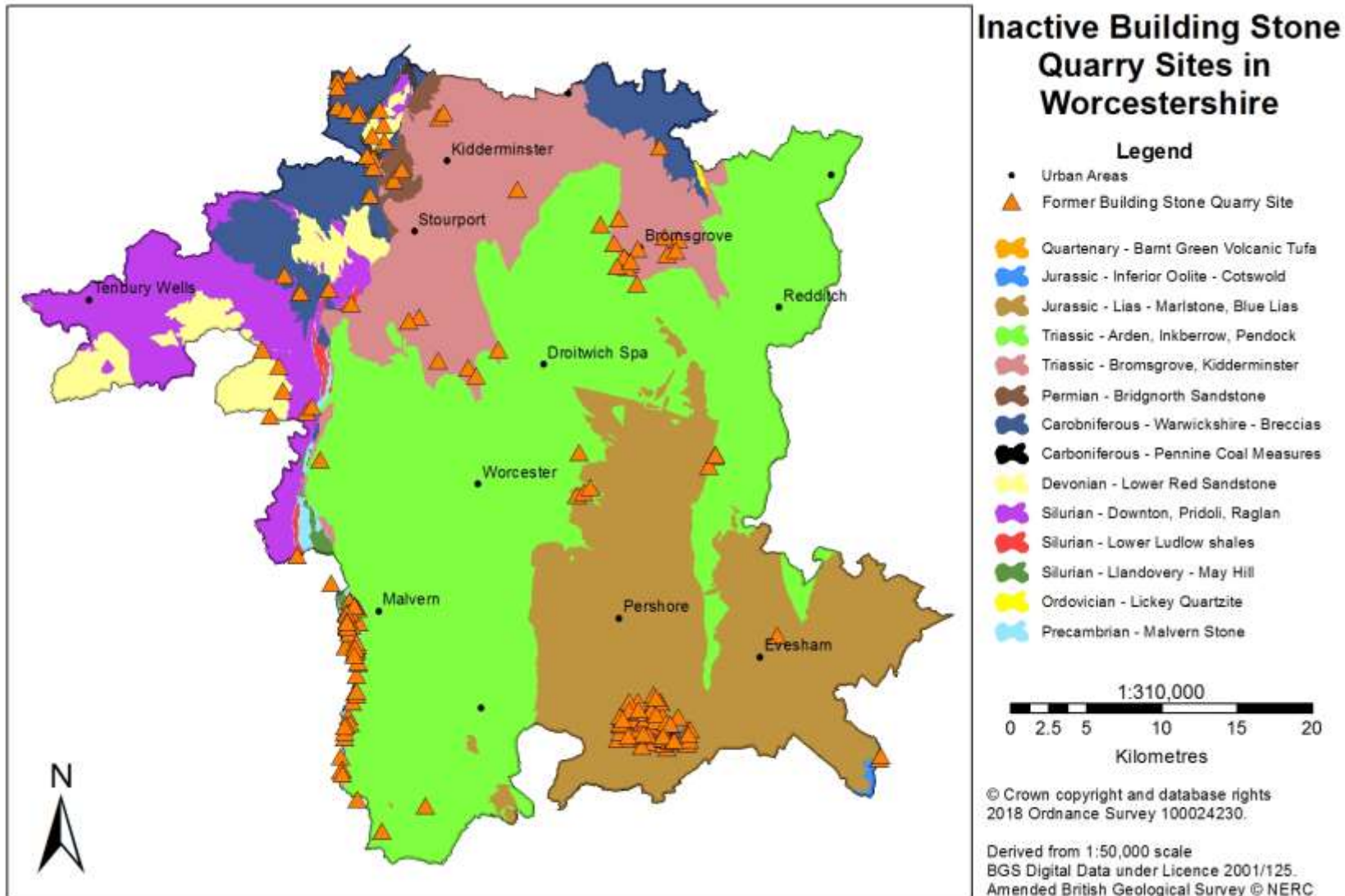
History of building stone quarries in Worcestershire

- 3.22 There are no active building stone quarries in Worcestershire.
- 3.23 English Heritage (now known as Historic England) completed a strategic stone study of the UK. This study identified 60 building stone quarries within Worcestershire, only one of which is classed as 'active' – the quarry near Broadway known as Fish Hill, where extraction ceased in 2010. Jurassic limestone from the Inferior Oolite Group was worked for building stone and aggregate at Fish Hill. Limestone from this quarry was traditionally used only in the small part of the county that consists of outliers of the Cotswolds (around Bredon Hill and Broadway)³⁶. This was the last remaining building stone quarry in the county, and building stone was always produced there as ancillary to the production of aggregates. It has now ceased operating and is undergoing restoration, part of which may incorporate an on-going 'low key' use with a stone masonry business on the site.
- 3.24 In 1997, 629,000 tonnes of limestone was produced in the county, but only 1,000 tonnes of that was used for building stone³⁷. Because the production of building stone in the county has ceased, there are no recent numbers available.
- 3.25 No other local building stone has been produced in Worcestershire for decades. Quarrying of igneous rocks in the Malvern Hills ceased in the 1960s, and these quarries only supplied a small area of the county around the Malvern Hills³⁸.
- 3.26 Other local stones have been widely used as building stones within the county on a much smaller scale, primarily limestones, sandstones, and granites.

