Historic England

Cheshire

Building Stones of England

The Building Stones of England

England's rich architectural heritage owes much to the great variety of stones used in buildings and other structures. The building stones commonly reflect the local geology, imparting local distinctiveness to historic towns, villages and rural landscapes.

Historic England and the British Geological Survey (BGS), working with local geologists and historic buildings experts, have compiled the Building Stones Database for England to identify important building stones, where they came from and potential alternative sources for repairs and new construction.

Drawing on this research, plus BGS publications and fieldwork, guides like this one have been produced for each English county. The guides are aimed at mineral planners, building conservation advisers, architects and surveyors, and those assessing townscapes and countryside character. The guides will also be of interest if you want to find out more about local buildings, natural history, and landscapes.

This guide is based on original research and text by Andy King (Geckoella Ltd).

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Front cover: The Bears Paw public house, Frodsham. Frodsham Sandstone. © John Davidson Photos / Alamy Stock Photo.

How to Use this Guide

Each guide describes the local building stones in their geological timescale order, starting with the oldest layers through to the youngest. The guide ends with examples of other notable building stones from other parts of England and further afield.

Geological time periods, groups, formations and building stones

Each building stone is listed under the relevant geological timescale, group and formation. A formation may be divided into members and where relevant these are referenced in individual building stone sections.

Middle Jurassic
↑— geological time period

Inferior Oolite Group, Lincolnshire Limestone Formation
↑— geological group ↑— geological formation

Lincolnshire Limestone
↑— building stone (alternative or local name)

Bedrock geology map and stratigraphic table

To help you with the geology of the area, there is a bedrock geology map and a stratigraphic table which shows the layers of rocks and the associated building stones in this geological timescale, group, formation order.

Page numbers for each building stone are included in the stratigraphic table for ease of reference. The page numbers are inverted to correspond with the geological age order.

Contents list

If you click on the page number for a building stone in the Contents list, you will go straight to the relevant section in the guide.

Building stone sources and building examples

A companion spreadsheet to this guide provides:

- More examples of buildings. Information is included on building type, date, architectural style, building stone source, and listed/ scheduled status
- A list of known (active and ceased) building stone sources such as quarries, mines, pits and delphs
- Additional information on building stones including lithology, grain size, sedimentary structures, key identification features, and notes on failure/weathering, and use.

The Building Stone GIS map allows you to search the Building Stones Database for England for:

- A building stone type in an area
- Details on individual mapped buildings or stone sources
- Potential sources of building stone sources within a given proximity of a stone building or area
- Buildings or stone sources in individual mineral planning authority area.

Further Reading, Online Resources and Contacts

The guide includes geological and building stone references for the area. A separate guide is provided on general Further Reading, Online Resources and Contacts.

Glossary

The guides include many geological terms. A separate Glossary explaining these terms is provided to be used alongside the guides.

The guides use the BGS lexicon of named rock units.

Mineral and local planning authorities

This guide covers the Cheshire Mineral Plan area of Cheshire East, Cheshire West and Chester, and mineral planning authority areas of Warrington and Halton (as one of the Merseyside authorities); and the corresponding unitary authority areas. In 2014 Halton Borough joined the Liverpool City Region Combined Authority.

Contents

1 Introduction

The solid geology of Cheshire is dominated by large tracts of red Permo-Triassic sediments, which cover much of the lower-lying western and central ridge areas of the county, stretching from Chester in the west to Congleton in the east, and from Warrington in the north to Nantwich in the south.

More resistant, hard pebbly sandstones within the Triassic sequence may form local ridges, as at Malpas and Alderley Edge. Along the eastern fringes of the county, linear outcrops of Carboniferous limestone, Millstone Grit and Coal Measures Sandstones form more prominent higher ground, extending from Astbury and east of Congleton to around Macclesfield. Carboniferous sandstones also form isolated outcrops of older inliers south of Chester. A small outcrop of Permian sandstone occurs along the northern county boundary south of Stockport.

The north-eastern tip of a Lower Jurassic outlier, which extends into northern Shropshire, is present on the southern margin of Cheshire around Wilkesley and Coxbank, but it is poorly exposed. Apart from occasional tuff layers within the sedimentary succession, there are no significant volcaniclastic, igneous or metamorphic rocks exposed anywhere within the county. Much of this bedrock geology in lower-lying areas has been subsequently covered by extensive Quaternary drift deposits, including Devensian boulder clays and Flandrian sands and alluvium, especially in the areas around the River Mersey, between Ellesmere Port, Runcorn, Widnes and Warrington.

In comparison with many other English counties, Cheshire has a relatively limited diversity of building stones. The main stones used originate from the Millstone Grit or Coal Measures Sandstones horizons, or from red sandstone or pebbly sandstone formations within the Triassic sequence.

The outcrops of Lower Carboniferous limestone, Permian sandstone and Blue Lias are either too limited in extent or not of suitable lithology to have been used as building stones, or even rubblestones, other than in very localised circumstances.

Within Cheshire, the use of stone tends to be confined to older buildings, churches, bridges and retaining walls. The oldest known use of quarried stone dates back to the Romans, who used local red sandstone in the construction of ‘Deva’, today the modern city of Chester. However, the sandstone quarrying industry, still very active in Cheshire in the latter part of the 19th century, died out in the early 20th century. Many 19th and 20th-

century buildings in the county were built from brick, manufactured using local Triassic marls and clays, often laid in a characteristic Flemish bond style. The brick manufacturing industry was particularly active in the late 19th century. Another feature that is characteristic of Cheshire architecture is the widespread use of Tudor-style wood frame construction, with alternating patterns of black painted wood and white plaster. In many buildings, sandstone blocks were used as foundations or as a plinth on which brick or wood frame structures were erected.

