



Historic England

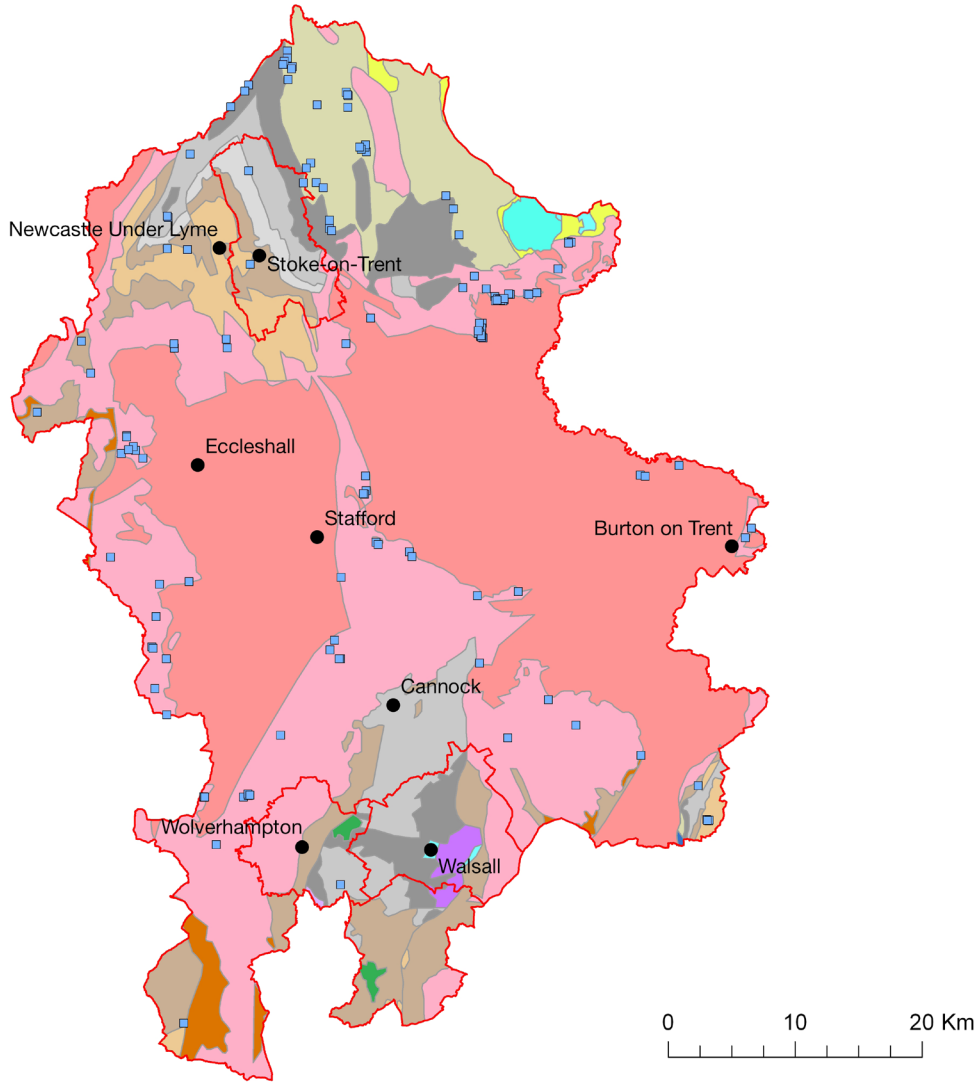
Strategic Stone Study

A Building Stone Atlas of Staffordshire

including Dudley, Stoke-on-Trent, Walsall & Wolverhampton

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Staffordshire Bedrock Geology Map