³⁶ Worcestershire County Council (2010) *Annual Monitoring Report 2009-2010*

³⁷ Bloodworth, A.J., et al. (1999) *Mineral Resource Information for Development Plans: Phase One Herefordshire and Worcestershire: Resources and Constraints* British Geological Survey Technical Report WF/99/4

³⁸ Worcestershire County Council (2010) *Annual Monitoring Report 2009-2010*



Re-use of existing stones for conservation

- 3.27 It may not be possible to obtain stone from historical sources for use in conservation, but windfall sources of building stone may become available. Such stone would typically be obtained through the demolition of existing buildings.
- 3.28 The best stone to use for conservation works is the original stone from the same quarry to ensure the best possible match³⁹.
- 3.29 Obtaining building stones through architectural salvage and recycling of construction and demolition waste has a long history, including stones quarried by the Romans being recycled in the middle ages. Many picturesque medieval ruins were created by local people 'quarrying' old buildings to build new houses and walls, and many monuments of national importance have been lost through the quarrying of their stones for other structures. The "cycle of substitution with cheaper alternatives leading to declining production and increasing cost has been an issue since the 19th century"⁴⁰. In order to conserve historic buildings and structures, "technically suitable and compatible materials must be used"⁴¹.
- 3.30 The Malvern Hills Area of Outstanding Natural Beauty Partnership supports the re-use of local stone in the repair of historic buildings and to add character to new development in and around Malvern. It is helping to facilitate the recovery and storage of stone for this purpose where buildings or walls are demolished and where stone is excavated as part of building works.

Re-opening existing quarries

- 3.31 While some disused quarries may have depleted their reserves of useful stone, others may still contain viable resources that are appropriate for restoration or repair projects, or to provide materials to maintain distinctive local vernacular character⁴². Please refer to sections 6.38 and 6.39 for successful case studies.
- 3.32 Guidance from English Heritage (now Historic England) states that "If the source of stone has been traced to a particular quarry but the quarry is now closed it may be possible to obtain the stone by reopening the workings for a short time [...] In recent years, a number of small, disused quarries have

³⁹ Jefferson, D., Hanna, S. and Martin, B. (2006) *Identifying and Sourcing Stone for Historic Building Repair: An approach to determining and obtaining compatible replacement stone* English Heritage.

⁴⁰ English Heritage (2008) *Mineral Extraction and the Historic Environment* English Heritage Publications, p.13

⁴¹ English Heritage (2008) *Mineral Extraction and the Historic Environment* English Heritage Publications, p.13

⁴² Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London

been temporarily re-opened to supply walling stone, stone roofing slates and even stone for crushing (to help replicate medieval mortar mixes)"⁴³.

- 3.33 Many disused quarries are in private ownership or located within designated areas. Permission from the landowner must be sought before visiting any quarry, and considering old quarry sites as potential sources of supply may be a sensitive issue.
- 3.34 There can be considerable variation of colour and quality within a quarry, and workings that have closed may no longer provide a stone that is an appropriate match. Old quarry faces may be unstable and unsafe, and weathering may have caused exposed stone to become unusable.
- 3.35 A feasibility assessment of the quality and quantity of stone in the quarry must be completed to ensure compatibility with existing material, and to ensure that enough new stone can be provided within the timescale of the project⁴⁴. Historic England provides extensive guidance on matching stone sources⁴⁵, please refer to Appendix 3: Additional Resources.



Image 3: Worcestershire Cathedral contains building stones from across the county, including Highley Sandstone, Alveley Stone, Bromsgrove Sandstone and Tufa from the Quaternary limestone deposits in the Teme Valley. *Photo ©Visit Worcestershire.*

⁴³ Jefferson, D., Hanna, S. and Martin, B. (2006) *Identifying and Sourcing Stone for Historic Building Repair: An approach to determining and obtaining compatible replacement stone* English Heritage.

⁴⁴ Jefferson, D., Hanna, S. and Martin, B. (2006) *Identifying and Sourcing Stone for Historic Building Repair: An approach to determining and obtaining compatible replacement stone* English Heritage.

⁴⁵ English Heritage (2008) *Mineral Extraction and the Historic Environment* English Heritage Publications.

4. Policy context for building stone

National Planning Policy Framework

- 4.1 The National Planning Policy Framework (NPPF) sets out policy on the development of mineral resources, including building stone. It does not provide specific targets for building stone production, but it does state that "When determining planning applications, great weight should be given to the benefits of mineral extraction, including to the economy"⁴⁶. It also states that, in considering proposals for mineral extraction, "minerals planning authorities should: consider how to meet any demand for small-scale extraction of building stone at, or close to, relic quarries needed for the repair of heritage assets, taking account of the need to protect designated sites" and "recognise the small-scale nature and impact of building and roofing stone quarries, and the need for a flexible approach to the duration of planning permissions reflecting the intermittent or low rate of working at many sites". Authorities must also ensure that there are no unacceptable adverse effects on natural or historic environments, or on human health.
- 4.2 The NPPF requires planning authorities to "provide for restoration and aftercare at the earliest opportunity, to be carried out to high environmental standards"⁴⁷.
- 4.3 In addition, the NPPF requires planning policies to "Provide for the extraction of mineral resources of local and national importance" and "so far as practicable, take account of the contribution that substitute or secondary and recycled materials and minerals waste would make to the supply of materials"⁴⁸. Minerals of local and national importance are defined as "Minerals which are necessary to meet society's needs, including [...] local minerals of importance to heritage assets and local distinctiveness"⁴⁹. As previously described, building stones play a major role in establishing local character. English Heritage states that "if the erosion of local and regional identity is to be arrested, measures need to be taken to ensure that local materials are both made available for use in the present and safeguarded for use in the future"⁵⁰.

Planning Practice Guidance

- 4.4 The Planning Practice Guidance is an online guidance resource for planning authorities and applicants, and contains specific guidance on minerals. In relation to building stone quarries, it states that "Mineral planning authorities should recognise that, compared to other types of

⁴⁶ Ministry of Housing, Communities and Local Government (2018) *National Planning Policy Framework*, paragraph 205.

⁴⁷ Ministry of Housing, Communities and Local Government (2018) *National Planning Policy Framework*, paragraph 205.

⁴⁸ Ministry of Housing, Communities and Local Government (2018) *National Planning Policy Framework*, paragraph 204

⁴⁹ Ministry of Housing, Communities and Local Government (2018) *National Planning Policy Framework*, Annex 2: Glossary

⁵⁰ English Heritage (2008) *Mineral Extraction and the Historic Environment* English Heritage Publications, p.13

mineral extraction, most building stone quarries are small-scale and have a far lower rate of extraction when compared to other quarries. This means that their local environmental impacts may be significantly less. Such quarries often continue in operation for a very long period, and may be worked intermittently but intensively ("campaign working"), involving stockpiling of stone".

