Introduction

Dorset has a varied geological succession, and this is reflected in its landscape and also in its buildings. In the past, the inhabitants of each parish would have used the stone which was closest to them to build their towns, villages, houses and farms. Studying these older buildings, therefore, gives a good indication of the range of building stones originating from within the county. Limestone is the principal building stone of Dorset, with sandstone, chert, chalk and flint being used to a lesser extent.

The bulk of Dorset’s building limestones were formed during the Jurassic period, with the majority of the individual limestone beds being less than 1m in thickness. The thicker limestone beds, such as those of the Ham Hill Limestone Member of the Lias Group, were cut (sawn) as ashlar, while the thinner beds were broken into rubblestone or dressed to shape by hand. Some of the limestone beds are highly fossiliferous, containing the remains of ammonites, belemnites, brachiopods and bivalves. Sometimes, the presence of larger fossils can create weak-points in the rock, rendering it unsuitable for building purposes.

The limestones chosen for building were (and still are) usually the finer grained, ooidal and bioclastic varieties, which have coarse or finely crystalline calcite cements binding the grains or shell debris together.

Dorset has many grand and small manor houses that have grown and changed during their history. The manor houses could afford to use the best quality stone available within their own estates, while the surrounding villages would have used stone of lesser quality. The best known of the Dorset building stones are the Purbeck Marble and Portland limestones. Both have been used extensively in Dorset, but have also been exported for use in the construction of important buildings in, for example, London, Cardiff, Nottingham, Manchester, Leeds and Dublin.

Most of the medieval cathedrals and larger churches in England were decorated with Purbeck Marble. Whilst the quarrying of Purbeck and Portland limestone remains an important industry today, most of the smaller quarries which produced Dorset’s other building stones have closed down over time as demand for their products waned.
Dorset Bedrock Geology

- Building Stone Sources
  - Bracklesham Group and Barton Group - Sand, Silt and Clay
  - Thames Group - Clay, Silt, Sand and Gravel
  - Lambeth Group - Clay, Silt, Sand and Gravel
  - White Chalk Subgroup - Chalk
  - Grey Chalk Subgroup - Chalk
  - Gault Formation and Upper Greensand Formation - Mudstone, Sandstone and Limestone
  - Lower Greensand Group - Sandstone and Mudstone
  - Wealden Group - Mudstone, Siltstone and Sandstone
  - Purbeck Limestone Group - Limestone and Mudstone, Interbedded
  - Portland Group - Limestone and Calcareous Sandstone
  - Corallian Group - Limestone, Sandstone, Siltstone and Mudstone
  - West Wiltshire Formation, Ampthill Clay Formation and Kimmeridge Clay Formation - Mudstone, Siltstone and Sandstone
  - Kellaways Formation and Oxford Clay Formation - Mudstone, Siltstone and Sandstone
  - Great Oolite Group - Sandstone, Limestone and Argillaceous Rocks
  - Inferior Oolite Group - Limestone, Sandstone, Siltstone and Mudstone
  - Liassic Group - Mudstone, Siltstone, Limestone and Sandstone

Derived from BGS digital geological mapping at 1:625,000 scale, British Geological Survey © NERC. All rights reserved.
Lower Jurassic

Lias Group

The Lower Jurassic sequence, which is assigned to the Lias Group, is divided into Lower, Middle and Upper divisions. The sequence is characterised by rapid alternations of Mudstone and limestone deposited in a shallow marine environment. It has an outcrop that can be traced continuously from Dorset into Yorkshire.

Blue Lias Formation

The basal unit of the Lias Group is the Blue Lias Formation, which contains the oldest of the Jurassic limestones. These thinly bedded limestones are the principal stone quarried from the Lias sequence for building purposes. The limestones are blue-grey in colour, fine-grained, micrite-cemented, and commonly contain bivalve, ammonite and vertebrate fossils. Beds of harder limestone alternate with fissile mudstone horizons. Some of the darker limestones are rich in organic material. The beds are of variable depth, but are typically around 0.15m, as can be seen in the the Blue Lias limestone and shale on the shore under Church Cliffs, Lyme Regis (below). The Lower Lias crops out in the west of the county in the Lyme Regis and Charmouth areas. The Lias hills of the coast and around Marshwood Vale (north-east of Charmouth) are topped with Upper Greensand. On the western side of the Vale, the Blue Lias limestones and Lower Lias mudstones form the lower slopes of these hills.

