

STRATEGIC STONE STUDY

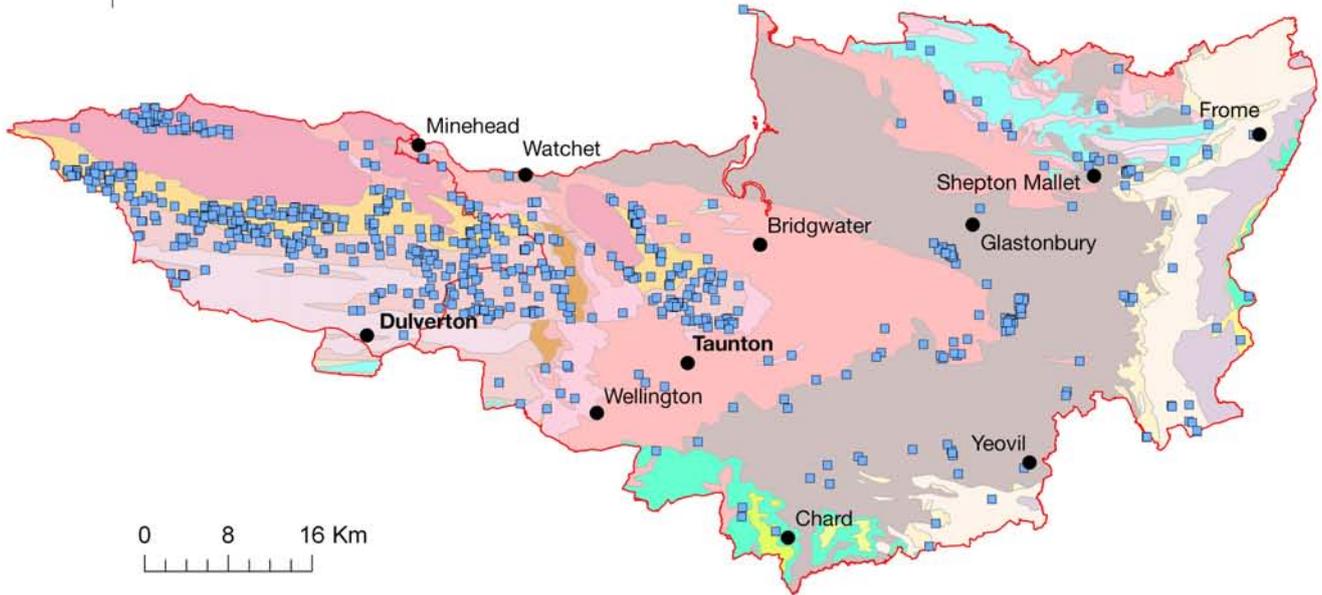
A Building Stone Atlas of
SOMERSET & EXMOOR

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ENGLISH HERITAGE

Somerset & Exmoor Bedrock Geology



Somerset Bedrock Geology

■ Building Stone Sources

Dykes

■ MAFIC IGNEOUS-ROCK

Bedrock Geology

- WHITE CHALK SUBGROUP - CHALK
- GREY CHALK SUBGROUP - CHALK
- GAULT FORMATION AND UPPER GREENSAND FORMATION - MUDSTONE, SANDSTONE AND LIMESTONE
- CORALLIAN GROUP - LIMESTONE, SANDSTONE, SILTSTONE AND MUDSTONE
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- GREAT OOLITE GROUP - SANDSTONE, LIMESTONE AND ARGILLACEOUS ROCKS
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- PENNINE MIDDLE COAL MEASURES FORMATION AND SOUTH WALES MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE, SANDSTONE, COAL, IRONSTONE AND FERRICRETE
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- UNNAMED EXTRUSIVE ROCKS, SILURIAN - MAFIC LAVA AND MAFIC TUFF

Click on this link to visit Somerset's geology and their contribution to known building stones, stone structures and building stone quarries (Opens in new window . <http://maps.bgs.ac.uk/buildingstone?County=Somerset>)

INTRODUCTION

Geologically speaking, Somerset and Exmoor is an extremely diverse area, with rocks varying in age from the Silurian Period (425 million years old). Virtually all the rocks are **SEDIMENTARY METAMORPHIC** in origin, with only a few localised occurrences of **INTRUSIVE** or volcanic rocks, this provides a considerable variety of building stones ranging from extremely hard, highly resistant **SILICEOUS FLINTS, CHERTS AND QUARTZITIC SANDSTONES**, to softer, sandy **LIMESTONES**, and fissile **SLATES** useful for roofing and walling. In general terms the geology and occurrence of Somerset and Exmoor's main building stones can conveniently be considered in four groups:

- To the west of the area lie the rolling hills of Exmoor; the Brendons and the Quantocks. These are mainly formed of purple-red Devonian sandstones;
- The northern edge of the county is marked by the dissected ridge of the Mendip Hills, formed from grey and reddened Lower Carboniferous limestones;
- To the south, bordering on Devon and Dorset, lie the Blackdown Hills, formed of **CRETACEOUS GLAUCONITIC** sandstones with chert and **CHALK** with flints; and
- Between these 'upland' areas are the lower-lying vales of Taunton Deane, the Somerset Levels and south Somerset. The rocks here range from reddish Permo-Triassic sandstones, **BRECCIAS** and **CONGLOMERATES** in the west, through a central belt of Lower Jurassic (Lias Group) blue-grey and creamy limestones, over to the east and southeast borders of the county where Middle Jurassic pale yellow and grey limestones (Inferior **OOLITE** and Great Oolite groups) occur.

Quarrying for building stones has occurred in Somerset since at least Roman times, and traces of this activity can still be seen in the Mendip Hills. Today the Mendip area still contains very large, active limestone quarries although the stone is extracted mainly for aggregate rather than building purposes. However, the current need for local stone for either conservation repair or to maintain traditional character in new buildings seems to be increasing, although the number of pits and quarries now available for these stones is only a fraction of those worked in former times.