■ BUILDING STONE SOURCES

Bedrock Geology

	TRIASSIC ROCKS (UNDIFFERENTIATED) - MUDSTONE, SILTSTONE AND SANDSTONE
	TRIASSIC ROCKS (UNDIFFERENTIATED) - SANDSTONE AND CONGLOMERATE, INTERBEDDED
	PERMIAN ROCKS (UNDIFFERENTIATED) - SANDSTONE AND CONGLOMERATE, INTERBEDDED
	WARWICKSHIRE GROUP - MUDSTONE, SILTSTONE, SANDSTONE, COAL, IRONSTONE AND FERRICRETE
	WARWICKSHIRE GROUP - SILTSTONE AND SANDSTONE WITH SUBORDINATE MUDSTONE
	PENNINE UPPER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE, SANDSTONE, COAL, IRONSTONE AND FERRICRETE
	PENNINE MIDDLE COAL MEASURES FORMATION AND SOUTH WALES MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED)
	PENNINE LOWER COAL MEASURES FORMATION AND SOUTH WALES LOWER COAL MEASURES FORMATION (UNDIFFERENTIATED)
	UNNAMED IGNEOUS INTRUSION, WESTPHALIAN - MICROGABBRO
	MILLSTONE GRIT GROUP - MUDSTONE, SILTSTONE AND SANDSTONE
	BOWLAND HIGH GROUP AND CRAVEN GROUP (UNDIFFERENTIATED) - LIMESTONE
	BOWLAND HIGH GROUP AND CRAVEN GROUP (UNDIFFERENTIATED) - MUDSTONE, SILTSTONE AND SANDSTONE
	DINANTIAN ROCKS (UNDIFFERENTIATED) - LIMESTONE WITH SUBORDINATE SANDSTONE AND ARGILLACEOUS ROCKS
	LUDLOW ROCKS (UNDIFFERENTIATED) - MUDSTONE, SILTSTONE AND SANDSTONE
	WENLOCK ROCKS (UNDIFFERENTIATED) - MUDSTONE, SILTSTONE AND SANDSTONE
	SILURIAN ROCKS (UNDIFFERENTIATED) - LIMESTONE, MUDSTONE AND CALCAREOUS MUDSTONE
	TREMADOC ROCKS (UNDIFFERENTIATED) - MUDSTONE, SILTSTONE AND SANDSTONE

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Ordovician

Midlands Minor Intrusive Suite

Lamprophyre

The lamprophyre sills of Dosthill, near Tamworth, were intruded into late Cambrian to early Ordovician shales during the late Ordovician. Known locally as ‘Dosthill Granite’, these unusual grey-black, fine-grained igneous rocks comprise slightly larger hornblende, pyroxene, olivine and biotite crystals set within a finer-grained groundmass of plagioclase feldspar. This rock was primarily quarried for roadstone, although some was used to make paving setts (Barrow et al. 1919).

Silurian Limestones

During mid-Silurian times, the area that would ultimately become Staffordshire lay about 15° south of the equator. A global sea-level rise had led to the submergence of the Midlands platform by a warm, tropical sea. Richly fossiliferous, calcareous mudstones dominate the succession laid down in this, although temporary falls in sea-level allowed reef growth, high carbonate productivity and the accumulation of limestones – some of which have been used for building purposes.

Barr Limestone Formation

The oldest limestone unit cropping out in the east Walsall area is the Barr Limestone Formation. It is a grey, fine-grained rock containing calcareous nodules. It was primarily used for the production of lime as opposed to building stone.

Much Wenlock Limestone Formation

The grey to light-blue, buff-weathering, bioclastic ‘Wenlock Limestone’, with its abundant shelly fauna, has been quarried (since Roman times) in the Wolverhampton and Walsall areas, albeit principally for the manufacture of lime. In the Walsall area, the Much Wenlock Limestone Formation comprises the Lower and the Upper Quarried Limestone members (formerly the Lower and the Upper Wenlock Limestone), which are separated by the Nodular Limestone Member (Nodular Beds). The Lower Quarried Limestone has been used to some extent for walling and building stone, with the 19th-century Rushall Church being the prime example (Barrow et al. 1919).



Aymestry Limestone Formation

The Aymestry Limestone Formation (also known as the ‘Aymestry Rock’ or the ‘Sedgley Limestone’) comprises a blue-grey, muddy, nodular limestone. This was worked at a small quarry near Goldthorn Park. The bulk of the quarried stone was used as flux for the iron furnaces at Coalbrookdale, and was extracted to the south of the Staffordshire area around Dudley.

‘Lower’ Carboniferous Dinantian Limestones

Milldale & Hopedale Limestone Formations

The Devonian was a period of uplift and erosion in the Staffordshire area, resulting in an absence of deposits of this age. Sedimentation resumed during the early Carboniferous (Dinantian), when massive limestones were laid down under tropical conditions in ‘stable shelf’ environments. The best exposures of this limestone are in the Peak District, where it is principally used for aggregate or lime production rather than as building stone.

Between the stable limestone shelves were deeper-water, stagnant, basinal areas in which accumulated thick deposits of dark, cherty limestones and calcareous mudstones. Some carbonate material cascaded into the basins via turbidity currents. Small ‘reef-knolls’ or algal mud mounds developed on the margins of the shelf areas.

