Strategic Stone Study

Hampshire
(including the New Forest National Park, part of the South Downs National Park, and the cities of Southampton and Portsmouth)

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Introduction

The solid geology of Hampshire essentially comprises a gently folded succession of sedimentary rocks dating from the Cretaceous and Palaeogene periods. These rocks are best understood in terms of a large basin-like structure (the ‘Hampshire Basin’) which extends for over 160 km from Dorchester (Dorset) in the west to Beachy Head (East Sussex) in the east. The southern boundary of the basin is delineated by the near-vertical chalk ridge which forms the Purbeck Hills in Dorset, the area from Old Harry Rocks to The Needles and the ‘central spine’ across the Isle of Wight and then continues under the English Channel. The northern limit of the basin is reached at the chalk of the South Downs, Salisbury Plain and Cranborne Chase. At its widest point the basin extends for around 48 km between Salisbury and Newport (on the Isle of Wight).

For convenience, Hampshire can be sub-divided into six areas on the basis of its geology, each area having its own distinct landscape and character. These areas are as follows: the Wealden Greensand, the Hampshire Downs, the South Downs, the North Hampshire Lowlands, the South Hampshire Lowlands and the New Forest.

The Wealden Greensand continues into east Hampshire from West Sussex and includes part of the South Downs National Park area. Geologically, this is the oldest part of the county and comprises a succession of Lower Cretaceous sandstones, ironstones and siltstones (assigned to the Hythe Formation of the Lower Greensand Group and the overlying Folkestone and Wealden Greensand formations). These strata represent sources of building stones much-used in the county: the pale grey-green Hythe Sandstone, the deeply coloured Carstone (an ironstone) and the pale whitish Malmstone. Historically, Lower Greensand Group sandstones were worked at Passfield while Malmstone was quarried at Old Burghclere-Kingsclere, Upper F로yle and Selborne.

The Hampshire Downs and the South Downs extend through much of central and south-east Hampshire (north of a line from Awbridge to Waterlooville) and form relatively high hills with steep slopes where they border younger clays and sands of the lowlands to the south and north. The Upper Cretaceous chalk of the Downs has seen some use as a building stone. Flint - either quarried directly from the White Chalk Subgroup or gathered from downland fields as derived nodules – is a much more extensively used building material. This has long been recognised as a very hard, resistant building stone and has been employed in the construction of very many walls and buildings across the Downs and in adjoining areas throughout the county.

The North Hampshire Lowlands and South Hampshire Lowlands (including the Coastal Plain) are underlain by soft Palaeogene sands, clays and gravels assigned to the Thames, Lambeth, Bracklesham and Barton groups. The Coastal Plain areas around Southampton, Portsmouth and Hayling Island are dominated by superficial deposits laid down in more recent geological times. Occasional harder layers within the Palaeogene strata were exploited on a localised scale for supplies of building stone, yielding mainly ironstones and ferricretes; flint cobbles and pebbles present in the deposits of the coastal areas were also used for building purposes. However, the relative paucity of locally available building stones meant that many of the prestigious buildings and structures in these areas utilised imported stone, notably Bembridge Limestone and Quarr Stone from the Isle of Wight and Purbeck Stone and Portland Stone from Dorset. The youngest building stone to have been used in Hampshire is Tufa, although this was employed only on a very minor scale in the Hayling area.

The geology of the New Forest comprises mainly Palaeogene sediments assigned to the Bracklesham and Barton groups. Many of the older buildings in the National Park, especially churches, were constructed of a mixture of locally sourced flint nodules and blocks of red-brown or dark purple coloured, iron-cemented sandstones and ferricretes (such as Burley Rock). Many buildings and structures also feature imported stone, especially Purbeck Stone.

Overall, Hampshire has no commercially significant building stone resources, and no quarries currently extract building stone in the county. Although extensive use has been made of several local stone types in the past, a roughly equivalent number of stones imported from adjoining areas have also been employed for building purposes in the county.