DEVONIAN

Hangman Sandstone Formation

Hangman Sandstone

Geologically the oldest, widely used building stones within northern Exmoor and west Somerset are the purplish-red and green sandstones of the Hangman Sandstone Formation. These rocks also form much of the dramatic cliff scenery between Combe Martin Bay and Minehead. The formation consists of a variety of rock types ranging from **SILTSTONES** and sandstones to fine pebble conglomerates, and historically **LITHOLOGICAL** differences and geographical occurrence have been used to subdivide the very thick sequence of rocks; this has resulted in a multitude of different local names being applied to the rock units most widely used. For building purposes, the stone comprises hard, quartzitic sandstones which are typically homogeneous and difficult to dress.

There is an abundant supply of weathered rubbly surface stone from this formation across much of the outcrop area; many of the farm and village buildings within Exmoor National Park use Hangman Sandstone for walling and rubblework. Occasionally it is used as **ASHLAR**, as in Victorian and Edwardian houses in Minehead. Within the Quantock Hills, especially north of a line stretching from Triscombe to Holford, these sandstones are used for a range of building purposes and numerous, small derelict quarries remain. Some such as those in Halsway Combe, were probably opened primarily for the purpose of providing stone for construction of the local **Halsway Manor House** (image below) dating from the 15C. The older east wing (right) is built mainly of sandstones (Hangman Sandstone Formation), probably from nearby quarries in Halsway Combe; the western (left) end was added in the 19C and uses mainly Otter Sandstone



Ilfracombe Slate Formation

Ilfracombe Slate

Overlying the Hangman Sandstone Formation and occupying a similar extensive **OUTCROP** pattern across Exmoor; and the Brendon and Quantock Hills, is the Ilfracombe Slate Formation. Typically this formation comprises greyish or brownish cleaved slates with thin siltstone or fine grained sandstone units, which contrast with the massive sandstone units of the underlying Hangman Sandstone Formation. Harder sandstones within this formation were dug throughout the outcrop from Kentisbury to Holford, and were used locally for buildings and occasionally walling.

At Treborough Quarry, the Ilfracombe Slates were worked for nearly 500 years, and although the wavy cleavage surfaces were too crinkled and folded to produce best quality slates, they were sufficiently durable to be used for roofing, with thicker slabs used for doorsteps, cisterns and flooring. The quarry was certainly in use in 1426 when slates were purchased for Dunster Castle, and remained active until the 1900s. A period of intermittent working between the World Wars followed, and the quarry finally closed in 1938. Within the Ilfracombe Slate Formation are relatively thin sandstone horizons, which have been used locally to source building stone. The clock tower at Nether Stowey was constructed in 1897 (and re-conditioned in 1969) from a mixture of dressed sandstone blocks from the Ilfracombe Slate and Hangman Sandstone formations, with some Otter Sandstone. The **QUOINS** and **TRACERY** are mainly of Doulling Stone.

Cockercombe Tuff

The very distinctive Cockercombe Tuff is a fine-grained, grey-green volcanic lithic tuff, confined to a small outcrop area in the northern Quantock Hills around Cockercombe, Keepers Coombe and Plainsfield. It was mainly used for local ashlar and rubblestone, notably for the construction of Quantock Lodge and Plainsfield Gatehouse.

Slightly higher within the formation are a series of thin limestone horizons which can be traced as a line of small quarries stretching from Exmoor through the Brendon Hills onto the central Quantock Hills.



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At least five different limestone units – named the Rodhuish, Roadwater, Aisholt, Holwell and Leigh Barton limestones, are recognised. In the field, the presence of **INTERBEDDED** siltstones or sandstones is often a clue to distinguishing which limestone unit is which, although lithologically they are all quite similar and comprise grey or pinkish grey, re-crystallised, **BIOCLASTIC** limestones, often containing fossil corals. These limestones were formerly extensively worked all along the outcrop strip for the production of lime and the local rough walling stone used in farms and villages. Assigning individual limestone blocks or hand specimens to specific units is very difficult.

Plainsfield Gatehouse (top right image) on the Quantock Hills, built mainly of grey/green Cockercombe Tuff with dressings of Bath Stone and sandstone (Otter Sandstone Formation), within the archway interior.

Morte Slate Formation

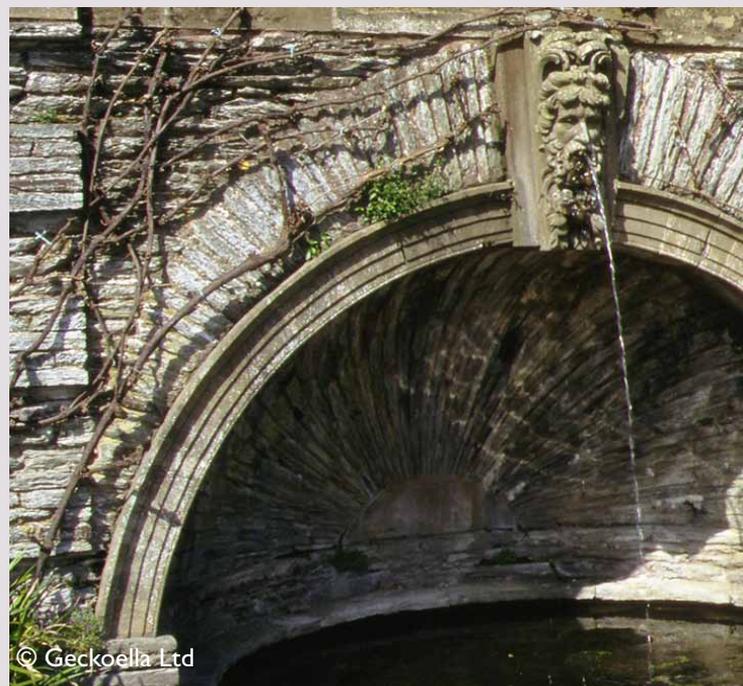
Morte Slate

The Morte Slate Formation overlies the Ilfracome Slates and crops out across the southern parts of Exmoor and the Brendon and Quantock Hills. The formation comprises a thick, rather monotonous sequence of silvery green thickly cleaved slates, interbedded with occasional fine-grained sandstones. The silver surface lustre of the slates is often apparent, and is a useful distinguishing character. Where interbedding with sandstones, this has prevented the development of closely spaced cleavage, the formation has provided rough building and walling stone, and numerous local, small-scale quarries existed along the outcrop where this poorer-quality stone was dug on site to avoid transport costs. Villages and houses built of these slates are an important element in the landscape character of the southern Quantocks and they were widely quarried in this area, notably at West Monkton and King's Cliff near North Petherton.