Blue Lias limestone has been used for building purposes in Lyme Regis, but it tends to weather badly due to its high clay content. To protect the stone from weathering, it is often covered with render or hung with slates. The Blue Lias limestone has been used in the Town Mill and the Borough Offices. In the 18C, this limestone was used to make stucco or interior plasterwork. Much of the Blue Lias limestone used in Lyme Regis was quarried just over the Devon county boundary at Uplyme. The limestone has been used throughout West Dorset for paving, which has also been quarried from Uplyme and from Keinton Manderville in Somerset. When used for paving, the stone is laid on its bed, and it is sometimes possible to see oysters and other fossils on the exposed surfaces. It has also been used for kerbstones, which can still be seen in Sherborne and Shaftesbury, but it is gradually being replaced by harder-wearing imported stones.
**Dyrham Formation (‘Middle Lias’)***

**EYPE CLAY, DOWN CLIFF SAND & THORNCOMBE SAND MEMBERS**

The Middle and Upper Lias successions generally do not contain lithologies suitable for building purposes. The ‘Middle Lias’ has three divisions: the Eype Clay, Down Cliff Sand and Thorncombe Sand members. The sandy beds, are generally too soft for use as building stone, but the harder, calcite-cemented sandstone ‘doggers’ in the Thorncombe Sand Member have occasionally been used as foundation stones supporting a brick outershell. Examples can be seen at Bettiscombe Manor near Bridport. In Symondsbury, the Manor Farm stable block contains a few blocks of Thorncombe Sand in the rubble walls.

**Beacon Limestone Formation**

Spanning the Middle-Upper Lias boundary is the Beacon Limestone Formation, which encompasses the famous “Junction Bed”. There are occasional outcrops of Junction Bed limestone in Dorset. Its colour is a mix of pink, white and orange, and it tends to be rubbly in character. Although rarely used for building stone, the Junction Bed limestone has provided firm foundations for buildings at Symondsbury and Melplash. The limestone can also be seen in buildings in association with other stone types in Trent and Sandford Orcas. Here, the stone is white and often contains ammonites. Generally, however, the Junction Bed has been used for lime burning, and is never used solely for buildings - where it is always mixed in with other stone types.

**Bridport Sand Formation**

The Bridport Sand Formation sits at the top of the Lias Group. This thinly bedded, sandstone-dominated unit includes a well developed bioclastic limestone interval at Ham Hill in north Dorset. Despite forming a series of spectacular sea cliffs at Bridport, these fine-grained, variably cemented sandstones appear, in general, to have been rarely used for building purposes outside the town itself.

**HAM HILL LIMESTONE MEMBER**

Though widely used in many Dorset buildings, the Ham Hill limestone only crops out near Yeovil in Somerset, where it has been quarried for building since Medieval times. The orange-brown limestone consists of ferruginous, calcite-cemented, shell debris, and is about 15m thick and strongly cross-bedded. West Dorset has many prestigious houses and churches which have been built using this stone; many houses in Symondsbury and other villages have also been dressed with Ham Hill Stone. The stone is particularly suitable for dressings and mouldings because it retains its strength even when used perpendicular to its bedding.

The limestone is best carved fresh from the quarry as, like many such limestones, when it subsequently dries out, it hardens and becomes more difficult to work.
Middle Jurassic

Inferior Oolite Group

Inferior Oolite ‘limestone’

The Inferior Oolite Group comprises hard, shelly and ooidal limestones, which were deposited in a sub-tropical, shallow marine environment during the Middle Jurassic. The limestones contain an abundance of ooids - small, spheroidal, calcareous grains formed by carbonate algal accretion around a nucleus which is either a shell fragment or detrital quartz grain. The group is relatively thin, ranging from less than 2m in parts of the south of the county to about 20m in the north near Sherborne. The limestones are commonly iron-rich, and this gives rise to their often strong orange colour.

The succession in general comprises a thin sandy limestone at the base, overlain by a thicker ooidal limestone bed with abundant fossils. Overlying this bed are a number of thinner limestone beds of up to 1m in thickness. In the quarries near Beaminster, there is a red-stained limestone bed (indicating a particularly high iron content).

The Inferior Oolite limestones are important building stones that are widely used in West Dorset. The beds used for building stone are generally fine-grained, micritic limestones, which are cream to orange in colour and contain few fossils. The colour of the limestone tends to vary. In the Yeo Valley, the Inferior Oolite quarried to the west of Sherborne around Bradford Abbas and Nether Compton is darker in colour than the South Dorset stone. In contrast, the Sherborne building stone is lighter due to its lower iron content. Low’s Hill Quarry to the west of Sherborne (below) provides good exposures of the darker coloured, more ferruginous Inferior Oolite limestone. This quarry is 3m deep, and is a Site of Special Scientific Interest.

Between Burton Bradstock and Drimpton (near Broadwindsor), 138 former quarries have been recorded. Many of the quarries are isolated on the tops of small hills, such as Jacks Hill near Mapperton and Chideock Quarry Hill. Near Sherborne, the outcrop of the Inferior Oolite Group is continuous from Nether Compton to Oborne, where 48 former quarries have been recorded. Coombe Farm Quarry at Mapperton and Frogden Quarry in Oborne are actually still working the Inferior Oolite.