The characteristic white to grey, variably fossiliferous limestones of the Peak National Park (especially the White Peak) occupy only a small area in the northeast of the Staffordshire Moorlands district. Much of the limestone in the Staffordshire section of the Park is assigned to the Milldale and Hopedale Limestone formations (both Peak Limestone Group). The Milldale Limestone Formation comprises limestone of both Waulsortian reef and inter-reef facies. The single or compound mud-mounds are composed of fossiliferous, massive micrite with common spar-filled cavities, whereas the inter-reef facies consists of well-bedded crinoidal biosparite and subordinate dark grey, cherty, micritic limestone (Waters & Davies, 2006). The overlying limestones are those of the typically mid-grey, coarsely bioclastic and conglomeratic Hopedale Limestone Formation and the brownish grey or dark grey, texturally and compositionally variable beds of the Ecton Limestone Formation. These limestones give way vertically and laterally to the deeper water mudstones (with limestone) and sandstone turbidites of the Widmerpool Formation (formerly the Mixon Limestone-Shales Formation). This latter formation includes the pale grey-brown calcareous sandstones and siltstones of the Onecote Sandstone(s) (Member), which are used locally between Butterton and Mixon.

Most of the limestone occurring in Staffordshire is quarried for aggregate and/or cement (Harrison & Adlam, 1985), with little being used for vernacular buildings. Irregular white blocks are, however, commonly used as drystone field walling (often representing cleared field brash), and a number of agricultural dwellings – as well as cottages in villages such as Wetton, Waterhouses, Alstonefield and Butterton – made use of quarried limestone rubble. This rubble was also employed in the construction of local bridges such as Lode Mill Bridge, Alstonefield (above). On the eastern side of the Staffordshire Moorlands, medieval churches such as St. Peter's in Alstonefield and St Margaret's in Wetton are constructed of roughly coursed limestone, but have sandstone dressings (Wilkinson, 2006).

Dinantian limestone was quarried at Brown End quarry, Welton Road quarry, Dale quarries in the Manifold, Lee House quarries, Grindon Moor quarry, at Caldon Low, and close to Alstonefield.



More exotic limestones such as the so-called 'Ashford Black Marble' (Monsal Dale Limestone Formation; Ford, 1964), which were worked for ornamental purposes, do not occur in Staffordshire, although they sometimes feature in the interiors of great county houses as carved and polished fireplace supports (e.g. the Great Hall, Keele Hall, Newcastle-under-Lyme).

'Upper' Carboniferous

'Namurian' Sandstones

Coarse sandstones, generally referred to as 'grits' or 'gritstones', typify the geology of much of the Staffordshire Moorlands and escarpments to the east of Biddulph, Stoke, and around Leek. These rocks have been used as querns and millstones since at least mediaeval times due to their hard and abrasive nature. They have also been in demand as building and roofing materials.

The late Dinantian to Namurian witnessed the progressive infilling of several thermally subsiding basins, with the development of extensive pro-grading deltas (Jones, 1980). Sandy sediment was derived from two main sources – a minor South Midlands source, which supplied quartz-rich sands lacking in feldspar (e.g. the Minn and Cheddleton sandstones), and a major northern (Scottish) source, which supplied the feldspar-rich 'Millstone Grit' sands. Many of the resultant sandstone bodies (e.g. the Roaches Grit, the Chatsworth Grit and the Rough Rock) have been extensively used for building and walling.

The 'Namurian' succession is broadly divided into three parts. The lower, mudstone-dominated part is referred to as the Bowland Shale Formation (formerly the 'Edale Shales'). This passes conformably upwards (in Staffordshire) into the Morridge Formation, which contains a number of southerly-derived protoquartzitic sandstones. The Morridge Formation, in turn, is conformably succeeded by the thick, quartzofeldspathic sandstones of the Millstone Grit Group.

Bowland Shale Formation

Minn, Hurdlow, Lum Edge, Blackstone Edge, Cheddleton, Kniveden & Brockholes sandstones.