Useful accounts of the geology and use of building stones in Hampshire are provided in the relevant memoirs of the British Geological Survey (BGS) and in the key references listed at the end of this Atlas. During the compilation of data on which this Atlas is based, two new building stone types have been identified and named (Hambledon Chalk and Sopley Stone); these are herein described for the first time. For clarity, the building stone types recognised during this study are summarised in Table 1, set against the modern stratigraphical framework (which is adhered to throughout).
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Table 1. Summary (interactive) of stratigraphical and building stone names applied to Cretaceous and Cenozoic sediments and sedimentary rocks in Hampshire.
Hampshire Bedrock Geology

- **BUILDING STONE SOURCES**
  - **SOLENT GROUP** - CLAY, SILT AND SAND
  - **BRACKLESHAM GROUP AND BARTON GROUP (UNDIFFERENTIATED)** - SAND, SILT AND CLAY
  - **THAMES GROUP** - CLAY, SILT, SAND AND GRAVEL
  - **LAMBETH GROUP** - CLAY, SILT, SAND AND GRAVEL
  - **WHITE CHALK SUBGROUP**
    - **CHALK GROUP** - CHALK
  - **GREY CHALK SUBGROUP**
  - **GAULT FORMATION AND UPPER GREENSAND FORMATION (SELBORNE GROUP)** - MUDSTONE, SANDSTONE AND LIMESTONE
  - **LOWER GREENSAND GROUP** - SANDSTONE AND MUDSTONE

Derived from BGS digital geological mapping at 1:625,000 scale, British Geological Survey © NERC. All rights reserved.
The use of stone in Hampshire’s buildings

Hampshire has a rich built heritage, with some 13,000 listed buildings and 200 conservation areas in the county. However, there is a relative dearth of good local building stone. Timber framing dominates the vernacular architecture of the county, even in the area with the largest resource of local building stone, the Wealden Greensand.

In the Saxon and medieval periods, Hampshire was heavily influenced by the extent of royal and ecclesiastical ownership. About 25% of Hampshire’s land was church-owned. The county’s agricultural surpluses financed the building of many fine stone buildings, including castles, the Old and New Minsters at Winchester, monasteries, churches and manor houses, as well as city walls for Winchester and Southampton. The Roman builders of Portchester Castle and Saxon and Norman churches made extensive use of coursed unsplit local flint combined with better quality stone for dressings and architectural details. In addition to the local Greensand sandstones and Heathstone, stone was brought in from Wiltshire quarries such as Chilmark. The county’s coastal position and river network also facilitated the importation of building stone from the Isle of Wight (Quarr Stone and Nettlestone Sandstone), Dorset (Purbeck Stone), Devon (Beer Stone) and northern France (Caen Stone) all of which were generally used for dressings, wall facings and features such as doorways and windows.

From the start of the C14th, the practice of knapping and squaring of flints to produce flat surfaces which could be framed (often in limestone) became common. Such ‘flushwork’ became highly fashionable in the late C15th. Flint generally is one of the most characteristic building materials of a large part of the county, being found in houses of various social status, farm buildings and boundary walls. It is still used today.

The Dissolution of the monasteries resulted in the break-up of monastic lands and a growth in large privately-owned farming estates. The abandonment of some monastic buildings provided a ‘new’ supply of ‘local’ stone which could be reused in some larger new houses and barns. From the mid-C16th brick became the fashionable and high status building material, and was used in several important houses of this period including Basing House and The Vyne. By the end of the C16th brick was being used for some town houses and rural vernacular buildings, but even into the C17th brick was mostly used for plinths to timber-framed buildings and for the construction of chimney stacks. By the C18th brick had become the dominant building material across the county although in some areas such as the Test Valley, chalk cob was widely used for smaller houses.