Low’s Hill Quarry to the west of Sherborne provides good exposures of the darker coloured, more ferruginous Inferior Oolite limestone.
Most of the Inferior Oolite quarries were able to provide large enough blocks for ashlar. The church, manor houses and vicarage of the village were therefore built of the best stone. The cottages used dressed stone, while the farm outbuildings were built of rubble.

In Symondsbury, Inferior Oolite ooidal limestone has been extensively used as a building stone. The Old Rectory is Inferior Oolite ashlar, the stable block in Mill Lane is a mix of stone – which includes Inferior Oolite limestone – and the Post Office cottage is entirely constructed of Inferior Oolite limestone (top left). Crepe Farm and its barn (top right), which are set apart from the village, are built with the limestone, but the stone is a darker orange. This was sourced from quarries at Sloes Hill and Watton Hill, where it is known as the Wild Bed. Most village buildings were originally constructed of stone from their own parish quarries, but these may have been worked out by the 19C. Thereafter, the best quality stone was said to come from the quarries at Whetley Cross, Horn Park and Barrowfield in Beaminster. The quarry on Allington Hill, which produced the limestone used in the 13C hospital of St Mary Magdalen, was worked out during the 18C. There were also several quarries around Mapperton and around the town of Beaminster, which provided Inferior Oolite limestone for building purposes until the 20C.

Bridport uses a good deal of Inferior Oolite, which is thought to have originated from Allington Hill or Hyde Hill quarries. Hyde Hill Quarry provided limestone for the 19C buildings in Walditch. All villages that had Inferior Oolite limestone quarries made use of it. Those villages near to Bridport incorporated the more thinly bedded Forest Marble from Bothenhampton as damp-proof foundation stones. At Loders, in the south-west of Dorset, the church walls are of local Inferior Oolite limestone, but stand on a plinth of Forest Marble limestone from Bothenhampton. The east wall of the church was repaired during the 19C using stone from Chiselcombe Quarry at Loders Cross.

Most building stone would only be used within the parish it was quarried from, travelling no more than a few miles (or sometimes less). Records from the 19C show that the stone from some of the bigger quarries was taken further afield. Accounts for the two quarries in Waddon Hill show customers in Thorncombe (7.5 km west of Waddon Hill) and Burton Bradstock (13.6 km south-east of Waddon Hill).

**Great Oolite Group**

The thick beds of ooidal limestones that characterise the Great Oolite Group of the Bath area in Somerset are not present in Dorset, where the equivalent beds are dominated by the deeper-water mudstones and finer grained, argillaceous limestones of the Fuller’s Earth and Frome Clay formations. Lithologies suitable for building stone are only present amongst the harder limestones of the uppermost part of the group in the Forest Marble and Cornbrash formations.

*Dorset Strategic Stone Study 6*
Forest Marble Formation

The Forest Marble Formation is a thin unit consisting of mudstones, thin sandstones and shelly limestone. The term “marble” is misleading as the limestone is not a metamorphic marble, which would have formed under high heat and pressure, but refers to the limestone being hard enough to take a good polish. The Forest Marble is named after the Wychwood Forest in Oxfordshire, and was formed in the Middle Jurassic around 165 million years ago. The hard, fossiliferous, crystalline limestone beds provide a most durable building stone (top right).

In the north-west of Dorset, there is a discontinuous, roughly NE-SW trending outcrop of Forest Marble limestone between Stalbridge and Halstock. Forest Marble limestone can also be found in the south-west of Dorset between Watton Cliff near Bridport and Radipole near Weymouth. In the southern area, Watton Cliff is capped with the Forest Marble. The beds of shelly limestone within the succession are about 3cm thick in the upper part of the deposit, but up to 1m in the lower part of the formation. The thin limestone beds are used for roofing, and the thicker beds for ashlar and rubblestone. A working quarry still exists at Bothenhampton. The limestone was also worked in a series of quarries east of Burton Bradstock towards Swyre and Bexington. The Forest Marble’s general hardness, durability and lack of porosity are characteristics which make it suitable for use as plinths and foundation stones. Forest Marble plinths can be seen in Symondsbury church, Loders and Bradpole.

The large quarries that worked the limestones in South Wych Hill in Bothenhampton date back to the 14C. They provided stone for Bridport, where the majority of houses and the rope factory (bottom right) were entirely built from Forest Marble limestone. Over the centuries, there have been as many as 12 quarries working the limestones, and two of them remained active until the 1940’s. Beds from these quarries have produced dressed stone and paving stone for Bothenhampton. At West Fleet, a quarry in the Forest Marble provided limestone for the 15C parish church and Moonfleet House. South of Sherborne, the Forest Marble limestone quarries from Lillington Hill to Longburton were used for Sherborne Castle Estate. Forest Marble limestones can also be seen in buildings in Melbury Sampford, Evershot and Yetminster.
The appearance of the Forest Marble limestone is distinctive and it can be recognised throughout West Dorset. Subtle changes are observed in the lithology, however. In Longburton, for example, the shells within the limestone are much darker and give the stone a darker overall appearance. Whithill Quarry in Lillington near to Sherborne is still working the Forest Marble limestones today.