The Morte Slates used for building around Wiveliscombe generally lack sandstone bands and exhibit regular planar cleavage. It is probable that this variety of slate comes from Oakhampton Quarry which produced the best quality roofing slates along with a range of slabs, sills and flooring.



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In 1754 nearly one thousand loads of stone were sent from Hestercombe to build Taunton Gaol. Hestercombe Gardens, just north of Taunton, remains one of the best places to see the use of Morte Slates as a building stone. The garden (designed by Sir Edwin Lutyens) used Morte Slates (and Lower Jurassic Ham Hill Stone) in his inspired design for the garden which includes stone columns, paving, walling, water channels and a Rotunda Pool. The Rotunda Pool (above image) comprises Morte Slate Formation surrounds and paving **SETTS**, with Ham Hill Stone dressings.

Pickwell Down Sandstone Formation

Pickwell Down Sandstone

The Pickwell Down Sandstone Formation represents the youngest of the four main Devonian rock types occurring across Exmoor and the Brendon hills, and crops out in a west-east trending belt through Dulverton to Wiveliscombe. These sandstones resemble some rocks in the older Hangman Sandstone and Ilfracombe Slate formations, but can often be distinguished by their characteristic red to purple colour. A persistent band of massive hard volcanic tuff marks the base of the formation. The formation has been extensively worked for use as a local building stone, providing colourful ragstone walling and some ashlar, as at Dulverton. Pickwell Down Sandstone can be seen in walls along the approach road to Wimbleball Reservoir, in particular the basal tuff layer has been used as a local walling stone.

Portishead Formation

Within the core of the Mendip Hills, and exposed in a series of eroded, large-scale folds surrounded by Carboniferous limestones, is the Portishead Formation. The outcrop of these dominantly feldspathic and quartzitic sandstones stretches from Black Down (just north of Cheddar) eastwards to Beacon Hill (north of Shepton Mallet). Some pebbly sandstones and sandy quartz conglomerates occur in the lower part. The upper sandstones are often greyish in colour; giving way in lower parts of the succession to the typical red and purple colouration due mainly to the presence of the iron mineral **HAEMATITE**. The Portishead Formation sandstones have a limited outcrop and are mainly used locally for dry stone field walls.

LOWER CARBONIFEROUS

Small outcrops of the Doddiscombe and Westleigh Limestone formations occur in the far south west corner of Somerset, west of Wellington.

Doddiscombe Limestone Formation

This formation crops out around Appley and Tracebridge, where there are many abandoned slate quarries. However, the main outcrop of these black, hard slates and cherty mudstones lies within Devon. The rocks are used locally for roofing slates and walling.

Westleigh Limestone Formation

Similarly, the main quarrying area for the finest of the Westleigh Limestone Formation used in Somerset was at Westleigh and Holcombe Rogus just over the Devon border. These limestones are typically greyish and uniformly well-bedded, although their rather sombre appearance is made much more interesting by the presence of interbedded bands, nodules or elongated lenses of very hard black chert. The limestones are very resistant and used locally as ashlar and rubblestone walling, especially around the source quarries near Burlescombe on the Somerset – Devon border. However, Westleigh limestone is also frequently encountered in public buildings in the Vale of Taunton Deane, including Taunton Municipal Hall.

It was also the favoured choice for foundation and building stones for railway stations within the area following the opening of the Great Western Railway. The Municipal Hall (image below), the former Old Grammar School, c. 1520, is built mainly of Devonian Morte Slates with Ham Hill Stone windows, dressings and **BUTTRESSES**. The front wall comprises rather sombre, grey Lower Carboniferous Westleigh Limestone with dark chert bands



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Other Lower Carboniferous limestones

Lower Carboniferous limestones represent one of the most extensively quarried stones within Somerset, and large amounts (nearly 12M tonnes) are extracted annually from quarries, especially in eastern Mendip. However, this stone is primarily crushed and used as aggregate and roadstone, and today it is difficult to obtain dressed Lower Carboniferous limestone blocks for building purposes. The limestones have a large outcrop area right across the Mendip Hill ridge, extending from Brean Down to the east Mendips near Frome and Shepton Mallet; a continuous limestone belt with extensive quarries occurs around Merehead, Cloford, Whatley, Holwell, Mells and Vallis Vale. A small inlier of Lower Carboniferous limestone is also present at Cannington Park, near Bridgwater. The 19C Cannington Cemetery Gate is constructed of roughly squared Lower Carboniferous limestone sourced from nearby Cannington Park Quarry. Quoins and ornament are of Douling Stone and red Otter Sandstone, the detailed tracery is carved Bath Stone (right image).

A complex, varied group of different limestone types are included within the term 'Lower Carboniferous limestones' - and the various rock types have been given different local names along the outcrop. Examples include Holwell Limestone, Cheddar Limestone and Vallis Limestone. Many of the limestones are highly **FOSSILIFEROUS**, notably for brachiopod shells and corals, which can also be helpful in distinguishing the different lithologies. A summary of the main rock types of Lower Carboniferous limestones is given in Table 1 below.