Several country houses were built or remodelled in the C18th and C19th, which were constructed of brick, were rendered or used imitation stone, with only limited use of natural stone. Highclere Castle is one of the few stone-built mansions, being relaced in Bath Stone ashlar by Sir Charles Barry in 1839-42.

With enclosure of large areas of downland in the C18th and C19th and changing agricultural practices, some new farmsteads or outfarm groups were built within the newly enclosed fields. Many existing farmsteads had buildings added using brick and flint, or brick alone, although timber-framing remained widely used even into the mid-C19th.
Wealden Greensand

Despite the local availability of the most valuable building stones found in the county, the use of timber frame predominated in the vernacular buildings of the area until the 17th century. Stone was used more for the footings of barn walls or smaller farm buildings such as stables.

However, in localised areas, close to the chain of quarries on the Weald edge between Bentley and Ramsden, stone was commonly used in buildings and walls. Upper Greensand Malmstone was used as ashlar, or as coursed and uncoursed rubble. It was occasionally used as paving, with harder, more chert-rich forms laid as pavement cobbles. Examples of houses and churches built of Malmstone can be seen in villages along the foot of the Greensand escarpment, such as Selborne and Blackmoor.

Stone from the Wealden Greensand was used across the county. Stone from Selborne was used in the rebuilding of Winchester Castle by Henry III between 1222 and 1224, in addition to stone imported from Caen, Wiltshire and the Isle of Wight. But even in the Wealden Greensand area stone was often imported.

Cardinal Beaufort’s residence at East Meon was remodelled between 1438 and 1441 using local Malmstone and flint, but also features stone from Beer in Devon.

Lower Greensand sandstones were used in many farm buildings in this part of the county including hop kilns serving the local hop industry which developed from the 17th century, although most hop kilns are of 19th-century date. The stone is usually used as coursed rubble, but occasionally the stone was finely dressed as in the highly unusual barn at Ditcham.

Lower Greensand variants include Carstone, Bargate Stone and Hythe Sandstone, which are occasionally used for ashlar work as well as in coursed rubble walling; with Bargate Stone sometimes seen as roughly dressed ‘brick-sized’ blocks. Some was also occasionally used for pavement cobbles. Bargate Stone is found in St. Mary’s Church, Liss and the War Memorial cloisters at Blackmoor, whilst Hythe Sandstone is used in the church of St. Peter, Petersfield and many buildings in Bramshott. Carstone can be seen in the tower of St Mary’s, Buriton and Burgates Farm House and the walls of adjoining properties in West Liss.

One interesting feature rarely seen elsewhere in Hampshire is ‘galleting’, the practice of pushing fragments of Carstone or small flints into the mortar between the main blocks. A good example of Carstone galleting (used in conjunction with Malmstone) is provided by the Five Bells Inn, Buriton.
Hampshire Downs and South Downs

Timber framing dominates the vernacular architecture of this area despite the plentiful supply of flint from the Chalk. Flint was usually a by-product of quarrying of chalk for lime or marling, or picked from the fields after ploughing. Both forms were widely used across the area, ranging from the rubble core of the New Minster walls, to the facing stones of numerous church walls and the roughly knapped flintwork of the footings of timber-framed buildings. Its widespread use for the walls of houses dates from the C18th and is highly characteristic of C19th cottages where it is combined with brick dressings, quoins and banding.

The Chalk provided another characteristic building material in this area – cob. The chalk-derived soil was mixed with straw and water and built up in layers to form thick walls that were usually rendered on houses, but often left exposed when used for boundary walls. Cob cottages, typically thatched, are a particular feature of some Test Valley villages such as Monxton.

Some harder chalk was used as rubblestone, particularly in the South Hampshire Downs. Occasionally chalk was used as ashlar, for example, in the Church of St Peter and St Paul, Hambledon (Hambledon Chalk). The use of rubblestone in exterior walls of cottages, farmhouses and barns is common in the Meon Valley. Examples can be seen at Soberton, Lower Clatford and Wherwell in the Test Valley and The Dell at Kingsclere in the Northern Downs. At the end of the C19th many architects associated with the Arts and Crafts Movement became interested in using local stone. One of the best examples of the use of chalk blocks from Brook Quarries is Marshcourt, south of Stockbridge in the Test Valley by Edwin Lutyens.