The oldest of these sandstones are the graded, quartzose Minn Sandstones (Bowland Shale Formation), which were originally quarried at Gunn stone pits (in the Churnet area), Cliff Quarry, and Hollins Farm Quarry to the north of Leek. Minn Sandstone makes a poor building stone due to its tendency to break into small blocks and its being discoloured by red ironstone nodules (Evans et al. 1968). It was consequently worked for walling stone and road aggregate, and more recently, for local stone fireplaces and general repair (Staffordshire County Council, 1994). The other orange-grey, protoquartzitic sandstones include the Hurdlow Sandstones (Bowland Shale Formation), Lum Edge Sandstones (Morridge Formation), Cheddleton Sandstones (Bowland Shale Formation), Blackstone Edge Sandstone (Morridge Formation), Kniveden Sandstones (Bowland Shale Formation) and the Brockholes Sandstones (Bowland Shale Formation), all of which have been used for local buildings and/or walling (Cox, 2004).

Millstone Grit Group

The southerly-derived protoquartzitic sandstones are succeeded by the northerly-derived 'gritstones' (plus mudstones, siltstones and thin coals) of the Millstone Grit Group. The boundary between the two successions is complex, with interdigitation of the two sequences at the transition, but the fluvio-deltaic 'gritstones' rapidly become dominant, forming substantial units. The 'gritstones' are generally characterized by the presence of pink potassium feldspar crystals (sometimes up to 25%; Rees & Wilson, 1998) and rounded to sub-rounded grains of igneous-derived quartz (typically around 85%), with some lithic fragments and quartzose pebbles.

They are invariably current bedded on various scales, and their high feldspar content gives them a more orangey-red colour than the sandstones of the underlying Morridge Formation. The nature, distribution and lateral persistence of the 'gritstones' all vary considerably across the region. Notable 'gritstone' units include the Longnor Sandstones, Kinderscout Grit, Sheen Sandstones, Five Clouds Sandstones, Corbar Grit, Roaches Grit, Ashover Grit (or 'Third Grit'), Chatsworth Grit (or 'Second Grit') and the Rough Rock.

The Church of St. Luke in Leek, Cheddleton Station (both below) and the Church of St. Giles in Cheadle are all constructed of squared and coursed blocks of sandstone from the 'gritstones' succession.



The Church of St. Luke in Leek.



Cheddleton Station.

These sandstones were also the preferred building material for many church towers, as seen at St. Edward's in Cheddleton, St. Edward the Confessor in Leek, St. Lawrence's in Biddulph and St. John's in Burslem (Wilkinson, 2006). Similarly, the Friends Meeting House, as well as other notable buildings (e.g. The Vicarage, Ford House, Greystones), in Leek were entirely built of these local sandstones.

Elsewhere, the late 17th-century St. Chad's School in Lichfield provides a rare example of an urban house built entirely of Namurian sandstone, as are the Noel's Almshouses in Stafford (right), which exhibit well-coursed ashlar blocks. Vernacular buildings made from Roaches Grit sandstone include old farm buildings and nearby stone cottages (below).



Noel's Almshouses in Stafford.



Cottages made from Roaches Grit sandstone.



Mow Cop Castle, constructed of Chatsworth Grit.

The Chatsworth Grit sandstones are cemented to varying degrees by secondary silica, and they, along with Rough Rock sandstones, have been worked on the Mow Cop ridge. Mow Cop Castle (a summerhouse built in 1754 for the Wilbraham family of Rode Hall, above), Odd Road Church, Mow Cop, and many other buildings and walls in the villages lying along the ridge are constructed of Chatsworth Grit. The quarries at the northern end of Troughstone Hill, outside Biddulph, worked Chatsworth Grit sandstone for rough stonework in parts of Biddulph Grange, the rockery and walling in the gardens, and Squires Well, Mow Cop (below). Chatsworth Grit was also obtained from Bagnall and to the south of Brown Edge (Rees & Wilson, 1998).

'Gritstone' yielded by outcrops of the Roaches Grit, the Chatsworth Grit and the Rough Rock is commonly used for drystone walling, but can weather badly (Cox, 2004).



Squires Well, Mow Cop.

Pennine Coal Measures Group

By the end of the Namurian, basinal infilling had led to the development of areas of shallow water that were periodically emergent. The subsequent Westphalian interval saw the establishment of extensive 'coal swamps', which would ultimately form the coal-bearing deposits known as the 'Coal Measures'. Thereafter, uplift and erosion produced a large alluvial plain in which fluvial deposition dominated. Some of the resultant 'red-bed' sandstone units have served as sources of building stone.