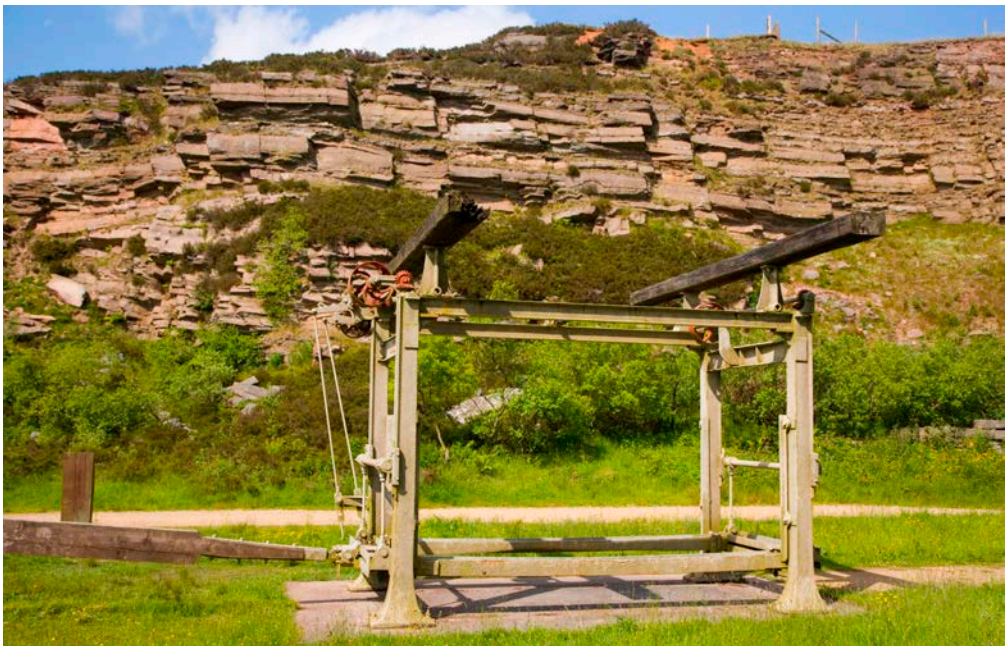
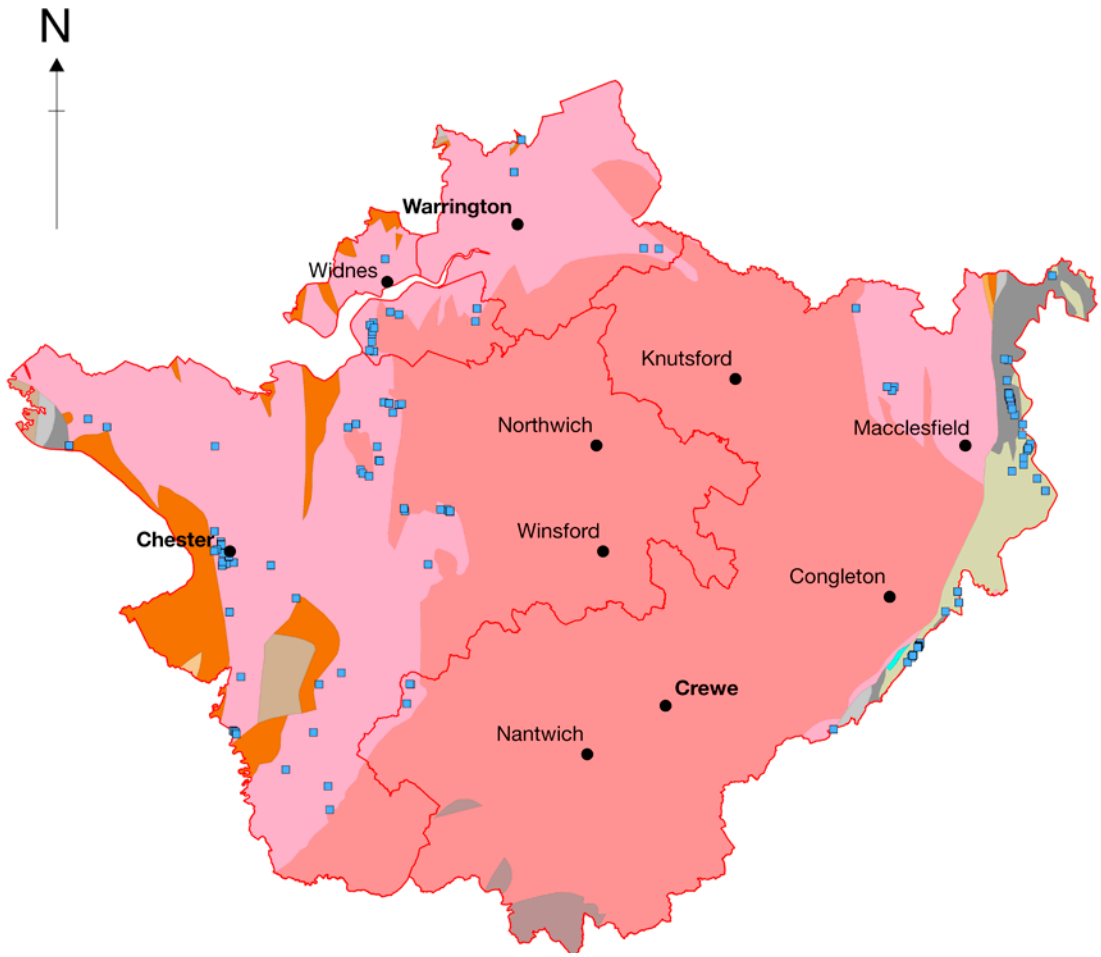


Figure 1: Tegg's Nose Quarry and swing saw, near Macclesfield. Millstone Grit Formation.