Local Planning Policies

- 4.5 There is a range of local planning policy and guidance in Worcestershire that makes reference to local materials, conservation, and building stone.

Hereford and Worcester Minerals Local Plan

- 4.6 The adopted Minerals Local Plan from 1997 forms part of the existing Development Plan and makes brief mention of building stone resources in the county in paragraphs 3.1 and 3.2, but states that because of its "specialised nature and extremely small scale production" building stone will not be considered in the plan⁵¹. However, the intention is for the new Minerals Local Plan to address all types of minerals, including building stone.

Borough of Redditch Local Plan No. 4

- 4.7 The Borough of Redditch Local Plan No.4 includes policies that seek to conserve and enhance designated and non-designated heritage assets. Of specific relevance to the need for building stone are policies 37 and 38.
- 4.8 Policy 37 seeks the conservation and enhancement of all historic buildings and structures and the reasoned justification accompanying the policies states, at paragraph 37.12, that "The alteration or extension of a historic building will be expected to reflect the special characteristics of the existing building and be designed either to merge unobtrusively with it or appear as a separate entity. Materials used in the construction of extensions or alterations must strive to achieve as close a match as possible with the original in their selection and application".
- 4.9 Policy 38 on Conservation Areas includes part A(iv), which requires development within conservation areas to "demonstrate attention to the quality, sourcing and application of materials, finishes and detail, reflecting but not necessarily copying the elements of existing buildings within the area".
- 4.10 The Local Plan also seeks to ensure appropriate materials are used in modern development. Policy 40, on high quality design and safer communities, states that all development will be expected to, among other things, "be of a high quality design that reflects or complements the local surroundings and materials".

⁵¹ Worcestershire County Council (1997) *Adopted Minerals Local Plan*

Wyre Forest Core Strategy

- 4.11 The Wyre Forest Core Strategy includes policy CP11 on quality design and local distinctiveness. This policy requires new buildings to be well-designed and take account of appropriate scale, massing, proportions and materials in keeping with the site context.

Bromsgrove District Plan

- 4.12 The Bromsgrove District Plan includes policy BDP17.5 on urban design and conservation. Part (a) of the policy states that all development should "include high standards of architecture and design, using high quality sustainable materials and building methods". Part (b) states that new buildings in the town centre should "add to the evolution of the area whilst respecting the scale, height, massing, alignment and materials of adjacent historic buildings".

South Worcestershire Development Plan

- 4.13 The South Worcestershire Development Plan includes policy SWDP6 on the historic environment. Part (vii) of this policy states that development proposals "will be supported where they conserve and enhance the significance of heritage assets, including [...] the civic, religious and market cores of south Worcestershire's city, town and village fabric with their wide variety of building styles, materials and street and plot patterns".
- 4.14 Elsewhere in the plan, the reasoned justification states that "Contemporary design can either involve new materials and technology used in a traditional format or the use of traditional materials in a new and innovative design, or a combination of both.
- 4.15 Policy SWDP21 concerns design. Part B(x) of the policy states that "The detailing and materials of development should be of high quality and appropriate to its context".
- 4.16 Policy SWDP 24 concerns management of the historic environment. The reasoned justification for this policy states, at part (3), that "Proposals involving new build, repair, alteration or extension of heritage assets can conserve the significance of the existing asset and its setting. This may be achieved by means of appropriate siting, massing, form, height, scale, design and use of local materials".



Image 4: Cotswold Stone buildings on Broadway High Street.

- 4.17 There are also parts of two Areas of Outstanding Natural Beauty (AONBs) within the county, and the management plans for these areas contain guidance on issues related to the supply and use of building stone.

Cotswolds Area of Outstanding Natural Beauty (AONB) Management Plan

- 4.18 The Cotswolds Area of Outstanding Natural Beauty (AONB) extends into Worcestershire in and around Bredon Hill and Broadway. This area contains the recently closed Fish Hill quarry which produced Cotswold stone for walling.
- 4.19 The Cotswold AONB Management Plan (2013 – 2018) states that "to ensure continued supplies of suitable high-quality building stone [...] existing quarries within the AONB must continue to operate effectively". The Cotswold AONB has also produced a position statement on minerals and waste planning, which states that "a continuous supply of walling and building stone, including stone roofing slates, is required to conserve and enhance the distinctive built environment of the Cotswolds" and that "The character of stone varies considerably across the AONB, and local sources are required to maintain local distinctiveness". The position statement also notes that "Supply of building stone is becoming more restricted to bigger quarries supplying larger areas. This is leading to a more uniform appearance of stone buildings than existed previously. The study suggests that a possible solution would be the formulation of mineral planning policies which encouraged small scale local quarries and discouraged the further expansion of the larger operations. A resurgence of the formerly widespread "delving" tradition, particularly for low grade walling stone, as

part of land management is envisaged. An investigation of the potential for small scale mining for stone where this would be less harmful to the landscape is also suggested. The Board would therefore wish to see this matter explored in the Minerals Core Strategy/Local Plan process".

Malvern Hills Area of Outstanding Natural Beauty (AONB) Management Plan

- 4.20 The Malvern Hills AONB Management Plan (2014-19) states that "A lack of local building materials can make it difficult to restore characteristic features, such as walls and buildings. Materials brought in can be costly to transport and can increase the carbon cost of development. Systems to recycle and re-use local materials need to be initiated or expanded. The use of loose material in former quarries and the limited winning of new materials should be considered where this helps to meet conservation objectives".
- 4.21 Policy BDP8 of the Management Plan is to "Support the recycling, re-use and limited extraction of small quantities of locally distinctive building materials, such as Malvern stone, where this is needed to help retain local distinctiveness in the built environment".



Image 5: The Malvern Hills.