Pennine Lower Coal Measures Formation

Although there are numerous sandstones associated with the Westphalian 'Coal Measures', particularly in north Staffordshire, not many are laterally persistent, and they tend to be weaker than the Namurian sandstones. As a result, 'Coal Measures' sandstones have not been widely used for building purposes. The Woodhead Hill Rock and the Kinglsey Sandstone (or Woodhead Sandstone), both of which form prominent ridges in the Staffordshire Moorlands, were, quarried in the vicinity of Kingsley, however.

Warwickshire Group (the 'Barren Red' or 'Red/Barren Measures')

Halesowen Formation

The majority of the stone used for building in north Staffordshire was quarried from the Halesowen Formation of the Warwickshire Group (formerly known as either the 'Barren Red' or the 'Red or Barren Measures'). The Halesowen Formation itself is part of a stratigraphic sequence previously sub-divided into the 'Newcastle Formation' and the 'Keele Formation' (Watkin, 1980; Rees & Wilson, 1998) on the basis of colour: the 'Newcastle Formation' (now Halesowen Formation) being largely grey coloured and the 'Keele Formation' (now the Alveley Member of the Salop Formation) being red. The boundary between these two former formations is diachronous, however, and a distinction on the basis of colour alone is not always possible (beds such as the Hanchurch Sandstone, for example, show a lateral colour change from grey to red). In south Staffordshire, the Halesowen Formation is largely but not entirely grey, with a number of major sand bodies in the lower and middle parts of the sequence. The finely laminated, grey sandstones of the Halesowen Formation generally do not make good building stones (the fine lamination is susceptible to attack by the agents of weathering), although the Guildhall in Newcastle-under-Lyme is said to be built of this material (right).

The Church of St. Editha in Tamworth is believed to be constructed of reddish brown Halesowen Formation sandstone (referred to as the 'Big Brown Sandstone' of the 'Coal Measures' in early Geological Survey accounts), but the rock is generally too friable to make a good building stone. A more common usage has been as tombstones, examples of which are seen in local graveyards around Newcastle and Stoke.



The Guildhall, Newcastle-under-Lyme, is said to be built of sandstones of the Halesowen Formation.

Hanchurch, Springpool and Butterton Sandstones

The Hanchurch Sandstone (Halesowen Formation) was worked at Job's Wood Quarry and Quarry Bank quarry near Silverdale, while small quarries on the Sneyd Estate, Keele provided local sources of red, laminated Springpool Sandstone and Butterton Sandstone (also Halesowen Formation). The structures of St. John the Baptist Church and Keele Hall feature (to some extent) the local Butterton and Springpool sandstones – both of which served as nearby sources of rough walling stone. Keele Hall, built in a Jacobean Revival style, is said by Gibson & Webb (1902) to be constructed of local 'Keele Stone', but is largely composed of good quality red sandstone with cream sandstone dressings and dimension stone. These particular sandstones are probably more representative of the variegated sandstones of the Triassic (Bromsgrove Sandstone Formation) rather than those of the more proximal Upper Carboniferous succession (cf. the sandstones seen at St. John's Church – which does, notably, also feature 'Hollington Stone' dressings).



St John the Baptist Church, Keele, is in part built of the local Butterton and Springpool sandstones (Halesowen Formation).

Permian

Clent & Bridgnorth Sandstone Formations

Three rift basins – the Stafford, Needwood and Cheshire basins – developed during late Carboniferous or early Permian times and provided depositional sites for a range of continental sediments. In south Staffordshire, the resultant Permian sequence is split into two stratigraphic units known as the Clent Formation (Warwickshire Group) and the Bridgnorth Sandstone Formation (New Red Sandstone Supergroup). The Clent Formation, here, comprises mainly red-purple mudstones with thin red-brown sandstones.

Bridgnorth Sandstone, meanwhile, is a brick red, medium-grained, aeolian sandstone, with well rounded grains and large-scale cross-bedding. It is poorly cemented and weathers rapidly, so does not make a good building stone.

Triassic

The stratigraphical nomenclature applying to the Triassic succession of the Midlands is currently undergoing revision. In general, the ‘lower’, sandier part of the sequence, formerly known as the ‘Bunter and Keuper Sandstones’, is now referred to as the Sherwood Sandstone Group. The ‘upper’ part of the Triassic sequence – which is dominated by mudstones with occasional thick evaporite beds, and formerly referred to as the ‘Keuper Marl’ – is now known as the Mercia Mudstone Group. The black marine mudstones, within thin sandstones, occurring towards the top of the Triassic sequence are now assigned to the Penarth Group (the former ‘Rhaetic’).