**Cornbrash Formation**

The Forest Marble Formation is overlain by a thin development of the Cornbrash Formation. This formation comprises a thin, hard, rubbly limestone, which is pale yellow in colour and often highly fossiliferous. The limestone is interbedded with soft, cream coloured, calcareous mudstone. The Cornbrash is rarely used as a building stone, and was generally used for limeburning. It has been quarried in Stalbridge for this purpose. Limestone from the Fleet and Chickerell quarries was used in the old village of Chickerell, and the remains of a quarry in the Cornbrash can be seen next to the road in East Fleet. Cornbrash limestone was also used in Radipole, near Weymouth, for the church and the old manor house.

**Upper Jurassic**

**Corallian Group**

The varied beds that comprise the Upper Jurassic Corallian Group represent the depositional products of a marginal marine environment. The group comprises a series of sedimentary cycles involving ooidal and reefal limestones, lagoonal mudstones and sandstones. The strata crop out in the Weymouth Anticline, from Abbotsbury to Osmington on the northern limb of this structure, and along the Wyke Regis coast in the south.

The limestones of the Osmington Oolite Formation are the most important source of building stone within this sequence. In South Dorset, this formation has been extensively quarried in Abbotsbury and used within the village (below left). The limestone is predominantly orange in colour, but this is dependent on its disseminated iron content, and a range of colours from cream to orange can be seen. When freshly quarried, the stone is often blue-grey, but this colour only remains until the disseminated iron oxidises.

The Osmington Oolite limestone is quarried from Chapel and Linton Hills. The largest quarry, meanwhile, is Oddens Wood (below right). This quarry has permission to operate, but work has yet to commence. The reopening of this quarry will provide stone for repairs to historic buildings. The outcrop on Linton Hill extends eastwards to Rodden and Langton Herring, which also use the Corallian limestones extensively.
In North Dorset, the principal building stone obtained from the Corallian Group is known as the Todber Freestone (Stour Formation). The best building stone is found at Marnhull, where it is slightly paler than the typical Todber Freestone. Lower in the succession is a second ooidal limestone bed, the Cucklington Oolite (Stour Formation). This is a medium-grained ooidal limestone, which has a micrite cement. The most important quarries were in the Blackmore Vale between Marnhull and Todber, and there are still three working quarries in that area.

The Todber Freestone Member thins and dies out to the north and south, and other limestones were therefore worked for the surrounding villages.

At Hinton St Mary, Todber Freestone was produced from their own quarries. The stone can be seen in the church, and also as dressings on the White Horse Inn. At Todber, the fossil-rich beds of the Clavellata Formation (above the Todber Freestone) were found to be unsuitable for building as the fossils create weak-points in the stone. The Todber Freestone is almost fossil-free, but as already noted, it dies out further south. Corallian limestone has also been used throughout the Stour Valley. Above Blandford and north of Fifehead Magdalen, the Cucklington Oolite is used along with better quality stone from Marnhull. Most of the prestigious houses in the Stour Valley are built from limestone ashlar from the Marnhull or Todber quarries. The 11C church at Iwerne Steepleton and one house in Sutton Waldron are also built from the Corallian limestone. Another good example is Iris Cottage in Marnhull. The exterior is built from smooth-faced blocks of Todber Freestone from the Marnhull Quarries. Shillingstone, Child Okeford and Fontmell Parva House have all used Corallian limestones either in association with other building stones or as dressings. Both Whiteway Hill Quarry in Marnhull and Redlands Quarry in Todber are currently working the limestones of the Corallian Group.

Portland Group

Limestones of the Portland Group are quarried in south Dorset on the Isle of Portland and the Isle of Purbeck. The group is divided into a lower Portland Sand Formation and an upper Portland Stone Formation. The white, ooidal limestone most commonly described as Portland Stone is probably the best known of England’s building limestones. It has been exported and used in prestigious buildings in many cities including London, Dublin and Cardiff. In the 14C, the stone was exported to Exeter for the Cathedral, and in the 17C to London for St Paul’s Cathedral. On the Isle of Purbeck, similar though more thinly bedded ooidal limestones are worked as freestone, but are commonly described as Purbeck-Portland Stone.

The sediments that make up the Portland Group include marine sands, cherty limestones, and ooidal and bioclastic limestones. The ooidal and bioclastic limestones in the upper part of the group form the main worked freestone beds on both the Isles of Portland and Purbeck. In the Portland quarries, the freestone beds are subdivided into the Base Bed, Whit Bed and Roach. Each bed is between 1 and 2m thick.