Bedrock Geology Map



Key

- Building stone sources

Bedrock geology

- Lias Group — mudstone, siltstone, limestone and sandstone
- Triassic Rocks — mudstone, siltstone and sandstone
- Triassic Rocks — sandstone and conglomerate, interbedded
- Permian Rocks — mudstone, siltstone and sandstone
- Permian Rocks — sandstone and conglomerate, interbedded
- Pennine Middle Coal Measures Formation and South Wales Middle Coal Measures Formation
- Warwickshire Group — mudstone, siltstone, sandstone, coal, ironstone and ferricrete
- Warwickshire Group — siltstone and sandstone with subordinate mudstone
- Pennine Lower Coal Measures Formation and South Wales Lower Coal Measures Formation
- Millstone Grit Group — mudstone, siltstone and sandstone
- Dinantian Rocks — limestone with subordinate sandstone and argillaceous rocks

Stratigraphic Table

Geological timescale	Group	Formation	Building Stone	Page
Lower Jurassic	Lias Group	Blue Lias Formation	Blue Lias Limestone	21
Triassic	Penarth Group	various		
	Mercia Mudstone Group (Keuper Marls)	Tarporley Siltstone Formation	Malpas Sandstone Tarporley Siltstone and (Keuper Waterstones) (Mercia Mudstones)	20 19
	Sherwood Sandstone Group	Helsby Sandstone Formation	Helsby Sandstone (Manley Stone, Runcorn Red) Frodsham Sandstone (Lower Keuper Sandstone) Delamere Sandstone (Keuper Sandstone Conglomerate, Peckforton Stone) Passage Beds (Basement Beds)	17 15 14 13
		Wilmslow Sandstone Formation	Upper Mottled Sandstone	10
		Chester Pebble Beds Formation	Pebble Beds (Bunter Pebble Beds)	11
		Kinnerton Sandstone Formation	Lower Mottled Sandstone	11
Permian	Appleby Group	Collyhurst Sandstone Formation	Collyhurst Sandstone	10
Carboniferous	Warwickshire Group	Salop Formation	Erbistock Beds	10
	Pennine Coal Measures Group	Pennine Lower Coal Measures Formation	Coal Measures sandstones (Woodhead Hill Rock, Milnrow Sandstone, Ridge Stone, Kerridge Stone, Old Lawrence Rock)	9
	Millstone Grit Group	Rossendale Formation	Rough Rock	7
		Marsden Formation	Chatsworth Grit Roaches Grit	6 5
		Morridge Formation	Minn Beds (Crowstones)	5
	Peak Limestone Group	Astbury Formation	Astbury Sandstone Astbury Limestone	5 5

Building stones in geological order from the oldest through to the youngest layers.

2 Local Building Stones

Lower Carboniferous

Peak Limestone Group, Astbury Formation

Astbury Limestone and Astbury Sandstone

Rocks of lower Carboniferous age crop out only in a small inlier at Astbury, just south of Congleton. Here, massive, thickly bedded, pale grey limestones (Astbury Limestone) were once extensively quarried underground, principally for lime, but no exposures remain. The workings are now flooded, and the stone is largely worked out. The overlying Astbury Sandstone is a coarse-grained, cream-coloured, feldspathic sandstone, resembling the gritstones from the Millstone Grit (described below). It was formerly quarried at several places around the southern part of the inlier. Both these rock types were employed locally on a small scale as rough building stones or rubblestones, mainly for farm buildings and walls.

Millstone Grit Group, Morridge Formation

Minn Beds (Crowstones)

The Minn Beds crop out on the eastern edge of the county, around Limekiln Brook near Astbury. Eastwards, more extensive and thicker outcrops occur on Bosley Minn and Wincle Minn in Cheshire and Biddulph Moor in Staffordshire. Within Cheshire, the Minn Beds are represented by pale greenish-grey, thinly bedded to massive quartzitic sandstones, typically with very dark carbonaceous partings and siltstone interbeds. The thicker sandstone units are locally called ‘crowstones’. Sandstones in the Minn Beds have been worked in the past as walling stones and as poor quality road aggregate, but because they have a tendency to split into small pieces they do not make good building stones. The most extensive workings in Cheshire occur at Rough Hey and Foxbank quarries, south of Macclesfield, where the lithologies vary from coarse pebbly gritstones to fine sandstone.

Millstone Grit Group, Marsden Formation

Roaches Grit

Roaches Grit crops out along the eastern edge of Cheshire. The main outcrops form prominent ridges and escarpments east of Macclesfield and south-east of Bollington, especially at Cophurst Edge and Windyway House.