Sherwood Sandstone Group

Developments of the Sherwood Sandstone Group are present within three separate depositional basins in Staffordshire (i.e. those originating in late Carboniferous or early Permian times), each basin being characterised by slightly different sandstone-dominated successions.

In the north-west of the county, forming part of the Cheshire Basin, the oldest exposed Triassic unit is the Kinnerton Sandstone Formation. It is a red-brown to yellow, fine to medium-grained, cross-stratified sandstone, largely of aeolian origin (Warrington et al. 1980; Charsley, 1982). In the other basins, the basal units are represented by locally derived breccias and conglomerates (with associated sandstones and subordinate mudstones) viz. the Hopwas Breccia Formation in the Stafford Basin and the Huntley Formation in the Needwood Basin.

The Hopwas Breccia Formation (of uncertain age, and quite possibly Permian in part) comprises a coarse breccia (of Carboniferous Limestone and quartzite clasts), with red, calcareous sandstone interbeds (Barrow et al. 1919). The calcareous cement is readily removed by the agents of weathering and although the sandstones were quarried near to Hopwas itself, they are too soft to serve as a good, durable building stone. The other basal Triassic formations are similarly poorly cemented, and are generally considered to be poor building stones.

Overlying the basal (Permo-)Triassic units are developments of variably pebbly sandstones (the former 'Bunter Pebble Beds') e.g. the Chester Pebble Beds Formation of the Cheshire Basin

and the Kidderminster Formation of the Stafford Basin. Essentially pebble-free sandstones occurring within the 'Pebble Beds' are generally too poorly cemented to be used as building stone, but locally better cementation has enabled their use. Heighley Castle, located to the west of Newcastle-under-Lyme, was built in the early 11C of red pebbly sandstone (Chester Pebble Beds Formation) quarried from the adjacent hillside (Heighley Lane quarries). (It is noteworthy that the quarrying operations also produced a deep defensive ditch at the back of the castle.) The Castle was razed to the ground by Parliamentary forces during the Civil War, but much of the stone was then recycled by local communities, most notably from the nearby village of Betley.

The Church of St. Margaret, Betley (below), dating from c1500, is built of pebbly sandstones similar to those used in the construction of Heighley Castle (although the churchyard gateway is of baryte-cemented 'Hollington Sandstone', with Millstone Grit sandstones featuring in the nearby walls; Thompson, 1999). Equivalent pebbly sandstones, such as those of the Needwood Basin's Hawksmoor Formation, were generally considered to be too pebbly and/or friable to make a good building material, but they have provided much sand and gravel e.g. the Hulme quarries at Park Hall, and quarries at Weston Coyney, Rugeley and Brocton (near Cannock Chase). A small quarry that supplied the local area with red sandstone containing few pebbles was, however, located to east of Stafford at Kingston Hill (Kidderminster Formation), and a quarry at Blythe Marsh (working Hawksmoor Formation sandstones) supplied plinth and dressing stone for St. Giles' Church in Newcastle-under-Lyme (Branney, 1983).





Stafford Castle.

The stratigraphically higher Wilmslow Sandstone and Wildmoor Sandstone formations (of the Cheshire and Stafford basins, respectively) both consist of brick red, fine-grained, planar and cross-bedded, fluvial sandstones, which are largely devoid of pebbles. Their poor cementation usually renders them too soft for building with, but the Wildmoor Sandstone has been quarried for building stone near Stourton and Bishop's Offley.

Unconformably overlying these Lower Triassic sandstones are the following (basin-specific) sandstone-dominated units: in the Cheshire Basin, sitting above the Wilmslow Sandstone Formation, lies the Helsby Sandstone Formation; in the Stafford Basin, sitting above the Wildmoor Sandstone and Kidderminster formations, respectively, lie the Bromsgrove Sandstone and Kibblestone formations, while; in the Needwood Basin, sitting above the Hawksmoor Formation, lies the Hollington Formation. Collectively, these formations probably constitute Staffordshire's most important sources of building stone, and were once quarried extensively across the county.

Helsby Sandstone Formation

The Helsby Sandstone Formation has two distinct facies, one fluvial and the other aeolian. The fluvial facies comprises reddish-brown to white, medium to coarse-grained sandstones, with sporadic conglomerates. The aeolian sandstones, meanwhile, are well sorted, fine to medium-grained, and pebble free. They are commonly cross-stratified, and contain white, bladed crystals of barite. The Helsby Sandstone is currently quarried for dimension stone ('Grinshill Stone') to the west of the Staffordshire area at Grinshill in Shropshire.