Limestone name	Description
Hotwells Limestone	Massive, grey, crinoidal and oolitic, bioclastic fine-grained limestones
Clifton Down Limestone	Includes dark grey to black, granular limestones (eg. Cheddar Limestone); fine- to very fine-grained limestones ('chinastone limestones') with calcareous mudstones, white oolitic limestones (eg. Cheddar Oolite) and dark, splintery limestones
Vallis Limestone	Pale-grey, coarse crinoidal facies variant of the Burrington Oolite
Burrington Oolite	Massive, light grey oolitic and crinoidal limestones, often with well-marked dolomitic bands
Black Rock Limestone	Dark grey to black, fine-grained limestones with abundant crinoidal debris, bedding varies from thin to massive, shaly partings occur in the lower and middle parts of the sequence, along with two characteristic cherty horizons



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UPPER CARBONIFEROUS *Pennant Sandstone Formation*

A small outcrop of Pennant Sandstone is present within the north-east Somerset area along the fringes of the former Somerset coalfield. The succession is represented by grey to pinkish grey, cross-bedded, lithic sandstones with minor beds of sandy shales, mudstones and thin coal seams. The sandstones are used locally for rubblestone walling, mainly in and around the Coalfield to Mells area of eastern Mendip. The largest former quarries for the Pennant sandstones were at Temple Cloud now within Bath and Northeast Somerset, the Unitary Authority area.

PERMO-TRIASSIC **Hestercombe Diorite**

Associated with the Morte Slates at Hestercombe, and confined to this one small area, is the rather unusual, reddish-brown Hestercombe Diorite. This **IGNEOUS** rock has a speckled appearance caused by the interlocking coarse crystals of two minerals: the pale feldspar oligoclase and dark, fibrous greenish chlorite. It is younger than the Morte Slates (probably of Permian age, about 260 million year old) and formed as a magma injected into the Devonian slates. The diorite was quarried within the combe at Hestercombe and is used very locally for ashlar and rubblestone, as in the walls of Hestercombe House and Bampfylde Hall. Within the Vale of Taunton Deane, a number of Permo-Triassic formations are represented by reddish-brown conglomerates, breccias and sandstones.

Although the main conglomerate - or breccia-dominated formations may often be readily distinguishable by the size and form of their pebble or cobble clasts, they also frequently contain relatively 'finer-grained' units of pebbly sandstone. Confusingly, the sandstone dominated formations may also contain relatively 'coarser-grained' pebbly sandstone beds. Consequently, it may be extremely difficult to confidently assign individual blocks of Permo-Triassic pebbly - or coarse-grained sandstone to a specific formation, although the location and known outcrop extent of the various formations involved can assist in determining their provenance.

Wiveliscombe Sandstones

The Wiveliscombe Sandstones outcrop mainly in an approximately north-south trending zone stretching from Stogumber through Wiveliscombe to Bathealton. They usually comprise red to reddish-brown (occasionally buff or yellowish) thinly-bedded to massive sandstones. The better quality, harder building stones are obtained from the sandstone beds which have a **CALCAREOUS CEMENT**; sandstones which are poorly-cemented tend to be relatively soft, friable and easily eroded. The harder sandstones are cut into ashlar or square stones, and used locally as building stone in Stogumber (eg. the former brewery) and villages around Langley and Wiveliscombe. *The 19C Williton Police Station is built mainly of local red Triassic sandstones (including Otter and Wiveliscombe sandstones) with some older, Devonian Hangman Sandstones (below image).*

Aylesbeare Mudstone Group

VEXFORD BRECCIAS.

Running in a north-south trending outcrop pattern immediately east of the Wiveliscombe Sandstones, are the Vexford Breccias. These purple and red-brown breccias typically contain subangular to angular clasts of sandstone, slate and quartz, with some rounded fragments of Carboniferous limestone or 'Culm' chert. In the field the strongly cemented Vexford Breccias often form prominent scarps, especially where they overlie the relatively soft-weathering sandy facies of the Wiveliscombe Sandstones. The Vexford Breccias have been used locally as a general building stone in farm walls and out-buildings, but the former quarries that supplied these rocks are long disused.

Luccombe Breccia Formation

The Luccombe Breccia Formation is confined to the Porlock area of north west Somerset and consists of reddish-brown, well-cemented sandy breccias with medium to large sized clasts, typically of platy, dark slates and mudstones but lacking limestones. The formation is often very calcareous, with abundant calcite-veining in places. The formation gives rise to a distinctive topography of small, steep-sided knolls; the well defined ridge from Copperclose Wood to near Luccombe is formed by the 'Luccombe Boulder Bed', a particularly coarse conglomeratic unit containing cobbles and boulders up to 50cm in diameter. The breccias are locally used for all kinds of building.



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Sherwood Sandstone Group

Budleigh Salterton Pebble Beds Formation

The Budleigh Salterton Pebble Beds Formation comprises various red conglomerates, breccias and pebbly sandstones containing small pebble to cobble sized clasts composed of rock types derived from the underlying folded Devonian and Lower Carboniferous limestone sequences. Both rounded and angular clasts are present, in some cases in the same bed; limestone clasts are usually well rounded and in some places they are abundant enough to have been collected for lime burning.

Draycott Marble

Draycott Marble is not a true marble (a type of **METAMORPHOSED** limestone) but is a dolomitic conglomerate that formed during the Permo-Triassic in eroded gorges along the flanks of the Mendip Hills. It was mainly quarried on the southern flanks of Mendip Hills between Shipham and Wells. The lithology is a very distinctive comprising a clast-supported breccia or conglomerate composed of grey angular to subangular fragments of Carboniferous Limestone set in a reddish-brown matrix; the overall effect is to give the stone a marble-like texture with an attractive pinkish or pinkish-grey hue. Draycott Marble could be worked readily into long pieces and was used as lintels, chimney pieces, gateposts, paving stones and rubblestone walling in numerous villages and towns on the south of the Mendip Hills.