Like many of the Millstone Grit sandstones, it is pale-coloured, medium to coarse-grained and feldspathic, with some layers becoming sufficiently coarse grained to be termed ‘gritstones’. It is characterised at outcrop from other grits by the presence of large, rounded, ferruginous concretions and it has a tendency to exhibit spheroidal weathering. Roaches Grit was worked at several quarries along the Windyway escarpment north of Tegg’s Nose, including Windyway and Walker Barn quarries.

Roaches Grit has been used as a tough, durable stone in many buildings along its outcrop, although it tends to be slightly softer than the best layers of Chatsworth Grit. For example, it was used at the 16th-century Wild Boar Inn and adjoining buildings at Wincle, near Macclesfield, which were constructed of roughly squared and coarsed sandstone blocks. Roaches Grit also provided the stone for the reservoir dams in the Langley Valley.

Figure 2: Wild Boar Inn, Wincle. Roaches Grit.

Chatsworth Grit

Like many of the thicker sandstones in the Millstone Grit around Macclesfield, Chatsworth Grit has been extensively quarried for general building purposes and for walling stone. It typically comprises coarse-grained, light purple and grey, locally pebbly sandstones, with minor interbedded mudstones and siltstones. The basal layers are often represented by massive, tough, compact, fine-grained, free-working sandstones.

The Chatsworth Grit occurs along the south-eastern and eastern edges of Cheshire. The main outcrop forms prominent ridges and crags east of Mossley and Congleton (Rainow Hill, Cloud Side) and trending north from Wincle via Nessit Hill, around eastern Macclesfield (Tegg’s Nose, Ward’s Knob and The Hollins) to the east of Bollington.

The workings have mainly been on a small scale, but a number of major quarries follow along the strike of the Chatsworth Grit outcrop. These are almost all now abandoned, as the building stone industry here has greatly declined over the past few decades. In addition to meeting local demand, this stone was formerly carted to the Staffordshire Potteries. The Chatsworth Grit at Mow Cop was renowed as a source of millstones that retained a sharp edge.

One of the largest quarries in the Chatsworth Grit was at Tegg's Nose, which formerly yielded massive pink and white gritstones, hardened by secondary silicification. Although reserves of the stone remain, quarrying here ceased due to the increasing overburden of the shaly rock above. Like Roaches Grit, Chatsworth Grit was also extensively quarried along Congleton Edge and Mow Cop ridge, with the main workings at Rainow Hill, from Girthing Bank to Nick i' th' Hill, from Edge Hill to Black Cob, and at Mow Cop.

An example of the typical use of Chatsworth Grit can be seen in the hamlet of Ginclough, near Rainow, where the mill and many of its cottages are built of locally sourced sandstones.

Figure 3: The mill at Ginclough, near Rainow. Chatsworth Grit.

Milstone Grit Group, Rossendale Formation

Rough Rock

Rough Rock occurs along the south-eastern and eastern edges of Cheshire, with its main outcrop extending east of Astbury and Congleton (Timbersbrook). It is also present further north, at Macclesfield and Bollington. It commonly forms a good topographic feature on which there are several conspicuous tors, as at Rock End.

The lower parts of the Rough Rock are typically represented by impersistent or flaggy sandstones, which around Macclesfield are fine grained and coloured purple and grey. The upper parts are more consistent and comprise distinctly pink or light purple-coloured, medium to coarse-grained, massive feldspathic sandstones, with rare pebble seams. The Rough Rock has been extensively extracted along Congleton Edge and the Mow Cap ridge, between Dane-in-Shaw and Timbersbrook, Willocks Wood and near Mount Pleasant. All these workings are no longer used. It was also formerly worked east of The Cloud, but only on a relatively small scale.

The wall adjoining the Church of St Michael and All Angels in Macclesfield is built of lenticular blocks of greyish current-bedded Rough Rock sandstone, probably originating from the lower part of the formation. A further example can be seen at the 16th-century Lion and Swan coaching inn at Congleton, in which the plinth and lower levels are constructed of Rough Rock sandstone, with the upper parts built in black and white, Tudor-style, timber frame.

Figure 4: The Lion and Swan, Congleton. Rough Rock used for plinth and lower levels.

Figure 5: The wall adjoining the Church of St Michael and All Angels, Macclesfield. Rough Rock.

Pennine Coal Measures Group, Pennine Lower Coal Measures Formation

Coal Measures sandstones (Woodhead Hill Rock, Milnrow Sandstone, Ridge Stone, Kerridge Stone, Old Lawrence Rock)

The outcrop of Coal Measures Sandstones is mainly confined to a small area east of Macclesfield. The rocks occur as a series of north to south or north-east to south-west trending linear exposures. They extend from near Bollington, via Higher Poynton to the south of High Lane.

Typically, these sandstones are medium grained and greyish in colour, but some are prone to weather a deep yellow-brown. They vary from being relatively massive to flaggy. The sandstones occur at various levels within the sequences, often separated by thicker units of siltstones, mudstones and coal seams. The miners and quarrymen gave the different sandstone beds various names, such as Woodhead Hill Rock, Milnrow Sandstone, Ridge Stone, Kerridge Stone and Old Lawrence Rock, and used them as marker horizons between the coal seams. However, these different sandstones are virtually indistinguishable when *ex situ* and so are regarded here as Coal Measures Sandstones for convenience.