Malvern Hills AONB Building Design Guide

- 4.22 The Malvern Hills AONB Guidance on Building Design supports the Management Plan. This document contains a chapter on local stone as a building material, and stresses the importance of Malvern stone in areas near the hills. It states that "Traditional materials such as stone and traditional brick are characteristic in the landscape. They are durable and help to ensure that a development is sustainable in the long term as well as being characteristic of the local area. Where the use of traditional materials is not economic it is important to ensure that any new materials are appropriate for the local landscape".
- 4.23 It also states that "Where stone is to be used for new buildings, extensions or alterations, it should be sourced, if possible, local to the AONB. Sometimes, it may not be possible to source new supplies of characteristic stone. In this case, consider sourcing reclaimed materials" and that "Where it is not possible to source sufficient amounts of reclaimed local stone, it may be possible to use stone from across the three counties of

Herefordshire, Worcestershire or Gloucestershire where the shape, size, colours and textures of the stone reflect that of surrounding buildings. This helps to reduce the carbon footprint of the development and supports the local economy".

Image 6 (right): Gullet Quarry on the border of Worcestershire and Herefordshire. Quarrying took place here until 1977. The quarry produced Malvern Stone which was used widely as a building stone around the Malvern Hills.



Image 7 (above): Malvern Station Tea Rooms. A Malvern Stone wall is visible on the left of the image. *Photo ©Visit Worcestershire.*

Herefordshire and Worcestershire Earth Heritage Trust

4.24 Earth Heritage Trust is a charity active in Worcestershire and Herefordshire. Their mandate is to record, protect and promote geology and landscape and to raise general awareness of earth heritage by offering educational programmes to the public⁵².

⁵² Earth Heritage Trust (2013) Welcome page [online] available at: [Earth heritage Trust website](#) accessed 11.09.2018

Geodiversity Action Plan for Worcestershire

- 4.25 The Trust has produced a Geodiversity Action Plan (GAP) for Worcestershire, which identifies a number of objectives and actions to "provide long term and sustainable support for the conservation of geodiversity within Worcestershire"⁵³.
- 4.26 Objective 7 of the GAP is to "improve and sustain the links between geodiversity, biodiversity, archaeology and landscape".

A Thousand Years of Building in Stone

- 4.27 The Earth Heritage Trust's 'A Thousand Years of Building with Stone' project traced the history of stone buildings and re-discovered former quarries across Worcestershire and Herefordshire⁵⁴.
- 4.28 One of the key project outcomes is a database that records "over 4500 stone buildings and quarries across Herefordshire and Worcestershire, connecting buildings with their quarry sources"⁵⁵.



Image 8: The Abberley Hills from Teme Valley Road.

Abberley and Malvern Hills Geopark

- 4.29 The Abberley and Malvern Hills Geopark encompasses parts of Gloucestershire, Herefordshire, Shropshire and Worcestershire. It is driven by a collection of local organisations and exists to allow "people from all walks of life the opportunity to experience geology and to appreciate the importance of their geological heritage"⁵⁶. They also aim to promote geoconservation.

⁵³ Earth Heritage Trust (2009) *Geodiversity Action Plan Worcestershire* [online] available at: [Geodiversity Action Plan website](#) accessed 11.09.2018

⁵⁴ A Thousand Years of Building with Stone is available on the ['building stones' website](#).

⁵⁵ The Building Stones Database is available on the ['building stones' webpages](#).

⁵⁶ Information available on the [Abberley and Malvern Hills Geopark website](#).

5. Planning issues arising from building stone quarrying

- 5.1 The emerging Minerals Local Plan is required to provide a policy framework that will ensure that the environmental, amenity and other impacts from any building stone quarrying in the county are acceptable. Potential impacts and other planning issues are detailed below.
- 5.2 It is important to recognise the differences in scale and methods of working between large crushed stone aggregate quarries and building stone quarries, as discussed earlier in this document.
- 5.3 Generally, dimension stone quarrying has less environmental impact compared to other types of quarrying, especially aggregates or crushed rock. Actual impacts clearly vary depending on the location of the site, and even a small site located within a designated area may have the potential to be "more damaging to important habitats and species than a large aggregates quarry located in a less sensitive, undesignated area"⁵⁷.
- 5.4 As the scale of production at a quarry largely determines the amount of road traffic as well as the amount of noise, dust, and vibration caused, it is important to bear in mind that building stone quarries are typically very small-scale operations.



Image 9: The former Fish Hill Quarry near Broadway.

⁵⁷ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London p.94

- 5.5 In the case of quarrying for conservation or restoration needs, a quarry might need to be accessed intermittently over a very long period of time. Unlike at large aggregate and crushed rock quarries where the impacts may be intense but relatively short-lived, this 'campaign' style access would have longer-term implications and in some cases the length of time between campaigns may allow for restoration to take place in the intervening 'fallow' years.
- 5.6 There are no building stone workings currently active in Worcestershire, and there have been no planning applications for new workings or extensions to/reopening of old workings submitted since at least 1990.
- 5.7 Some local policy and guidance, including the Minerals and Waste Planning position statement at produced by the Cotswolds AONB Board, recommends investigating the re-opening of quarries for the purpose of ensuring a supply of local stone for the conservation of local buildings. The position statement advocates "An investigation of the potential for small scale mining for stone where this would be less harmful to the landscape".

Traffic

- 5.8 Building stone quarrying is likely to cause some traffic impacts. This will be most acute near the quarry site. Any impacts due to traffic may be able to be mitigated and applications would need to include a transport assessment. As most building stone quarries operate with a small number of employees, the traffic impacts due to commuting would be likely to be negligible.
- 5.9 The noise from traffic can be effectively reduced through natural screening using trees and hedgerows or earth berms. To keep local traffic to a minimum, the use of other means of transport including rail, private roads and waterways or canals should be considered.
- 5.10 Building stone (especially for heritage or restoration works) is usually used in fairly close proximity to its extraction point. However, because "building stone quarries are often located in relatively remote areas, requiring access along minor roads"⁵⁸ and because small quarries frequently operate intermittently, careful management of traffic impacts should effectively reduce the impacts on the surrounding area.