Otter Sandstone Formation

Otter Sandstone, Lydeard Stone

This formation is widely used for all parts and all kinds of buildings in the Vale of Taunton Deane. Red, or pink and fawn mottled, even-grained sandstones are characteristic and are used in many buildings throughout the Vale of Taunton Deane, but especially from Bishops Lydeard and Cotford St. Luke northwards to Williton and Minehead. The best quality, most uniform stone is used for quoins and dressings; poorer quality stone is used as **RUBBLE** for the walls of buildings; the softer blocks of sandstone tend to show rounded edges and corners. *The almshouses in Bishops Lydeard (above image) date from 1616, and are built almost entirely from local reddish, cross-bedded Otter Sandstones.*



Mercia Mudstone Group

Arden Sandstone Formation

North Curry Sandstone

The North Curry Sandstone is one of the lesser known building stones in Somerset but is none-the-less important. It occurs on the rising ground between Curry Moor and West Sedgemoor on the Somerset Levels and in the Vale of Taunton Deane. North Curry Sandstone is a distinctive grey-green, coarse siltstone or fine sandstone, often with small scale, cross-bedding structures. Beds rich in calcareous siltstone tend to be weathered out. The stone, although thin bedded, offered good quality building blocks of variable size. Very large slabs appear to have been much in demand from medieval times for the quoins and dressings of churches and other high status buildings in and around Taunton. The main C19 building of Queen's College is built of North Curry Sandstone ashlar. East of Taunton, the North Curry Sandstone is more widely used for walling in all kinds of buildings in conjunction with Blue Lias limestone.

Penarth Group

Westbury Formation

Wedmore Stone

Wedmore Stone is confined to the higher ridge around Wedmore and adjoining villages. It is a hard bioclastic or shelly (i.e. whole shells rather than comminuted fragments) limestone, pale grey on fresh surfaces, but weathering to a honey-brown colour which gives a warm glow to the streets of Wedmore in the sunlight. The limestones usually occur in tabular beds, around 10cm thick, which in cross-section show current orientated thin bivalve shells. A variant occurs around the aptly named village of Sand, where the limestone passes into sand and cemented sandstone, which tends to be friable and may show signs of 'honeycombe weathering' effects. Wedmore Stone is widely used in the local area in buildings and walls.

Lilstock Formation

LANGPORT MEMBER

White Lias

The uppermost Triassic limestone, traditionally called the White Lias, is a whitish to pale grey, very fine grained (porcellaneous) to granular limestone which occurs below the Lower Jurassic Blue Lias succession. Some layers are tabular and uniform, with flat to undulatory upper and lower surfaces; other beds exhibit fine parallel lamination, often more discernible on weathered blocks. It generally lacks obvious fossils. The White Lias was formerly exposed in the base of many Blue Lias quarries on the escarpment on the south of the Vale of Taunton Deane and the Somerset Levels. Historically the main centre of production was around Curry Rivel and Langport; currently the stone is only worked at Bowdens Quarry, near Langport. Although the fine-grained limestones are very hard, the White Lias does not generally lend itself to building in courses like the well-bedded Blue Lias. In many cases it is laid as random rubble with a 'crazy-paving' effect, occasionally it is used as ashlar. White Lias was favoured by Victorian builders, and used for decorative **POLYCHROME** effect in combination with Blue Lias limestone in some buildings.

LOWER JURASSIC Lias Group

Blue Lias Formation

Blue Lias Limestones

Blue Lias Formation limestones are possibly the most widely used building stones in Somerset, and fresh surfaces of the limestone live up to its name, being a characteristic steely grey-blue colour. However, it oxidises to a rather drab, pale grey and eventually weathers to a yellow-brown colour on exposed surfaces, and especially along joints. This typically gives rise to 'blue-hearted' forms of the stone in buildings and walls, which exhibit fresh blue-grey centres and a yellow-brown oxidised 'outer skin' to individual blocks. Some buildings display weathered and unweathered faces of Blue Lias limestone side by side to produce a patchwork effect. At the outcrop, the limestone beds are tabular (10-30 cm thick), closely packed but separated by thin layers of fissile mudstone, with planar top and bottom surfaces and regularly jointed.



This makes the beds ready for use with a minimum of cutting and trimming. Although the more even-grained, crystalline beds produce good building stones, Blue Lias limestones can be subject to frost splitting, and weathered blocks often show the laminated layers 'ex-foliating'. The darker, more organic-rich beds of limestone are prone to decay of the finely disseminated iron sulphide compounds they contain, and this can cause the stone to become friable and crumble. In spite of its defects, there remains considerable demand for Blue Lias limestone for new buildings, extensions and restoration work, especially in conservation areas. Formerly there were many local quarries stretching over the whole outcrop area (from Watchet and Kilve via the Polden Hills to Street, and from the south side of the Vale of Taunton Deane and the Somerset Levels, around Langport, to Somerton and Shepton Mallet) and these supplied many local churches with flooring slabs and walling stones.

Today, active quarries occur around Street and Somerton which produce walling stone, harder polishable stone, flagstones and paving for internal use. Other quarries are worked at Charleton Adam and Keinton Mandeville. Some of the limestones have been worked for a considerable period as mosaic tesserae and stone tiles found on Roman sites in Somerset and can be matched exactly with beds found at Charlton Mackrell. *Kilve Court was constructed in 1702-05 during the reign of Queen Anne, and is built mainly of pale grey and buff weathering Blue Lias limestone, image above.*

A terrace of 18C cottages in the hamlet of East Quantoxhead are constructed in random rubble style of locally sourced red-brown Hangman Sandstones (Devonian) and greyish Blue Lias limestones (below image).

Downside Stone

A particular type of limestone from the Blue Lias, called Downside Stone is present within the Mendip area, the thickest beds occurring around Shepton Mallet. Downside Stone represents a 'littoral facies' (ie. near shore, very shallow water) variety of the Blue Lias. It is a distinctive stone and comprises grey coarse-grained, fossiliferous pebbly limestones, in places becoming conglomeratic. The pebbles consist of limestone, chert and occasionally quartz, derived from the Carboniferous Limestone and Devonian Portishead Beds. The Downside Stone is generally harder and better weathering than the 'normal' Blue Lias limestones; pebbles within the conglomerates tend to weather out producing a 'honeycombed' effect. Downside Stone is used within the Mendip area for walling; the coarse conglomeratic variety being used especially in Wells around Cathedral Green and the Bishops Palace. Unlike the Blue Lias, Downside Stone is no longer quarried.