The sandstones were used locally as building and walling stones, mainly in the Macclesfield and Bollington areas. One example is the entrance lodge to King's School in Cumberland Street, Macclesfield, where the sandstones were used for the chimney stacks, quoins, window lintels and decoration in an otherwise brick-built structure. Another is the row of cottages along Bollington Road, Bollington, where the sandstones have been coarsely squared and laid in rough courses.

Figure 6: Cottages along Bollington Road, Bollington. Coal Measures Sandstones.

Figure 7: King's School, Macclesfield. Coal Measures Sandstones.

Warwickshire Group, Salop Formation

Erbistock Beds

The Erbistock Beds (also formerly known as the Erbistock Formation) only occur in two inliers south of Chester. The larger eastern inlier is bounded by Farndon, Coddington, Gateshead and Hatton Heath. Only the tip of the smaller western inlier occurs in Cheshire, just south of Poulton. The rocks comprise reddish-brown or reddish-purple, fine-grained sandstones, with paler mudstones and seatearth. The thickest sandstones occur in the lowest part of the sequence. The Erbistock Beds are relatively soft, when compared to other red sandstones occurring in Cheshire, and weather relatively easily. This fact, combined with their limited distribution, means that they are only employed very locally as occasional rubblestone and walling stone.

Permian

Appleby Group, Collyhurst Sandstone Formation

Collyhurst Sandstone

Collyhurst Sandstone has a very limited outcrop within Cheshire. It is confined to the far north-east corner of the county where the formation occurs in a 3km-long 'triangular sliver', extending from Poynton northwards to Hazel Grove and Stockport (outside the county), where the outcrop is much thicker.

Lithologically, Collyhurst Sandstone is a bright red-brown or orange-brown-coloured sandstone on fresh surfaces, and exhibits a distinctive 'millet seed' texture to the sand grains. The medium-grained sandstone beds typically alternate with layers of fine-grained sharp sand.

Outside of Cheshire, comparable Permian-aged sandstones are important for building purposes. Forms such as Penrith Sandstone (from Cumbria)

are well known. However, within Cheshire, using Collyhurst Sandstone is less common. It weathers relatively easily, and this, combined with its very limited distribution, means it is only used very locally for occasional building purposes.

Triassic

Sherwood Sandstone Group, Kinnerton Sandstone and Wilmslow Sandstone Formations

Lower Mottled and Upper Mottled sandstones

As their names imply, these sandstones have a very distinctive appearance. They are generally soft, incoherent, fine to medium-grained, foxy red and reddish-brown-coloured sandstones, which are extensively and characteristically mottled with buff and grey patches, blotches and bands.

Although mottled sandstones have an extensive outcrop within Cheshire, the normal facies are readily weathered into characteristic wind-blown holes, hollows and caves. They are too soft and easily eroded to be used as a building stone. Occasionally, these sandstones may be affected by barite mineralisation, indicated by abundant pale buff rosettes of barite crystals. They are then grey or greyish-brown in colour and become harder and resistant. These mineralised sandstones are used locally for building purposes near Overton, Malpas, and along the scarps of the mid-Cheshire ridge. The mottled sandstones provide valuable marker formations as they are very distinctive and lie adjacent to other harder red sandstones. The latter are important sources of building stone in Cheshire.

Sherwood Sandstone Group, Chester Pebble Beds Formation

Pebble Beds (Bunter Pebble Beds)

The Chester Pebble Beds form an extensive surface outcrop through Cheshire. A main central swathe extends from the south (Castletown, Shocklach Hall, Holt and Farndon areas) through the Chester district, including east Chester, Waverton, Tattenhall and Tarvin. The formation is largely obscured by drift northwards towards the River Mersey, Ellesmere Port and Elton. It crops out immediately north of Macclesfield and then extends to the north-east corner of the county as a north to south trending belt, running east of Wilmslow and via Tytherington, Bollington and Poynton to Bramhall. The formation also occurs in south-eastern parts of Cheshire, mainly as small, fault-bounded exposures near Kidsgrove, and between Scholar Green and Astbury.

The typical lithology is reddish-brown, medium to coarse-grained, cross-bedded sandstones, incorporating rounded quartzitic pebbles. These may vary in size, but rarely exceed 8cm in diameter. Sandstone beds with few or no pebbles also occur and ‘millet seed’ sand grains are common in the

coarser, more mica-free sandstone beds. Particularly conglomeratic horizons occur towards the lower parts of the sequence east of Chester.

The only other red Triassic conglomeratic or pebbly sandstones that were widely used as building stones in Cheshire occur within the Delamere Member of the Helsby Sandstone Formation. These sandstones typically contain smaller pebbles (up to 2.5cm in diameter) than the usual Chester Pebble Beds. However, it is important to note that non-pebbly sandstones occur in both these different formations and they may be virtually indistinguishable from each other when *ex situ*.

The harder sandstones, pebbly sandstones and conglomerates of the Chester Pebble Beds Formation were formerly well used as a valued building stone along the outcrop. This is borne out by the numerous old quarries. However, little, if any, of this material is currently worked. A large number of the villages located in the outcrop area are situated on hills formed by the Pebble Beds. In many of them, the church and other principal buildings were constructed using well-cemented Pebble Bed Sandstones (with or without scattered pebbles), obtained from quarries in the immediate neighbourhood. Examples include Eccleston, Christleton, Waverton, Saighton, Handley (Handley Stone), Tattenhall and Tarvin. A number of old buildings in Chester itself were also constructed with stone from the local Pebble Beds, including Chester Cathedral. Representative examples of the use of Pebble Bed Sandstones can be found in Farndon. These include St Chad's Church and roadside retaining walls on the east side of Churton Road, which is constructed from roughly dressed pebbly sandstone blocks.