The ooidal Whit Bed contains common shells, whereas the Base Bed is generally less shelly in character. The fossiliferous Roach Bed is the most distinctive of the Portland limestones as it exhibits large, open, biomoldic pore spaces. These relate to the leaching out of examples of the large gastropod Aptyxiella portlandica (known informally as the ‘Portland Screw’).

On the Isle of Portland, fine quality freestones are used extensively. The stone at Portland is a distinctive white oolite, which contains a scattering of thick-walled fossils. It was used by the Romans, and occasionally in medieval times. There are 35 named quarries on the Isle of Portland, but only a few are still being worked. Today, Kingbarrow Quarry is a nature reserve, and Tout Quarry is a sculpture park and public open space. Perryfield, Broadcroft and Withies Croft are still active and all work the Portland and Purbeck formations.
On the Isle of Portland, most of the houses built in the 19C were constructed of Portland Stone. There was an increase in the use of Portland Stone during the 18th, 19th and 20C. Today Portland Stone is still sought after for prestigious building projects. The hard and durable Roach Bed is confined to the north end of Portland, and is often used for sea defences.

It has been quarried from the Isle of Portland, the cliffs of the Isle of Purbeck, and the Ridgeway above Weymouth. The Portland Stone from Purbeck is said to be harder and denser than the Portland Stone from Portland.

On the Isle of Purbeck, the lower beds of the Portland Stone Formation were quarried directly from the cliffs, where the Under Freestone bed - which provided the best quality stone - was taken from beds up to 2m thick. Overlying the Under Freestone are three further beds of limestone that were worked – House Cap, Pond Freestone and the Blue Stone. The Pond Freestone, which is about 2m thick, is generally considered to be the best building stone bed. Cliff-side quarries continued to work until the 1930’s, and inland, the Purbeck-Portland freestone is still produced at, for example, the St Aldhelms Head Quarry (which works the Pond Freestone).

At Seacombe and Winspit, the main galleries are in the Under Freestone. At Seacombe, meanwhile, there are galleries in the Pond Freestone. On the Isle of Purbeck, the cliff quarries provide Portland Stone that has been used in Norman work in Christchurch Priory. These quarries were active earlier than those at Portland because the stone was easier to reach. Several manor houses in Dorset built before the 17C recorded using ‘Purbeck Stone’, but closer examination has revealed that it was a Portland Stone from the Isle of Purbeck (now often referred to as the Purbeck-Portland Freestone).

The Ridgeway quarries at Upwey were worked into the sides of the hills. Here, the Portland limestone being quarried lies below the Lower Purbeck Cypris Freestone, and is finer, more micritic and chalky in character. Purbeck limestone from the Ridgeway quarries has been used in a wide area of West Dorset. There is evidence to suggest that the quarries at Portesham, Chalbury and Poxwell have been worked occasionally during the 20C.

The quarries at Chalbury and Poxwell produced limestone of a fine-grained, chalky texture. Sitting below this is a chert-rich bed, and then below this are two more beds of limestone. Stone from the Ridgeway quarries, both Portland and Lower Purbeck, was used for the Abbeys in Abbotsbury and Cerne Abbas.

The Tudor Manor at Athelhampton also used both stones from Portesham, although the main walls are Lower Purbeck limestones, and at Waddon Manor and Corton Farm, both Portland and Purbeck limestones have been employed. Stone quarried from the Portland Stone Formation at Chilmark and Tisbury (Wiltshire) has been used in north and east Dorset. The building stones produced in this area include fine-grained, white or buff, sandy ooidal limestones and glauconitic sandy limestones varying from green to buff in colour. They have been used for constructing bridges and sluice gates in the Tarrant and Stour valleys.
Lower Cretaceous

Purbeck Group

Overlying the Portland Group is the Purbeck Group, which is now believed to be largely of early Cretaceous age. The Purbeck Group comprises a series of thin limestones, mudstones and calcareous clays deposited in shallow freshwater or marginal marine environments. The limestones have abundant fossils, mostly bivalves, but the beds worked as ‘marbles’, which are higher in the sequence, contain mostly gastropods. The marbles, and some of the bivalve-rich limestone beds, can be polished owing to their hardness. The Purbeck Group succession crops out on the northern and southern limbs of the Weymouth Anticline, and in the southern half of the Isle of Purbeck. Limestone from the group has been used locally from Roman times to the present day for building and decorative stonework.

The many limestone beds or ‘veins’ found within the sequence were all give individual names by the quarrymen. Many appear to have been quarried for specific purposes such as paving or for roofing tiles. On the Isle of Portland, near the base of the sequence, are the limestones named the Cap. Above the Cap, are the oldest beds used for building - the laminated micritic limestones known as the Cypris Freestone. The Cypris Freestone was quarried from the hills south of the Ridgeway between Weymouth and Dorchester.