Emissions

- 5.11 The generally small scale of building stone quarries compared to aggregate or crushed rock operations means that the emissions generated by these quarries are accordingly smaller.

⁵⁸ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London p.96

Dust

- 5.12 Dust can be created during stone extraction (sawing and cutting) and during the transportation of material around and off the site. The NPPF requires that any unavoidable noise, dust and particle emissions and any blasting vibrations are controlled, mitigated or removed at source⁵⁹.
- 5.13 Concerns about dust generally fall into two categories: nuisance effects and health effects. There is also the possibility of negative impacts on the wider environment, including heritage, ecology, agriculture and designated nature conservation sites.
- 5.14 Good site management can help reduce the impacts of dust at the source.
- 5.15 Special care must be taken to ensure that facilities that are sensitive to dust are not unduly impacted by building stone workings. Dust impacts arising from extraction can be mitigated through the following means⁶⁰:
- Using dust filters on equipment where possible
 - Restricting dust-creating activities to certain times or locations
 - Using water sprays and wheel-washes
 - Protecting materials and active work areas from wind
 - Blasting is unlikely to occur during the extraction of building stone, but if it does dust could be mitigated through the use of blast mats.
- 5.16 It may be appropriate to adapt the scope of these requirements to reflect the size of the proposed extraction site, as the impacts from a large-scale building stone quarry may be similar to large aggregate/crushed rock facilities, while a small building stone quarry operating on an intermittent or part-time basis will have comparatively much smaller potential impacts.

Noise

- 5.17 Noise can be created during stone extraction and cutting and during the transportation of material around and off the site. The NPPF states that planning policies and decisions should "mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life".
- 5.18 In addition to setting noise limits, there are a number of other ways to mitigate the noise impacts caused by building stone quarrying:
- Limiting working hours
 - Taking care with reversing alarms
 - Minimising drop heights from lorries or plant
 - Using rubber linings in chutes or transfer points where appropriate
 - Switching off machinery when not in use

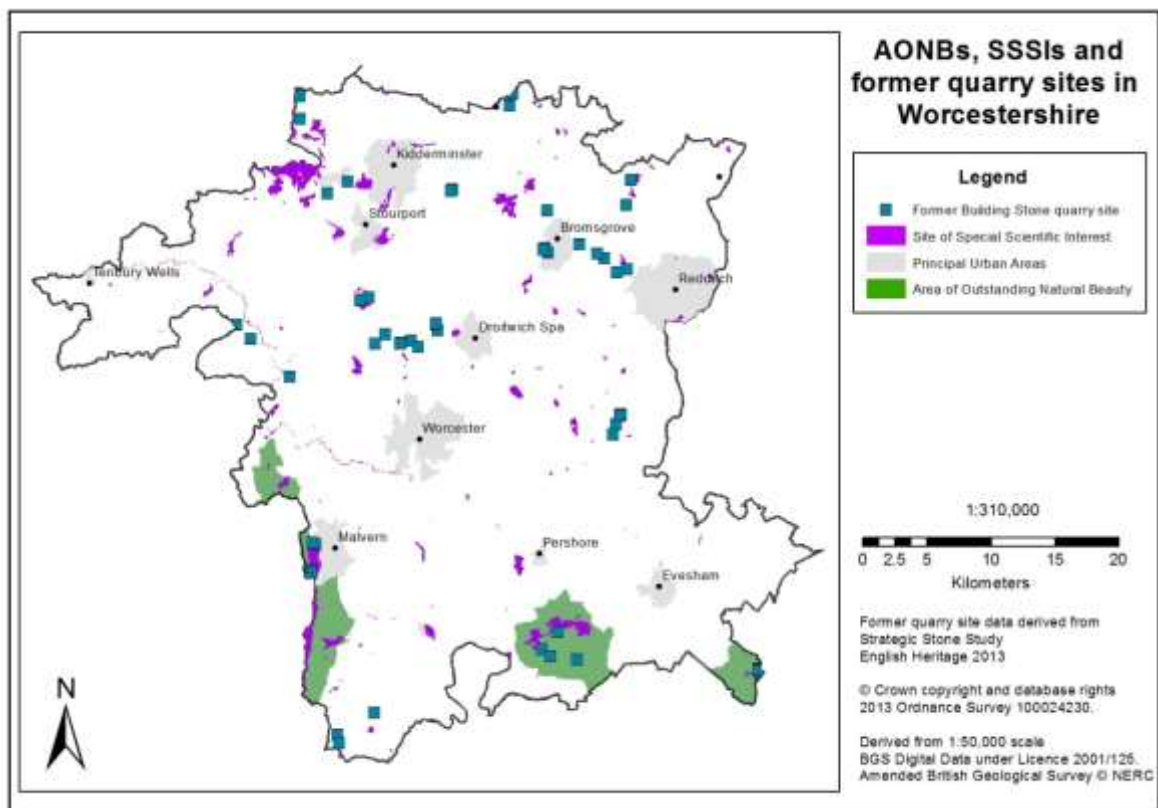
⁵⁹ Ministry of Housing, Communities and Local Government (2018) *National Planning Policy Framework*, paragraph 205(c)

⁶⁰ Arup Environmental/Ove Arup & Partners (1995) *The Environmental Effects of Dust from Surface Mineral Workings*. Report on behalf of the Department of the Environment.

5.19 It is extremely unlikely that blasting or high explosives will be used in the quarrying of building stone⁶¹. However, where small explosives are used, best practice for mitigating impacts should be followed. Explosives used in the extraction of building stone are often used very sensitively to avoid damaging the stone. Careful planning should still consider impacts on site neighbours, including from ground vibrations and blast waves.

Protected sites

5.20 As previously described, building stone sources in Worcestershire are often coincident with Areas of Outstanding Natural Beauty (AONBs) and Sites of Special Scientific Interest (SSSIs). Although building stone quarries can be restored, it may not be possible to restore them to the same type or standard of landscape that was present prior to working.