Beacon Limestone Formation

MARLSTONE ROCK MEMBER

Moolham or Petherton Stone

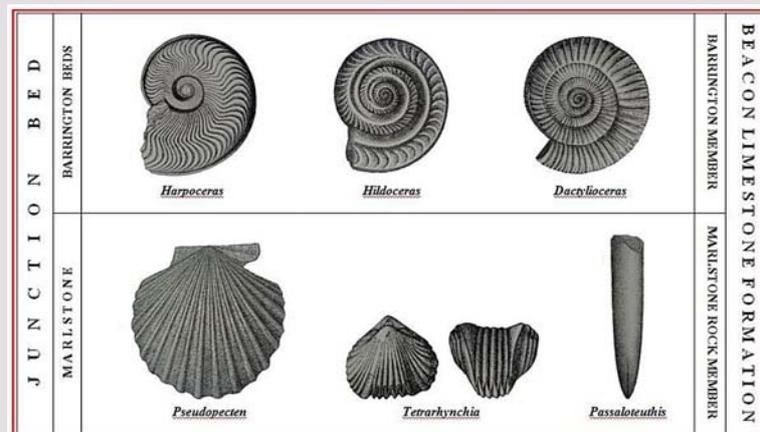
The Marlstone Rock Member (also locally known as 'Moolham' or 'Petherton Stone') is the lower part of Beacon Limestone Formation. This formation was formerly known as the 'Junction Bed', so named as it encloses the 'junction' between the Middle and Upper Lias rocks. Typically, the Marlstone is a dull rusty-brown, ferruginous, limestone, locally iron-shot and ooidal. It is highly fossiliferous, some beds being crowded with belemnites, brachiopods and bivalves. Charles Moore, a famous Victorian geologist, who lived in Ilminster found the iron content of the Marlstone to be around 15%, which was almost, but not quite high enough to make smelting for iron a viable prospect. In 1867 he wrote that had it been otherwise, the "... pretty little town [Ilminster] would have been extended in every direction ... railways would long have contended for its traffic ... the clang of the forge would have resounded, and its hills lit up by the lurid glare of blast furnaces." The Marlstone beds are massive and appear to lack an orientated fabric. It is used as ashlar and rubblestone walling for local buildings, church walls, quoins and buttresses, in a well defined zone extending from Broadway and Horton in the west to Yeovil in the east.

However, the thickest development and main use of Marlstone is in the Ilminster, South Petherton, Shepton Beauchamp and Glastonbury areas, including Barrington Court, north of Ilminster, and in Glastonbury, for example, at Glastonbury Abbey. There are many former Marlstone quarries around Ilminster and at Pennard Hill, but these have all long since closed. [Hill Farm, Shepton Beauchamp](#), like many similar buildings in this village and the South Petherton area. It is constructed of local highly fossiliferous limestone (top right image).

BARRINGTON MEMBER

Upper Lias Limestone or Yeovil Stone

Above the Marlstone, and forming the upper part of the 'Junction Bed' is the Barrington Member (also referred to as Upper Lias limestones or 'Yeovil Stone'). This crops out in a discontinuous belt extending from Ilminster to just north of Yeovil, and sporadically along the south Somerset/Dorset border.



Characteristic fossil found in building stones from the Marlstone and Barrington Beds (above image).

The Barrington Member is closely associated with the underlying Marlstone and together these rocks form a very distinctive flat-topped platform of low hills, especially around Ilminster. The Barrington Member comprises a condensed sequence of cream coloured, poorly-bedded, rubbly or earthy limestones; they are often iron-stained with blackish or limonitic hues. The limestones are highly fossiliferous and contain ammonites, crinoids and shell debris, although fossil belemnites are rare (in contrast with the underlying Marlstone). These limestones are a rather unusual and understated building stone, used mainly as rough-faced rubblestone walling in Yeovil, especially St. John's Church, in buildings in the outskirts of Preston. The Barrington beds can also be used as roughly squared blocks, but are quite unsuitable for carved mouldings. Formerly, these limestones were extensively dug in many shallow quarries along the outcrop.

HAM HILL STONE MEMBER

Ham Hill Stone

Ham Hill Stone is one of the most renowned and distinctive building stones in Somerset. This coarse, shelly limestone is readily sawn and dressed to provide ashlar, split to form roughly squared blocks and tooled to provide door and window surrounds and sills. When freshly cut it has a light golden yellowish-brown appearance which darkens with age and weathering. Weathering picks out the weaker, less cemented seams and the cross-bedding features which are so characteristic of this sandy limestone. The Ham Hill limestone crops out in a narrow belt west of Yeovil. The beds are still actively worked at Ham Hill where former quarry workings are now a Country Park. Montacute and other nearby villages are built largely of Ham Hill Stone, and the rock is in considerable demand for new buildings, extensions and restoration work, especially in conservation areas in south Somerset. Montacute House and Brympton House are outstanding examples of the beauty and weathering capabilities of Ham Hill Stone, although prestigious buildings further afield such as Barrington Court and Brympton D'Evercy also make use of the stone. Ham Hill Stone has a long history of use. It is frequently found on Roman sites and the Normans are also known to have used the stone. In medieval times it was transported by horse and cart to the River Parrett whence it was

shipped to Taunton. Therefore, many medieval churches in Devon, Dorset and west Somerset have Ham Hill Stone door and window surrounds. The advent of the railways enabled the Victorian church restorers to use the stone extensively. One of the glories of late Elizabethan architecture, Montacute House (bottom image) was commissioned in 1588, and constructed mainly of local Ham Hill Stone. One of the advantages of Ham Hill Stone is that it can be readily sawn and dressed to provide ashlar and tooled to provide door and window surrounds and sills. Below image shows sawn Ham Hill Stone slabs.



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MIDDLE JURASSIC Inferior Oolite Group

The Inferior Oolite Group is part of an important belt of limestones that extend from the Dorset coast through Bath, the Cotswold Hills and into the Midlands; the term 'Inferior' refers to the stratigraphic position below the Great Oolite, not the quality of the stone. Within Somerset the Inferior Oolite Group has a fairly extensive, but scattered broken outcrop in the east and southeast of the county running from Seavington St Mary through Crewkerne, along the edge of the Somerset-Dorset border, and then northwards to Doultong and the edges of Kilmersdon and Radstock. The rock type varies considerably from hard, yellow or ochreous, rubbly **OIDAL** limestones to thinly-bedded, fossiliferous, iron-shot glauconitic limestones. The limestones of the Inferior Oolite Group were widely quarried and used for rubblestone walling and ashlar. Towns and villages along the outcrop such as Seavington St Mary, Seavington St Michael, Hinton St George, Castle Cary and Crewkerne) are built substantially from local Inferior Oolite limestones.