Bromsgrove Sandstone Formation

Bromsgrove Sandstone is typically a darker red-brown colour than either the Helsby or Hollington formation sandstones, but is locally pale yellow or brown. It is mainly of fluvial origin, although some beds are aeolian. The sandstones are fine to medium-grained, with abundant mica flakes, and are generally calcite-cemented. It is this cementation that makes the upper, finer-grained parts of the formation highly suitable for use as a building stone.

In the Stafford area, the sandstone is light grey in colour, has both calcite and silica cements, and contains visible mica plates. Stone produced from major quarries such as Park Quarry (in Tixall Park) has been used locally for ornamental structures, as well as in St. George's Church and Sandwell Hall, Birmingham (Stevenson & Mitchell, 1955). Another historic structure built from 'Tixall Stone' is Stafford Castle (above), although the original stonework is masked by a Victorian brick cladding (Pevsner, 1974). A small quarry in the southeast corner of Sandon Park was used to supply stone for the memorial column to William Pitt the Younger (1806), while Sandon Hall was rebuilt from the same stone in 1852 (Calvert 1886; Whitehead et al. 1927).

Bromsgrove Sandstone has also been quarried (and later mined, as the good quality building stone bed was followed into the hillside) at Beech and at The Cliffs, Great Haywood. The stone produced from the Beech mines was used to build Trentham Hall in the 17th century (Staffordshire County Council, 1994). As it is no longer quarried, the red sandstones of the Permo-Carboniferous Enville Member (Salop Formation, Warwickshire Group) or the Lower Triassic St. Bees Sandstone of Cumbria are commonly used for repairs or restoration work.

Another locality where the Bromsgrove Sandstone Formation was formerly quarried is Stanton, near the Dove Valley. Much of the stone produced here was used to build the Elizabethan Wootton Lodge, which is a privately owned 17th-century house situated at Ramshorn, near Ellastone. Originally built for Sir Richard Fleetwood (the High Sheriff) in 1614, it was considered by Pevsner (1974) to be one of the best houses in Staffordshire. Amongst the local Gothic Revival houses, Alton Towers (c1817; below) and Alton Castle (a Pugin construction of 1847) are some of the best, and are built of the same Bromsgrove Sandstone ('Alton Stone') as the medieval castle (Chisholm et al. 1988).

Present day (and historically), variegated (i.e. red, cream and mottled) Bromsgrove Sandstone Formation sandstones are (and were) worked at three quarries located close to the village of Hollington ('Hollington Stone'; not to be confused with the sandstones of the Hollington Formation) viz. Red Quarry, Tearne (or Oldham's) Quarry and Fielding's Quarry. There are also a few small workings at Wootton Wood.

Examples of typical 'Hollington Stone' use include the portico at Biddulph Grange, the Royal Bank of Scotland, the NatWest Bank and part of the Guildhall in Newcastle-under-Lyme, much of Keele Hall, and Caverswall Castle (near Blythe Bridge). 'Hollington Stone' was also used for many Victorian town halls such as Stoke, Longton, Walsall and Wolverhampton (Wilkinson, 2006). The red variety of 'Hollington Stone' forms the bulk of the facing stone of the new Coventry Cathedral (Pevsner, 1974).

Penkridge Stone (Bromsgrove Sandstone Formation)

'Penkridge Stone', a variety of Bromsgrove Sandstone, is a fine-grained freestone produced in the area of the same name. It was mainly worked at two quarries – north of Wolgarston and Quarry Heath – and used in the construction of local churches.

Kibblestone Formation

On the eastern margin of the Stafford Basin, occupying the same stratigraphic position as the Bromsgrove Sandstone, are found the pale yellow-grey sandstones of the Kibblestone Formation. They are medium-grained, well-sorted, non-pebbly and essentially mica-free, and were deposited in an aeolian environment. These sandstones were probably quarried close to Wood House (Woodhouse Farm), east of Oulton.

Hollington Formation

The fine to medium-grained, current-bedded or finely laminated sandstones of the Hollington Formation were deposited by meandering rivers. Like their Helsby Sandstone counterparts, they are typically red-brown, but are off-white or mottled in places. The reasonably well developed calcite and barite cements of the Hollington Formation sandstones make them highly suitable for use as a building stone, and some of the more uniform beds have provided dimension stone suitable for carving.