5.21 Building stone quarries often expose geological features of scientific and aesthetic interest which themselves may warrant designation. Nationally, 37% of all active and intermittent building stone extraction sites in England and Wales fall within, or within 100m of, at least one major national or international designation⁶². In Worcestershire, there are a number of examples of disused quarries in both the Malvern Hills and the Cotswolds AONBs.

⁶¹ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London p.96

⁶² Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London.

5.22 National and international designations afford a high degree of protection from development. Local sites can also be designated for a variety of purposes including nature and geological conservation, and these designations would be material considerations in the decision-making process.

Green Belt

5.23 The north eastern part of Worcestershire lies within the green belt surrounding Birmingham. Kidderminster, Bromsgrove and Redditch are completely surrounded by the Green Belt. National policy on mineral working in Green Belt land will apply here.

5.24 The NPPF states that inappropriate development is "harmful to the Green Belt and should not be approved except in very special circumstances". However, it also states that mineral extraction is among certain other forms of development that are "not inappropriate in the Green Belt provided they preserve its openness and do not conflict with the purposes of including land within it"⁶³.

Visual Impacts

5.25 Any large building stone quarrying operation will have visual impacts on the landscape, as will any large buildings or machinery. Smaller quarries will likely have correspondingly smaller visual impacts.

5.26 Key issues for landscape are especially acute within designated areas, but any mineral working must consider the effect it will have on the surrounding area. Planting of trees, hedgerows or other vegetation may help mitigate the visual effects of a small building stone quarry, but such measures should be informed by landscape character.

5.27 Building stone quarries are often worked much more slowly than large crushed rock quarries, which can leave significant periods of time when exposed rock faces are left undisturbed. In some examples of exposed faces that have been left untouched for long periods, "all but the most recent working faces have [...] begun to weather and to be colonised by vegetation"⁶⁴ thereby helping reduce the visual impact of the bare rock face.

Geological and historical conservation

5.28 Conflicts can occasionally arise between the safeguarding of the historic environment and the safeguarding of the natural environment. These competing priorities can be especially acute in designated areas "where geological diversity has contributed [both] to the attractiveness of the

⁶³ Ministry of Housing, Communities and Local Government (2018) National Planning Policy Framework, paragraph 146.

⁶⁴ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London p.97

landscape and to distinctive styles of traditional architecture⁶⁵. While quarries in designated areas may be at lower risk of being lost through brownfield development or landfill⁶⁶, their importance as sources of historic building stone should not be overlooked.

5.29 The involvement of Natural England and the RSPB in the conservation of aggregate quarries helped to support a focus on biological and ecological conservation⁶⁷. There is a developing interest in geological and archaeological conservation opportunities for quarry operators as well, and in the case of building stone quarries geological conservation may be of special interest owing to the link between local geological heritage and the distinct character of the local built environment.

5.30 Both disused and active building stone quarries can also provide sites of historic and archaeological interest in terms of the industrial heritage of building stone quarrying, or in terms of other unrelated items uncovered as part of the quarrying process. These features may also be worth protecting.



Image 10: Whitman's Hill Discovery Venture, a restored building stone quarry in Herefordshire. Please see Appendix 1 for details. *Photo © Sarah Button.*

Climate change and resilience

5.31 The Council's *Minerals and Climate Change* background paper⁶⁸ outlines some of the key climate change sustainability issues for the minerals sector

⁶⁵ English Heritage (2008) *Mineral Extraction and the Historic Environment* English Heritage Publications, p.13

⁶⁶ Hughes, T. (2006) *Sourcing Stone for Building Conservation* in *The Building Conservation Directory*, Cathedral Communications

⁶⁷ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London.

⁶⁸ Worcestershire County Council *Minerals and Climate Change Background Paper* available on the [Worcestershire Minerals Local Plan webpages](#).

and areas in which the minerals industry can contribute to sustainability targets. These include energy efficiency and renewable energy, transportation and other emissions, flood mitigation, habitat creation and biodiversity.

- 5.32 The capacity for building stone quarries to contribute to these targets may be influenced by the particular characteristics of building stone sites – that is, they are frequently very small in size and operate over a long time frame.

Potential for restoration

- 5.33 Quarrying is ultimately a temporary land use, and quarries present excellent opportunities for restoration and for biological, geological and cultural conservation. Restored sites can make an important contribution toward green infrastructure goals, including recreation opportunities. The NPPF requires that planning authorities ensure that "worked land is reclaimed at the earliest opportunity" and that "high quality restoration and aftercare of mineral sites takes place".
- 5.34 Much of the best practice guidance for quarry restoration applies to large-scale sand and gravel or aggregate extraction sites that are able to progressively return large areas of former workings to productive use and contribute to biodiversity or habitat creation targets. The building and roofing stone sector is somewhat behind the aggregates industry in terms of conservation and restoration⁶⁹. As the majority of building stone quarries are small, this guidance may not necessarily apply.
- 5.35 Most historical building stone quarries in Worcestershire have simply been abandoned and left to regenerate naturally with no explicit programme of restoration. For small exposures, this may be an appropriate outcome provided the quarry face is made safe and a natural-looking landform remains, as it ensures that information about adjoining stone reserves remains on view and that the site remains accessible for scientific study⁷⁰.
- 5.36 There are few examples of the small-scale restoration of building stone quarries. The most frequently restored quarry types are sand and gravel and aggregate quarries. Some larger building stone quarries have been restored as recreation sites (including for diving and adrenaline sports) and there is one example of a large building stone quarry that being progressively restored while work continues in other parts of the quarry (see Appendix 1: Restoration case studies). The Planning Practice Guidance states that this type of 'progressive' or 'rolling' reclamation should be sought⁷¹.