The below image shows picturesque thatched cottages in the village of Hinton St George are built almost entirely of buff and pale grey limestones from the Inferior Oolite Group.

Hadspen Stone

This stone, found around the Castle Cary area, is a more massive, ferruginous and harder variety of inferior Oolite limestone. It exhibits a characteristic warm, brown colour.



Douling Stone

Douling Stone is the best known of the building stones belonging to the Inferior Oolite Group within Somerset. It has been quarried since Roman times, and is used in many medieval churches for mouldings and surrounds, and in Wells Cathedral. It is widely used as building stone, for rubble walling, copings, plinths, window surrounds and dressings in many towns and villages. Douling Stone is a creamy, cross-bedded crinoidal limestone, with a uniform, coarse sugary texture formed by abundant crinoidal debris set in a matrix of calcite. The outcrop extends from Douling (east of Shepton Mallet) to Nunney, but the best building stone seems to be confined to a small area between Douling and Chelynch where quarrying is still active today. The stone quarried in early medieval times was rather finer-grained, stone quarried later tends to be coarser grained, with conspicuous, more abundant crinoid ossicles.



Douling Stone was used extensively in the construction of the magnificent West front of Wells Cathedral, completed in about 1250 (below image). The smaller Church of St Etheldreda at West Quantoxhead, was built in 1854-56 of squared and coarsed Douling Stone with Bath Stone dressings and tracery, image above.



Great Oolite Group

Bath Stone

This group includes the famous Bath stones which comprise cream-coloured, ooidal **FREESTONES** with shelly detrital layers set in a carbonate cement. These are widely used as ashlar. Although Bath Stone is quarried outside Somerset (notably around Bath e.g. Combe Down and Odd Down), it has been extensively used within the county for mouldings and tracery particularly for town houses and churches. Bath Stone has also been widely selected for the repair of Beer Stone dressings of medieval churches in south and west Somerset in the absence of a suitable supply of Cretaceous Beer Stone from Devon. The Great Oolite Group includes three other Middle Jurassic formations (Fuller's Earth Rock, Forest Marble and Cornbrash) which crop out in eastern and southeast Somerset, typically in rather narrow, discontinuous bands from east of Frome, through Bruton to the Wincanton area, and along the Somerset – Dorset border. With the exception of the Forest Marble limestones, they have a relatively limited, very local use as building stones.

Fullers Earth Rock Formation

This formation contains a few poor quality limestones that are used for local rubblestone walling. The Fullers Earth Rock Formation comprises grey argillaceous limestones, typically rubbly in the lower parts of the sequence, and nodular at other levels. Fossil terebratulid brachiopods are distinctive and abundant in some beds. It is locally used along the outcrop, mainly as rubble walling, as for example, at Bruton.

Forest Marble Formation

Forest Marble limestones

William Smith (the 'Father of Geology') named the Forest Marble after the Forest of Wychwood, Oxfordshire in 1799, where the rock was once used in a polished form as a 'marble'. It is not a marble, but a flaggy limestone which typically is hard, blue-hearted, occasionally sandy, and contains many shell fragments, particularly ostreids. A freshly cut block shows a coarse texture, sparkles and has a bluish tinge; weathered surfaces are shades of brown or buff. The western edge of the Forest Marble Formation outcrop is often marked by a prominent scarp, and although as a unit it has the most uniform thickness (up



to 40m) of all Jurassic formations in southeast Somerset, there is a good deal of local variability in the thickness and nature of the beds that are suitable for building stone. Historically, there were many small quarries along the outcrop; some are still active today, notably close to the border near Stalbridge. Here the Forest Marble is hard wearing and weather resistant. It is currently used for extensions, new buildings and restoration work. Riven slabs, of a rich brown colour, were used for paving and coping stones, larger flagstones were used for bridging ditches. Traditionally, the thinner, high quality flaggy limestone and sandy beds were used for roofing. Whilst Forest Marble does not have the visual impact or versatility of Ham Hill Stone, its use enhances the visual character of many important buildings and villages. The villages of Upton Noble and Norton St Philip show the extensive use of Forest Marble at its best. *Witham Friary takes its name from a Carthusian Priory founded in 1182, and part of the priory now serves as St Mary's church. The adjoining row of cottages date from about 1750 and are constructed from local Forest Marble limestone with red brick ornament, above image.*

Cornbrash Formation

The Cornbrash Formation is conventionally divided into two main limestone units: the Lower Cornbrash comprising pale cream, shelly, flaggy or nodular bioclastic limestones; and the Upper Cornbrash with pale brownish-grey, sandy, bioclastic limestones with fine-grained, calcareous sandstone beds. Fossils, especially bivalves and brachiopods are common. The Lower Cornbrash is used mainly for lime burning, the Upper Cornbrash is used for local rough (walling) work along the outcrop, but is generally difficult to dress.

UPPER JURASSIC Corallian Group

The youngest Jurassic building stone encountered in Somerset is the Cucklington Oolite Member, which is confined to the far southeast corner of the county, east of Wincanton. It consists of pale grey to creamy yellow, very rubbly to flaggy, shelly ooidal limestones; fragmentary fossils, especially bivalves and echinoids are common. It has a very local use as rubblestone walling in the Cucklington and Stoke Trister areas; its flaggy nature is particularly suited to walling.