Figure 8: St Chad's Church, Farndon. Pebble Beds Sandstones.

Sherwood Sandstone Group, Helsby Sandstone Formation

Passage Beds (Basement Beds)

Above the Wilmslow Sandstone Formation (Upper Mottled Sandstone) and below the Delamere Sandstone (Keuper Sandstone Conglomerate), occasionally there is a series of hard brown, flaggy, interbedded, coarse-grained sandstones and reddish 'millet seed' sandstones. These share characteristics of both the underlying and overlying strata and have, therefore, been termed the Passage Beds/Basement Beds. Usually, these beds are absent, and the Delamere Sandstone rests with an unconformable base upon the Wilmslow Sandstone Formation.

A classic example of the exposure and use of the Passage Beds is provided by Beeston Castle, which sits on a prominent outlier formed by resistant Passage Beds overlying softer Upper Mottled Sandstones. The castle itself is constructed largely from locally sourced, crudely coursed and snecked sandstones belonging to the Passage Beds and Delamere Sandstone Member. Quarrying for building stone was carried out within the castle grounds in the 18th century, and the gatehouse leading into the outer bailey was demolished to build an access track for the removal of stones from the site.

Figure 9: Beeston Castle, Beeston. Sandstones from the Passage Beds and Delamere Sandstone Member.

Delamere Sandstone (Keiper Sandstone Conglomerate, Peckforton Sandstone)

The Delamere Sandstone crops out in a narrow north-east to south-west trending belt, extending from south Cheshire near Threapwood. It forms the resistant cap rock of the scarps around Broxton, Clutton, Bulkeley and Duckington, extending to the Burwardsley and Peckforton Hills areas. A series of north-west to south-east fault-bounded exposures of the sandstone also occurs immediately east of Alderley Edge, near Mottram St Andrew.

Lithologically, the Delamere Sandstone comprises coarse-grained, dark reddish-brown, red-orange, pale yellow to grey sandstones, gritstones and pebbly sandstones. These contain well-rounded, hard, pale grey or dark purple quartzitic pebbles similar to, but usually smaller than (up to 2.5cm), the pebbles of the Chester Pebble Beds. The rock is generally well cemented and resistant, the harder sandstones and pebbly sandstones making good building stones that are much used all along the outcrop.

Examples of the sandstone can be seen at Delamere railway station and the Vale Royal Abbey Arms at Oakmere, as well as the former schoolhouse and adjoining schoolmaster's house at Harthill, built of reddish-brown Delamere Sandstone ashlar with a roof of Welsh slate.

In the Peckforton area, Delamere Sandstone is termed 'Peckforton Stone', and it provides a good durable building stone that has been widely used for farm buildings and stone walls. There are numerous old sandstone quarries in Peckforton Hills, and stone from these quarries was used to build Peckforton.

Figure 10: Railway station buildings, Delamere. Delamere Sandstone.

Figure 11: Vale Royal Abbey Arms, Oakmere. Delamere Sandstone.

Figure 12: Former school, Harthill. Delamere Sandstone.

Frodsham Sandstone (Lower Keuper Sandstone)

The Frodsham Sandstone Member differs from the underlying Delamere Sandstone Member in that it is pebble free. It typically consists of red to reddish-orange, grey or buff, soft, predominantly fine-grained, well-sorted sandstones, with spherical to sub-spherical 'millet seed' sand grains in a red argillaceous matrix. It is not appreciably pebbly, but may contain numerous small nodal accretions of harder, barite-cemented material. The Frodsham Sandstone Member is relatively weakly cemented and softer than the underlying Delamere Sandstone Member. It is used locally along the outcrop area. The village of Frodsham provides several good examples of its use. These include St Lawrence's Church, constructed from large, squared and coarsed sandstone blocks, and part of the Ring O' Bells inn, built from squared and roughly coarsed red sandstones. Frodsham Sandstone is easily worked into regular sandstone blocks and can be used as ashlar. Examples include the 18th and 19th-century cottages in the High Street at Tarporley.

Figure 13: St Lawrence's Church, Frodsham. Frodsham Sandstone.

Figure 14: Outbuildings on Bellemonte Road, Frodsham. Frodsham Sandstone.

Figure 15: Outbuildings on Bellemonte Road, Frodsham. Frodsham Sandstone.

Helsby Sandstone (Maley Stone, Runcorn Red)

Along with the Chester Pebble Beds, Helsby Sandstone is one of the most important and widespread Triassic red-coloured sandstones used as a building stone in Cheshire. This formation covers an extensive area in the county and it forms much of the high ground of the Mid Cheshire Ridge, although the outcrop is faulted and discontinuous. There are three main areas of outcrop: the Helsby-Manley outlier, escarpments and hilly ground between Rileybank and Rangeway Bank farms, and narrow outcrops near Kelsall. A large outcrop lies around Delamere, Willington, Quarry Bank and Cotebrook. In the south, Beeston Castle surmounts a small inlier of Helsby Sandstone (the Passage Beds) and is detached from another major outcrop that forms Peckforton Hills, with a faulted appendage between Burwardsley and Bolesworth Castle. In south Cheshire, the beds occur in a north-east to south-west trending narrow belt between Threapwood and Broxton. In north Cheshire, the strata are intermittently exposed from Frodsham to Runcorn to south Warrington but are heavily concealed beneath boulder clay and Quaternary drift.