⁶⁹ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London

⁷⁰ Thompson, A. et al. (2004) *Planning for the Supply of Natural Building and Roofing Stone in England and Wales (The Symonds Report)* Office of the Deputy Prime Minister, London

⁷¹ Ministry of Housing, Communities and Local Government, *Planning Practice Guidance, Minerals section, paragraph 042 Reference ID: 27-042-20140306, Revision date: 06 03 2014.*

5.37 The building stone needs of restoration and conservation projects is often small scale and intermittent, requiring a creative approach to workings. Where the original source of a local stone is known, best practice is to use the original stone for subsequent work. The English Stone Forum details some successful examples of this, notably at Pitchford Church near Shrewsbury. The church needed re-roofing, and luckily the original quarry for the church roof stones was located nearby. A combination of a willing land-owner and support from the Minerals Planning Authority in the area allowed a six-week long delve to take place which provided enough stone to replace the Church roof and supply three other listed buildings in the area. Within four months of the quarrying being completed, the site was completely restored to parkland, and planning permission on the site has been renewed in case the stone is needed again⁷².



Images 11 and 12: The Pitchford delve during operation and six months later. *Photos ©Chris Wood, English Heritage. Further detail is available on the [English Stone Forum website](#).*

5.38 A similar example is found in Herefordshire where the roof of Dore Abbey was restored using stone from two small temporary quarries which were granted planning consents especially for that purpose. These delves were originally consented with a size of only 1/10 hectare in area, but good management eased public concerns and the size and time limit of the consent were subsequently extended⁷³, providing a source of Old Red Sandstone slates for roof restoration across the county.

5.39 In Warwickshire, Arden Sandstone quarry was re-opened for repair work on Baddesley Clinton, a nearby National Trust property.

5.40 Safeguarding small temporary building stone workings against other types of development or designation is of utmost importance as there is a risk that appropriate local sources of building stone will be permanently lost if development is permitted on or near them. Guidance from the British Geological Survey recommends creating Mineral Safeguarding Areas of "known mineral resources that are of sufficient economic or conservation value (such as building stones) to warrant protection for generations to

⁷² Wood, C. (2005) *Historical Perspective of conservation: The importance of stone, today's problems and lessons from the past*, England's Heritage in Stone conference proceedings English Stone Forum.

⁷³ Wood, C. (2005) *Historical Perspective of conservation: The importance of stone, today's problems and lessons from the past* England's Heritage in Stone conference proceedings English Stone Forum.

come"⁷⁴. This concept of safeguarding supply is especially pertinent in the case of quarries that may be worked intermittently and have the potential to be restored in the fallow periods when there is no active stone extraction underway. The National Planning Policy Framework requires planning policies to "safeguard mineral resources by defining Mineral Safeguarding Areas; and adopt appropriate policies so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development where this should be avoided (whilst not creating a presumption that the resources defined will be worked)"⁷⁵.

⁷⁴ British Geological Survey (2007) *A Guide to Mineral Safeguarding in England* British Geological Survey.

⁷⁵ Ministry of Housing, Communities and Local Government (2018) *National Planning Policy Framework*, paragraph 204(c).

6. Conclusions

- 6.1 Although there are building stone resources in Worcestershire, none of these are presently being worked and detailed information about the resources available is poor. The work of the English Heritage Strategic Stone Study and the subsequent Earth Heritage Trust 'A Thousand Years of Building with Stone' project and database has helped to provide some of this information. The likelihood of disused workings being re-opened for large-scale extraction is low, due to the fact that they are often located within AONBs or other designated areas and because of public resistance. There have been no applications for building stone workings in the county since at least 1990.
- 6.2 There is a critical need for local stone for restoration and conservation of stone buildings, and there is some policy support for the extraction of limited quantities of local materials for these purposes. There are a large number of buildings in the county constructed with local stone, and it is possible that in the future the re-opening of old quarries or the creation of new ones will be necessary to meet the repair and restoration needs of these buildings.
- 6.3 If historical workings were to be re-opened, this would require careful consideration of their potential impacts, with the main issues likely to include noise, visual impacts, biodiversity, and habitat loss. The generally small size of building stone quarries may help to keep these effects to a minimum, but it is important to bear in mind that building stone quarries may require intermittent access over very long time frames.
- 6.4 Protecting local building stone sites from other development by creating minerals safeguarding areas can help ensure that sites are not sterilised by subsequent development and ensures that the presence of this limited resource remains an active consideration for any new planning application.

Appendix 1: Restoration case studies

CASE STUDY: **CLICKER QUARRY (ADRENALINE QUARRY)**

Location: Cornwall, near Liskeard

Stone quarried: Blue Elvin (or Elvan, or Alvan)

Clicker Quarry operated from 1932 to 1969 as a quarry for the hard stone known locally as "Blue Elvin" granite. This stone was used as ballast for the Great Western Railway, and locally as a building stone. Recreational use of the quarry began in 1986, and the following 25 years have seen the further development including the UK's longest zip wire. The site is a designated geological SSSI, and the management company for Adrenaline Quarry have a woodland management programme in place to ensure that the wildlife who reclaimed the quarry during the decades it lay silent can continue to call the quarry home. The Cornwall Council's planning department declared the quarry "an intelligent use of space"⁷⁶

CASE STUDY: **STONEY STANTON (STONEY COVE)**

Location: Leicestershire, Stoney Stanton

Stone quarried: South Leicestershire Diorite (granite)

Quarrying at Stoney Stanton began in the early 19th century. By 1850, the site was established enough to support the construction of a railway line to move material out of the pit to the centre of the village. South Leicestershire Diorite was quarried for use as a road stone, but was also used as a building stone in the region. Spring water was a constant problem during the working life of the quarry, and when work ceased in 1958 it was allowed to flood. By the early 1960s, the site was being used as a training site for divers for the North Sea oil platforms. In 1978, a management company was formed to develop the quarry's potential as a scuba facility, and continuous improvements to the facilities there have made Stoney Cove one of the leading inland dive centres in the UK⁷⁷.