The basal Lulworth Formation of the Purbeck Group includes the Mupe Member, which contains a number of thin limestones - in particular, the Cypris Freestone. This was used for building in the area north of Weymouth and Dorchester, and as far east as Coombe Keynes near Wool and as far west as Abbotsbury. From Portesham to Upwey, and in the Poxwell area, the quarries produced both Portland and Purbeck limestones. These lower beds are followed by dark mudstone of the Ridgeway and Worbarrow Tout members. The overlying Durlston Formation comprises a succession of calcareous mudstones, cherty beds, limestones and clays. The limestones assigned to this formation include the two principal ‘marble’ beds, which sit near the top of the formation in the Peveril Point Member.
In the small village of Winterbourne Abbas, west of Dorchester, the majority of buildings have been constructed of the Cypris Freestone (Lulworth Formation), including the church. The new houses in the village have used limestone from the Durlston Formation, currently being worked on the Isle of Purbeck.

The majority of the limestone quarries on the Isle of Purbeck are in the Stair Hole Member of the Durlston Formation. Most of the veins used for building stone are above the basal Cinder bed. The Downs Vein is a thick, cream coloured limestone (that splits easily) with some chert on the top. At the top of many of the quarries is the Laning Vein, which lies above the Freestone Vein. It is a cream coloured, sandy limestone in which the shells have been replaced by calcite spar.

The base of the Peveril Point Member of the Durlston Formation is placed at the base of the massive Broken Shell Limestone Bed - also known as "the Burr". Above the Burr, are the principal marble beds. In the Middle Purbeck, the Freestone is the best stone for building as it occurs in thick beds that can be cut for ashlar. The manor house at Dunshay was one of the earliest to be built of Freestone in 1642. Freestone was used a great deal during 19C for churches in Poole and Bournemouth.

The Roach, Thornback and Grub from the Freestone Vein have also been used for paving and kerbs. Thinner slabs of the Downs Vein, which can be up to 2cm thick, have been used for roofing tiles throughout the Isle of Purbeck and the Frome Valley. Open cast quarrying in Worth and Langton Matravers is now providing Middle Purbeck Limestone for new-build projects and repairs across Dorset. In the absence of local quarries, it has also been used in villages that would be regarded as Inferior Oolite or Corallian limestone villages.
Upper Greensand Formation

The Upper Greensand Formation was deposited in a shallow marine setting at the end of the Early Cretaceous (c. 110 Ma). The formation is sandstone-dominated, with cherty nodules common in its upper part. The sandstones are green in colour due to the presence in abundance of the mineral glauconite. In West Dorset, the lowest part of the formation is poorly cemented, fine-grained and known as the Foxmould Member. This poorly consolidated sand is often used for mortar-making. The Foxmould Formation is overlain by the Whitecliffe Chert Member, the chert beds of which are used locally for building in the same way as flint. At the top of the formation, is the coarse-grained, well-cemented sandstone known as the Eggardon Grit Member.

The Upper Greensand Formation forms the capping to the flat-topped hills of Golden Cap, Langton Hill, Hardown Hill, Coney’s Castle and Lamberts Castle. There were many small quarries working the chert beds and chert drift at Hardown, Lamberts Castle and Blackdown. The Hardown Hill chert mines are still open, but are not worked. The chert from Hardown Hill has been used as far as Exeter for road stone. It is commonly used for walling in Charmouth and Marshwood Vale, and is often used with Blue Lias limestone in this area.

In Charmouth, the church has been built from Upper Greensand chert, and Forest Marble limestone has been used for the plinths.

In North Dorset, the Foxmould Member is replaced by the Shaftesbury Sandstone Member, which provided a good quality building stone and has been used for ashlar. Here, the sandstone appears a darker green than in the west because of its high glauconite content. The beds include a weakly cemented sandstone lower down, with hard, shelly, calcite-cemented, glauconite sandstone above. The upper sandstone bed was commonly known as Ragstone, and was quarried on both sides of the hilltop at Shaftesbury, where quarrying continued until 1888. Shaftesbury Upper Greensand has been used for building in all the villages around Shaftesbury, and has been used as far as Wimborne. The church at Sturminster Newton is entirely built from Shaftesbury Stone (Greensand) as is Pond House in Ashmore (below). The stone here, however, is often used with other materials such as flint (in Ashmore), heathstone (in the Tarrant Valley) and Purbeck limestone (further south).