Further east in the county, the Helsby Sandstone crops out north-east of High Legh, around Wilmslow, and between Alderley Edge and Prestbury, extending south to west Macclesfield. A small exposure is also present south of Alsager.

The lower part of the Helsby Sandstone Formation (Delamere Sandstone Member) consists of fairly well cemented, reddish-brown, locally grey or buff, mainly coarse-grained, cross-bedded sandstones with much clay-gall conglomerate, especially in the lower parts of each major unit. Interbedded, dark red, micaceous, shaly mudstones and siltstones also occur. The upper part of the formation (Frodsham Sandstone Member) comprises relatively soft, finer grained, very highly cross-bedded, red-brown, buff or grey sandstones, with few pebble horizons.

Figure 16: St Paul's Church, Helsby. Helsby Sandstone.

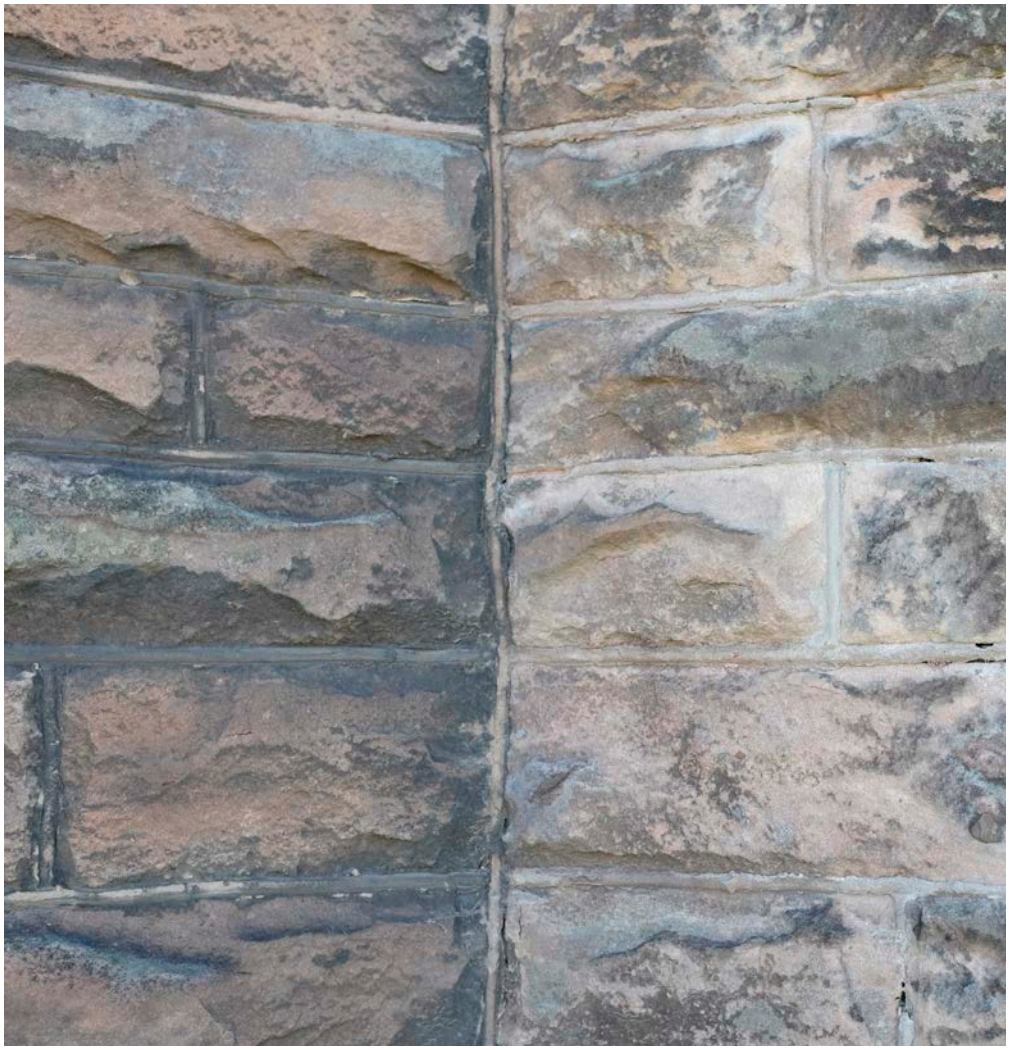


Figure 17: St Paul's Church, Helsby. Helsby Sandstone.

Some of the most important source quarries for Helsby Sandstone were at Helsby, Simmond's Hill, Delamere, Kelsall, Peckforton and Manley. At Manley Quarry, the local variant of the Helsby Sandstone Formation (Manley Stone) is a coarse-grained, sharp sandstone, containing rolled lumps of green shale and small quartzite pebbles. It was used in the construction of Grosvenor Bridge and Chester Castle. Other famous landmarks in Chester were also built from Helsby Sandstone.