LOWER CRETACEOUS

Upper Greensand Formation
SHAFTESBURY SANDSTONE MEMBER

Shaftesbury Sandstone

The Shaftesbury Sandstone Member consists of alternating beds of glauconitic coarse siltstones to fine-grained sandstones and weakly calcite-cemented sandstone, capped by a hard shelly calcite-cemented glauconitic sandstone. The uppermost shelly beds ('Ragstone') are rubbly and nodular, and have been used for building. The Shaftesbury Sandstone Member caps the Upper Greensand escarpment that runs from Penselwood Alfred's Tower to Longleat and into Wiltshire, and is best seen in Shaftesbury, the National Trust Stourhead Estate and Longleat. The Ragstone unit was formerly worked east of Penselwood at White Cross, and elsewhere along the Somerset-Wiltshire border. The formation at Pen Pits, near Penselwood was an important medieval source for millstones.

Calcareous Grit sandstones

'Calcareous Grit' sandstones crop out in the Blackdown Hills extending from Whitestaunton in the west to Chaffcombe and Winsham in the east. These are hard, nodular, calcareous sandstone with poorly-sorted grains of translucent quartz and chalky calcite set in sparse, powdery calcite cement. Green glauconite grains and black iron oxides derived from it, are conspicuous. The presence of fine-grained carbonate cement encourages the growth of a characteristic crimson lichen, especially on north-facing walls.

In addition to their use as the main building stone, ashlar, dressings and rubblestone, close to the source quarries, these sandstones are also widely used for the quoins and dressings of medieval churches and other high status buildings throughout the Blackdown Hills extending north into the Vale of Taunton Deane.

Chert

The main source of Chert nodules on the Blackdown Hills is also the Upper Greensand Formation, although as they are extremely durable, they also persist in abundance in material derived from this formation. Consequently much of the chert used in buildings in this area is probably from secondary sources, for example superficial alluvial and fluvio-glacial deposits. Some, possibly most, chert for building was formerly collected during the course of clearing stone from the fields prior to ploughing. On the Blackdowns, chert occurs as irregular nodules with whitish outside crusts but with interiors in various shades of grey, brown, orange or black. It is extremely fine grained, has a conchoidal fracture, and being composed of chalcedony (a form of cryptocrystalline silica), it is extremely hard. Chert forms the predominant stone used for all kinds of buildings in the central Blackdown Hills. It may be roughly squared or knapped and laid in courses in Victorian and more recent buildings, but it is also used without knapping, for example as pebbles for rubblestone walling. *The oldest parts of Wilton church, Taunton, date from Saxon times. However, most of the tower and nave are Victorian and are constructed mainly of chert sourced from the nearby Blackdown Hills. Ham Hill Stone is used for the window and door tracery, tower ornament and quoins, below image.*



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Glossary

Ashlar: Cut stone, worked to even faces and right angled edges. Used on the front of a building and laid in horizontal courses with vertical joints.

Bioclast: Term used to describe fragments of any skeletal material e.g bioclastic limestone, bioclastic sandstone.

Breccia: A sedimentary rock made up of angular fragments of rock in a finer-grained matrix.

Buttress: A projection from a wall and bonded to the wall to create additional strength and support.

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.

Chalk: A very fine-grained white limestone composed principally of microscopic skeletal remnants known as coccoliths.

Chert: A granular microcrystalline to cryptocrystalline variety of quartz.

Conglomerate: A sedimentary rock made up of rounded pebbles (>2mm), cobbles and boulders of rock in a finer-grained matrix.

Cretaceous: The youngest period of the Mesozoic.

Flint (or Chert) Hard, resistant beds or nodules composed of cryptocrystalline silica. The use of the term flint is restricted to nodules and beds that occur only in Chalk (Upper Cretaceous) rocks.

Fossiliferous: Bearing or containing fossils.

Freestone: Term used by masons to describe a rock that can be cut and shaped in any direction without splitting or failing.

Glauconite: A clay mineral found as an authigenic mineral in sedimentary rocks.

Haematite: A major mineral of iron, also found as an accessory mineral in many rocks.

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).

Interbedded: Occurs when beds (layers or rock) of a particular lithology lie between or alternate with beds of a different lithology. For example, sedimentary rocks may be interbedded if there were sea level variations in their sedimentary depositional environment.

Intrusive: A body of igneous rock formed from molten magma that has been injected into pre-existing rock.

Limestone: A sedimentary rock consisting mainly of calcium carbonate (Ca CO₃) grains such as ooids, shell and coral fragments and lime mud. Often highly fossiliferous.

Lithology: The description of a rock based on its mineralogical composition and grain-size e.g. sandstone, limestone, mudstone etc.

Metamorphic: Rocks which have been subject to heat or pressure which has caused changes in their solid state e.g. mudstone to slate, limestone to marble.

Metamorphosed: An alteration of the minerals, textures and composition of a rock caused by exposure to heat, pressure and chemical actions.

Ooid: A spheroidal grain of calcium carbonate formed by precipitation (by algae) of calcium carbonate in concentric layers.

Oolite: A limestone composed principally (>50%) of ooids and known as an oolite.

Outcrop: Area where a rock unit is exposed at the ground surface.

Polychrome: The decoration of exteriors, and interiors of buildings with several colours. Structural polychrome decoration means that the colour is not applied but is in the bricks, tiles or stones used in the construction.

Quartz: The crystalline form of silica (silicon dioxide, SiO₂).

Quartzite: A durable metamorphic rock consisting mainly of quartz grains and silica cement, formed by alteration of a sandstone by heat and pressure.

Quoin: The external angle of a building. The dressed alternate header and stretcher stones at the corners of buildings.

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).

Sedimentary rock: A rock that is commonly formed by the binding together (lithification) of sediment particles (e.g. sandstone, siltstone, mudstone, limestone).

Sett: A square stone used for paving.

Siliceous: A rock which has a significant silica content (non-granular) usually in the form of an intergranular cement e.g. siliceous limestone, siliceous sandstone.

Siltstone: A sedimentary rock composed of silt-sized grains (i.e. only just visible to the eye).

Slate: A compact fine-grained metamorphic rock with a closely spaced cleavage formed by the alteration of a mudstone or siltstone by heat and pressure.

Tracery: An architectural term used primarily to describe the stonework elements that support the glass in a Gothic window. The term probably derives from the 'tracing floors' on which the complex patterns of late Gothic windows were laid out.

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