⁷⁶ Adrenaline Quarry online (2013) [Press Kit: All the Facts Adrenaline Quarry](#) accessed 11.09.2018

⁷⁷ Stoney Cove (2013) [Stoney Cove History](#) accessed 11.09.2018

CASE STUDY: **LADYCROSS QUARRY**

Location: County Durham

Stone quarried: Sandstone

Ladycross Quarry has been in operation for at least 300 years, providing the local area with building and roofing stone and paving flags. No blasting occurs on site, and all extraction is done by hand. The quarry has been "under progressive restoration to a nature reserve since approx 1970"⁷⁸. The site is still operating alongside previously restored areas, which include "several ponds of varying depth and ph level designed to accommodate a range of wildlife"⁷⁹ as well as a nesting wall, bat habitat, and artwork designed to support the operator's public education goals.

CASE STUDY: **WHITMAN'S HILL QUARRY**

Location: Storrige near Malvern in Herefordshire

Stone quarried: Coalbrookdale mudstones and Much Wenlock Limestone

This former building stone quarry in Herefordshire provided mainly aggregates and foundation stone. It was in operation as early as 1876 and ceased operation in 1988. The quarry was then "restored and made safe"⁸⁰, a process which included face clearance, tree planting and the construction of earth bund walls to protect visitors from steep slopes. The site was designated a Regionally Important Geological site in 1999, and in 2005 The Herefordshire and Worcestershire Earth Heritage Trust acquired a ten year lease to manage and run the site as the Whitman's Hill Geodiversity Discovery Venture. The quarry is known for its abundance of fossils, and the Earth Heritage Trust offers guided visits to the site for geologists, students and the general public. A fossil collecting area has been created at the quarry in order to make the site as accessible as possible.



Images 13, 14 and 15: Fossil collecting visit to Whitman's Hill Quarry. Photos © Sarah Button.

⁷⁸ Northumberland County Council (2011) *Minerals and Waste Site Monitoring Report 2011/2012 Ladycross Sandstone Quarry* p.1

⁷⁹ Northumberland County Council (2011) *Minerals and Waste Site Monitoring Report 2011/2012 Ladycross Sandstone Quarry* p.1

⁸⁰ Herefordshire and Worcestershire Earth Heritage Trust (Undated) *The Heritage of Whitman's Hill Quarry* Earth Heritage Trust.

Appendix 2: Glossary

Building (and roofing) stone: "Naturally occurring rocks of igneous, sedimentary or metamorphic origin which are sufficiently consolidated to enable them to be cut, shaped, or split into blocks or slabs for use as walling, paving or roofing materials in the construction of buildings and other structures, such as bridges or monuments"⁸¹.

Designated assets/sites/areas: A collective term that includes a number of statutory designations including European designated sites (Special Areas of Conservation), National Nature Reserves, Sites of Special Scientific Interest, Scheduled Monuments, Areas of Outstanding Natural Beauty, Conservation Areas, Listed Buildings, Battlefields, Local Geological Sites, Registered Parks and Gardens, and Local Nature Conservation Sites.

Dimension stone: Natural stone that has been chosen and processed (cut, sawn, trimmed, ground, etc.) to a particular size or shape.

Indigenous stone: Building stone that occurs naturally and is produced in the United Kingdom.

Limestone: A sedimentary rock mainly made up of calcium carbonate fragments such as shells and coral fragments. Often contains fossils⁸².

Natural stone: Stone whose shape and size has been determined by natural forces. This term can also be used to distinguish naturally occurring stone from reconstituted stone or other manufactured products.

Quarry: A site where rock or minerals are extracted from the earth.

Restoration: A process whereby a former mineral extraction site is returned to beneficial after-use. Building stone extraction is often a temporary or intermittent land use: once all of the mineral has been won, the site is no longer useful for mineral extraction and an after-use will have to be established. This is often referred to as "restoration", even though sites are not always returned to their original use or condition. For example, it may be more appropriate for low-grade agricultural land to be 'restored' as a lake or nature reserve rather than returned to agriculture.

Sandstone: A sedimentary rock made up of sand-sized grains that are generally visible to the naked eye⁸³.

⁸¹ British Geological Survey (2005) *Building and Roofing Stone Mineral Planning Factsheet* Crown Copyright p.1.

⁸² Oliver, P., and Lott, G. (Ed.) (2012) *Strategic Stone Study: A Building Stone Atlas of Worcestershire* English Heritage.

⁸³ Oliver, P., and Lott, G. (Ed.) (2012) *Strategic Stone Study: A Building Stone Atlas of Worcestershire* English Heritage.

Appendix 3: Additional resources

There are excellent resources about building stone in Worcestershire (and nationally) available online. The following represents a list of some of the most comprehensive and useful websites and projects.

English Heritage/British Geological Survey Strategic Stone Study

A comprehensive online database with information about active and inactive building stone quarries and stone buildings across the UK

[Weblink to strategic stone study information.](#)

[Weblink to Strategic Stone Study map and database.](#)

English Stone Forum

An organisation that works to support the production and use of English building stone through publicity, research and professional training.

[Weblink to the English Stone Forum.](#)

Nature After Minerals

Online resources about quarry restoration and minerals planning for biodiversity.

[Weblink to Nature After Minerals site.](#)

Sourcing Stone for Historic Building Repair

A comprehensive guide from English Heritage about evaluating stone buildings, then setting criteria and sourcing stone for repair or restoration works.

[Weblink to 'Sourcing Stone for Historic Building Repair'.](#)

British Geological Survey Mineral Planning Fact Sheet: Building and roofing stone

[Weblink to the Building and roofing stone sheet.](#)

Earth Heritage Trust

A charity whose aim is to record, protect and promote geology and landscape in Worcestershire and Herefordshire. The Trust also runs the Geological Records Centre at the University of Worcestershire which holds paper and GIS information on the geology of the whole county, as well as a database of over 2000 geological sites of interest.

[Weblink to the Earth Heritage Trust.](#)

[Weblink to 'A Thousand Years of Building with Stone' project.](#)