Chester's city walls and the Eastgate archway were mainly constructed of Helsby Sandstone. A significant proportion of the stone used in Chester Cathedral (and the abbey buildings adjoining it) was obtained from old quarries in the vicinity of Northgate Street and Windmill Lane. By the 19th century, the Pebble Bed red sandstone was badly weathered. It was restored with subdued brownish-red sandstones, occasionally mottled with white, from the Helsby Sandstone Formation. Formerly, there were also Helsby Sandstone quarries around Beacon Hill near Runcorn. These sandstones, locally called 'Runcorn Red' were widely used in Cheshire: for example, at Runcorn town hall and the old police station, and also restoration works at Chester Cathedral and the city walls. They were transported via the River Mersey and several canals, including the Bridgewater and Ship canals.

Figure 18: Chester Cathedral, Chester. Helsby Sandstone.

Figure 19: Eastgate, Eastgate Street, Chester. Helsby Sandstone.

Mercia Mudstone Group, Tarporley Siltstone Formation

Tarporley Siltstone and Keuper Waterstones (Mercia Mudstones)

The Tarporley Siltstone often occurs as a series of partially fault-bounded outcrops throughout Cheshire. In the western part of the county, it crops out between Chester and Northwich, mainly centred on Alvanley, western Delamere Forest, Willington and Tarporley. Further east, the formation occurs as thin fault-bounded linear exposures around Monks Heath and Henbury. In north Cheshire, it crops out as small exposures south of the River Mersey, around Frodsham and east Runcorn, although these are partly concealed beneath glacial boulder clay. In north-east Cheshire, the Tarporley Siltstone crops out as small scattered exposures around Bollington and Mobberley, and also as north to south trending linear outcrops around Alderley Edge and Wilmslow. In south Cheshire, the outcrop area occurs around Malpas, between Newton and Hampton. Here, the distinct bright red sandstones are referred to as Malpas Sandstone.

The formation is heterolithic, comprising interlaminated and interbedded siltstones, mudstones and sandstones in approximately equal proportions. The sandstones are mostly grey-brown (paler than the siltstones and mudstones), very fine to fine grained, well sorted and micaceous. Sandstone beds are commonly less than 0.5m thick, although composite units, consisting of several individual sandstone beds, may reach over 5m thick. Flaggy units also occur. Intraformational mudclast conglomerates are common, with mudclasts concentrated at the bases of sandstone beds. Tarporley Siltstone was used as a general building stone along much of its outcrop length. The flaggy sandstones, in particular, were commonly employed for hearth stones, doorsteps and window sills. Noted quarries formerly occurred on Kidnall Hill, Luddington Hill and near Tarporley itself.

Above the Tarporley Siltstone Formation lies a very thick sequence of reddish marls and mudstones, called Keuper Marls (or Mercia Mudstones), containing several saliferous (halite) beds. These belong to a number of different formations, and in turn are overlain by black shales and grey or green calcareous mudstones assigned to the Late Triassic period Penarth Group.

Malpas Sandstone

The Malpas Sandstone is a locally developed sandstone-rich facies of the Tarporley Siltstone Formation. It occurs in the upper part of the formation in south Cheshire, mainly around the Malpas area.

The Malpas Sandstone comprises very distinctive, massive, bright red-coloured, fine to medium-grained sandstones, containing abundant ‘millet seed’ sand grains. Some beds also exhibit grey to fawn blotches and bands. Subordinate bands of red-brown to brownish, fine-grained, micaceous and laminated sandstones, coarse siltstones and occasional mudstones also occur. These resemble lithologies of the parent Tarporley Siltstone

Formation. The upper Malpas Sandstone beds (which lie directly beneath the Mercia Mudstones) characteristically contain abundant pale grey barite crystals, which show prominently on weathered surfaces. Like many of the other Triassic red sandstones in Cheshire, the Malpas Sandstone exhibits low angle cross-bedding.

Malpas Sandstone is not particularly hard and durable, often weathering with a distinctive 'cavernous' structure. Nevertheless, it is used extensively as a building stone within the outcrop area, notably within the town of Malpas itself. Here, a number of significant buildings are built substantially from this stone, or use it for footings or a plinth base.

Examples include the Church of St Oswald, which is constructed from locally sourced red sandstone ashlar (both Tarporley Siltstone and Malpas Sandstone), and a roadside wall in Church Street, the basal layers of which show the distinctive, intensely red-coloured, cross-bedding sandstones so characteristic of the Malpas Sandstone facies.

A number of old sandstone quarries formerly existed in the Malpas area, including those on the south-west side of Oat Hill and opposite St Joseph's College, Malpas.

Figure 20: St Oswald's Church, Malpas. Taporley Siltstone and Malpas Sandstone.

Jurassic

Lias Group, Blue Lias Formation

Blue Lias Limestone

In Cheshire, the only outcrop of Jurassic aged sediments is confined to a small semicircular outcrop (up to 5km wide) along the southern edge of the county around Dodcott, Wilkesley and Coxbank, extending to just south of St Audlem. The strata consist of thin (up to 15cm thick) grey limestone beds, varying from earthy to porcellaneous, set within a predominantly well-

bedded mudstone sequence. The limestone beds vary from regular tabular limestones to being laminated and irregular, with uneven, deeply undulating surfaces jointed with calcite veining.

Because of its limited distribution, and the dominance of mudstone facies over limestones facies within the Cheshire sequence, the Blue Lias Formation is only used as an occasional, very localised, rough rubblestone and walling stone.

3 Further Reading

The Further Reading, Online Resources and Contacts guide provides general references on:

- Geology, building stones and mineral planning
- Historic building conservation, architecture and landscape.

There is also a separate glossary of geological terms.

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Figures

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