The only quarry currently working the Upper Greensand Formation for building stone is Manor Farm Quarry in Melbury Abbas. The sandstone is fine-grained, calcareous and glauconitic. It is very similar to the Shaftesbury sandstone and the two are therefore very difficult to distinguish.
Upper Cretaceous

Chalk Group

The chalks of the Chalk Group were deposited in an open marine environment from about 100 million years ago during the late Cretaceous. They crop out extensively over the central parts of Dorset from the north-east to south-west regions. Traditionally, the Chalk Group succession was divided into three subdivisions viz. Lower, Middle and Upper Chalk. However, there has been considerable revision of the nomenclature, and a number of new formation names have been introduced. The Lower Chalk interval now comprises the West Melbury and Zig-Zag Chalk formations, which together are about 57m thick. The Middle Chalk interval is about 41m thick and now comprises the Holywell Nodular Chalk and New Pit Chalk formations, and shows the first appearance of flint nodules in the group. The Upper Chalk interval now comprises five formations - the Lewes Nodular Chalk, the Seaforde Chalk, the Newhaven Chalk, the Culver Chalk and the Portsdown Chalk formations. Tabular and nodular flint layers are common throughout the succession. The Chalk Group caps the eastern hills of the Marshwood Vale, and between Rampisham and Bulbarrow the Chalk Downland is cut by steep-sided valleys.

The Lower Chalk has been used in Cerne Abbas, Sydling St Nicholas and Cattistock. The Middle Chalk is characteristically flinty. North Barn in Cerne Abbas is one of the buildings which has remained intact over the years; it has an outer wall of large nodular chalk blocks containing scattered lumps of flint (top right). This is characteristic of the Middle Chalk, which would have been quarried from Giant Hill. Chalk blocks used for building stone were often known as ‘clunch’. Only a small number of buildings have chalk stonework in the exterior walls as it was generally too soft to survive exposure to the agents of weathering. The great barn at Iwerne Courtney has external walls that are constructed of Shaftesbury Stone and flint, but it is lined with chalk. In Coombe Keynes, the Purbeck and Heathstone cottages sometimes have chalk block internal walls. At Cattistock, many walls have been rendered and some of the chalk blocks found in the walls contain scattered sand grains. At Sydling, St Nicholas the chalk is also sandy.

The vast majority of chalk pits in Dorset have been quarried for road stone or lime production. The only evidence of quarrying for chalk blockstone is provided by the surviving buildings of the villages around the edge, or in the valleys, of the Downs, where the chalk was used in block form for house building.

Generally, chalk is not the predominant stone in buildings over its outcrop due to its vulnerability to weathering and high porosity. It is, however, used extensively in buildings with other stones that are not so susceptible to weathering. Many cottages that were once built from chalk are known to have been demolished and rebuilt with other local stone.

Flint

Flint nodules are present in much of the Chalk Group, but are particularly concentrated in the Upper Chalk. Flint is composed of a very hard, cryptocrystalline silica, which is black or dark brown in colour; it has a conchoidal fracture and a glassy appearance. The silica was derived from the siliceous skeletal components of marine organisms such as sponges. The formation of the regular bands or tabular layers of flint may be associated with infaunal burrow fills, but the more randomly distributed flint nodules are often found in association with macrofossils.

The hardness and durability of flint makes it good building material, providing a weatherproof exterior or a strong rubblestone wall core. The one problem with using it for building, however, is its uneven shape. Village houses built on the Chalk Downland use flint banded or chequered with brick or stone as exterior facing.
Flint is the most important building material on the Chalk Downland across central Dorset. The 15C and 19C parts of Maiden Newton church are built of flint and Purbeck limestone. The cottages in Tarrant Gunville are also built of flint, Upper Greensand and brick, and in the upper part of Piddle Valley, the cottages are built of flint and brick or Purbeck limestone from the Ridgeway. Flint is still being quarried from Woodford Quarry in the Frome Valley, where it comes from the Terrace Gravels, and is still used for building construction.

**Palaeogene (Lower Tertiary)**

**Heathstone (Ferrigenous sandstones)**

The Lower Tertiary (Paleogene) succession in Dorset is subdivided into the Reading, London Clay and Poole formations, which represent the depositional products of fluvial and marginal marine environments. The sediments are mostly clay- and sand-dominated with some pebble beds. The lithological complexity and variability of the successions exposed, both vertically and laterally, have made precise determination of the stratigraphic position of some Heathstone difficult.

Within the London Clay Formation, there are two iron-cemented sandstones known as Lytchett Matravers Sandstone and the Warmwell Farm Sand. These ferruginous beds have been mapped in isolated patches around Lytchett Matravers and north of Wimborne. Overlying this formation are the sediments of the Poole Formation, which is predominantly composed of alternating clay and sand beds, again with occasional lenses of ferruginous sandstone. The London Clay and the Poole formations form a continuous strip from Broadmayne to Cranborne across the south-east of Dorset. The nature of the sands and clays has given rise to an extensive heathland landscape over the whole of south east Dorset. The ferruginous sandstones provided the only suitable building material, and were therefore widely used and known locally as ‘Heathstones’.
The Lytchett Matravers Sandstone has been used in Lytchett Matravers church (below) and Almer church. At Lytchett Matravers, the sandstone is a dark brown colour, but at Almer the south wall sandstone is a lighter orange/brown. The quartz grains are generally very rounded and coated with iron, whereas in other buildings in Lytchett Matravers the grains are not as well rounded and less ferruginous in character. This sandstone is likely to have come from the Warmwell Farm Sand Member. The original quarries for these Tertiary sandstones are hard to locate as there is little evidence remaining of surface workings. In Chalbury, Horton, Woodlands, Knowlton Church and Cranborne, the Lytchett Matravers Heathstone has been used in association with other stones.