Mercia Mudstone Group

The Middle to Upper Triassic Mercia Mudstone Group represents the deposits of a broad alluvial plain (subject to intermittent flooding by the sea) on which ephemeral saline lakes were established. The sediments themselves essentially comprise a thick sequence of red-brown siltstones and mudstones, with locally significant developments of halite and gypsum. None of these lithologies are suitable for building purposes, and with only minor and impermanent developments of 'skerry sandstones' within the county (cf. elsewhere in the Midlands), the Mercia Mudstone Group has not served as an important source of building stone in Staffordshire.

The gypsum beds at Tutbury were, however, mined for alabaster, which was used for interior decorative purposes (such as monuments and chest-tombs). Several workings existed close to the Dove Valley, and it is currently extracted at the Fauld Mine between Tutbury and Hanbury. Alabaster is reported to also have been quarried near Tettenhall in the 15th century (Pevsner 1974). The second order of the Norman west doorway arch of Tutbury Church (c.1160) is made from local alabaster.



Glossary

Ashlar: Stone masonry comprising blocks with carefully worked beds and joints, finely jointed (generally under 6mm) and set in horizontal courses. Stones within each course are of the same height, though successive courses may be of different heights. 'Ashlar' is often wrongly used as a synonym for facing stone.

Barite: (BaSO₄) An industrial mineral important because of its high density.

Calcareous: A rock which contains significant (10-50%) calcium carbonate principally in the form of a cement or matrix.

Cement: The materials which bind the grains and/or fossil components together to form a rock.

Cross-bedding: A feature principally of sandstones formed by the movement of sand grains in currents to produce layering oblique to the margins of the beds.

Dressings: To say a building is constructed of brick with stone dressings means that worked stone frames the corners and openings of the structure.

Evaporite: A rock made up of mineral(s) formed by precipitation.

Facies: A term describing the principal characteristics of a sedimentary rock that help describe its mode of genesis e.g. dune sandstone facies, marine mudstone facies.

Feldspar: A commonly occurring aluminium silicate mineral of potassium, sodium and calcium.

Fossiliferous: Bearing or containing fossils.

Granite: Coarsely crystalline igneous rock, composed primarily of quartz, feldspars and micas, with crystal sizes greater than 3 mm.

Igneous rock: Rocks formed when molten magma cools and solidifies. It includes extrusive rocks erupted from volcanoes (e.g. basalt) and intrusive rocks that cool beneath the Earth's surface (e.g. granite, gabbro, granodiorite, dolerite).

Ironstone: Sedimentary rock which is composed of more than 50% iron-bearing minerals.

Limestone: A sedimentary rock consisting mainly of calcium carbonate (CaCO₃) grains such as ooids, shell and coral fragments and lime mud. Often highly fossiliferous.

Lithology: A basic description of the material features of a rock, generally as seen with the naked eye, but also including microscopic features. Commonly occurring sedimentary lithologies are sandstone, siltstone, mudstone and limestone; commonly occurring igneous lithologies are granite, diorite, dolerite and basalt.

Mica: Group of silicate minerals composed of varying amounts of aluminum, potassium, magnesium, iron and water. All micas form flat, plate-like crystals. Crystals cleave into smooth flakes. Biotite is dark, black or brown mica; muscovite is light-coloured or clear mica.

Micritic: The texture or matrix of a sedimentary rock or clast, often applied to a limestone or limestone pellet, which is composed of extremely fine grained lime-rich mud.

Mudstone: A fine-grained sedimentary rock composed of a mixture of clay and silt-sized particles.

Nodular: An irregular, spherical to ellipsoidal, flattened to cylindrical body, commonly composed of calcite, siderite, pyrite, gypsum and chert, common in soils and evaporate deposits.

Rubble: Rough, undressed or roughly dressed building stones typically laid uncoursed (random rubble) or brought to courses at intervals. In squared rubble, the stones are dressed roughly square, and typically laid in courses (coursed squared rubble).

Sandstone: A sedimentary rock composed of sand-sized grains (i.e. generally visible to the eye, but less than 2 mm in size).

Sedimentation: Process whereby loose and weathered material is transported (by water, wind, ice, volcanic eruption etc) and then deposited as layers of sediment.

Shale: An argillaceous rock with closely spaced, well-defined laminae.

Stratigraphy: Branch of geoscience dealing with stratified rocks (generally of sedimentary origin) in terms of time and space, and their organisation into distinctive, generally mappable units.

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