The majority of buildings that have used the Heathstone are likely to have obtained the sandstone blocks from the local Poole Formation. In the Poole Formation, iron-cemented sandstones only occur in patches and have been collected from sandpits. The only Heathstone source at present is in the Henbury Sandpit located between Corfe Mullen and Lytchett Matravers. The Poole Formation was also quarried at Woodhouse Hill, Studland and near Kingswood farm.

The Lytchett Matravers Sandstone Member has a finer grain size than the Poole Formation sandstone. Both vary in colour from dark to pale yellow-brown in East Dorset. The Poole Formation sandstones south of Wareham exist in various shades of brown, with an almost blood-red sandstone being found around Studland.

In Canford Magna, the church tower is constructed of Heathstone, as is the church tower in Kinson built in the 12C. In Kinson, the Heathstone has been dressed as ashlar and appears current-bedded. Heathstone can also be seen in buildings in Sturminster Marshall and Shapwick.

At the top of this early Tertiary succession in Dorset is the Barton Group, comprising the Boscombe Sand and Barton Clay formations (which include the Chama and Becton Sand members). A ferruginous sandstone from these units is used for building, and is fine-grained and blood-red to purple in colour. This ironstone is not from a heathland area, however, but from Hengistbury Head, where it crops out as two bands of ironstone doggers in the Barton Clay.
CONCERNS FOR FUTURE BUILDING STONE SUPPLY

Currently, there are 12 active Purbeck Stone quarries in Purbeck; this includes the St Adhelms and Swanworth quarries, which actually work the Portland Beds. Because some of the quarries work on a campaign basis, however, not all may be seen to be active at the same time. On Portland, there are six active quarries and there are a further six quarries actively working other types of stone across Dorset. This does not include Melbury Abbas quarry where permitted work has not yet started. In total then, there are 24 working quarries in Dorset. There has been a good supply of Purbeck and Portland Stone over the years due to their accessibility over large areas. The high demand for these stones continues as many of the newer stone buildings being built in Dorset are using them.

Of greater concern, however, are those older stone buildings which used stone quarried from within their own parishes. These parish quarries have been closed for many years, and now that the older buildings are in need of repair, such quarries will need to be reopened if conservation repairs (and indeed new-build projects) are to be sympathetic to the local character of Dorset’s villages. The main concern is not so much a lack of available building stone, but the problems associated with reopening former quarries. Over time, these closed quarries have been used as dumping grounds and/or have become conservation sites or recognised as sites of special geological significance (UNESCO WORLD HERITAGE COAST). The closed Junction Bed Quarry behind Manor Farm in Symondsbury is now being used as an old tractor repair site. In sites used like this, or as dumping grounds, the stone resource may be sterilized, preventing future access to the site. The quarries that are now conservation sites and special geological sites may also face significant problems in obtaining permission to reopen.

A further concern is the effect that the reopening these quarries may have on the local landscape. In Bridport, the local building stone source is on top of the nearby hills where the bulk of the best quality stone has already been taken or has weathered away. As a potential source of stone for Bridport, its future prospects may be limited. Sloes Hill, however, still has sufficient stone, but re-opening the quarry would inevitably change the landscape. One possible approach that should be recognised is that reopening of a former quarry for the building stone could be viewed as a short term venture where active working takes place on a small scale. If managed well, it could perhaps be operated for months rather than years, and ultimately be ‘reinstated’ to create a more aesthetically pleasing landscape.
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.

Bioclastic limestone: A limestone composed of fragments of calcareous organisms.

Calcite: A mineral made of calcium, carbon and oxygen — \( \text{CaCO}_3 \); the principal carbonate component of limestone, chalk and marble.

Cementation: The diagenetic process by which the constituent framework grains of a rock are bound together by minerals precipitated from associated pore fluids (e.g. quartz and calcite).

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.

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

Ferruginous: Containing iron minerals usually in the form of an iron oxide which gives the rock a ‘rusty’ stain.

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.

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.

Limestone: A sedimentary rock consisting mainly of calcium carbonate (\( \text{CaCO}_3 \)) 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 and/or pressure which has caused changes in their solid state e.g. mudstone to slate, limestone to marble.

Micritic: Limestone consisting of microcrystalline calcite mud or a very finely crystalline carbonate cement.

Mouldings: Anything with a contour or section, either projecting or inset, to give emphasis, usually to horizontal and vertical lines.

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

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

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

Porosity: The ratio of the fraction of voids to the volume of rock in which they occur.

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).
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Further Reading