North Hampshire and South Hampshire Lowlands

Much of the landscape was historically well-wooded before its clearance by assarting generally by the C14th. Timber framing was the predominant vernacular form for both farm buildings and houses. The supplies of local building stones were very limited; there is a small outcrop of Lower Greensand at the foot of the chalk scarp near Sydmonton. This and other local stones such as Ferricrete, Heathstone, Ironstone, Ferrells and Burley Rock were used as rubblestone. Examples can be seen at Heckfield to north-east of Basingstoke.
The South Hampshire Coast has been dominated by the urban developments of Southampton, Fareham, Gosport, Havant, Portsmouth and Titchfield since the C13th. The area’s brick earths, marine clays and silts provided little in the way of useful building stone. Beach pebble flint and Tufa were used in coastal villages and towns, mainly in walls. Beach flint cobbles are found in the walls of the parish church at South Hayling. To the east of Portsmouth, flint pebbles were often supplemented in walls by Sarsen Stone and erratic pebbles. Tufa and Sarsen Stone are found in the C13th Church of St. Mary in Hayling. This building also features irregular rubblestone of Harwich Formation Siltstone.

Extensive use of imported stones has been made in the area since the Roman Period. Large monastic estates developed at for example Netley and Titchfield. At Titchfield Abbey the buildings were largely constructed of Quarr Stone. Nettlestone Sandstone, also from the Isle of Wight was used at Netley Abbey.

Southampton’s 2 km of city walls were built mainly in Bembridge Limestone and Quarr Stone during the 1360s. Sarsen Stone was also used in the city walls, with some rare London Clay Cementstone nodules and Septaria. Portsmouth’s fortifications started to develop from the late C15th, and gradually extended to encompass Gosport in the C17th. Stone was used for structures such as Southsea Castle and the rebuilding of the city’s walls by Henry VIII in the C16th. The defences of Portsmouth include a remarkable range of forts reflecting different styles and technologies, defending the area both from sea and land. A range of imported stones were used, including Quarr Stone, Purbeck Stone, Portland Stone and others from further afield, although most of the C19th forts were primarily built in brick.

New Forest

The heathland area was agriculturally poor with few farmsteads and a large number of smallholders. Cottages and farm buildings were timber-framed, clay walled and later brick. They sometimes incorporated local stones available from the sandy heaths. These included Quaternary iron-cemented sandstones and conglomerates, Heathstone, Ferricrete and Burley Rock. They were often mixed with nodular flint. Examples of their use can be seen in Brockenhurst, St Michael and All Angels, Sopley and in Burley’s village walls. Stone from the Tertiary Reading Beds was used on the northern and western side of the area, for example at Fordingbridge, Sopley and in the Church of St Mary at Ellingham, near Ringwood. Irregular Readings Beds rubblestone was used occasionally along its outcrop and in adjoining areas, such as in the church tower of All Saints in Harbridge.

In the far north west corner, on the borders of Wiltshire and Dorset, the chalk of the Martin and Rockbourne Downs dominates the landscape and extends into Cranborne Chase and the chalk downs of Wiltshire and Dorset. In this area of Hampshire flint used in alternate banding of brick and flint is locally distinctive, as is the use of cob for walls.

Stone was widely imported for churches and larger buildings. In the coastal plain the Cistercian abbey at Beaulieu was mainly built of Quarr Stone, with Caen Stone used for interior decoration and Purbeck Marble for columns. Remains of large stone-built barns survive at several locations including St Leonard’s, possibly the largest tithe barn in England, built of coursed rubblestone including Quarr Stone and Bembridge Limestone.

Many churches were rebuilt or expanded in the C19th and early C20th, typically using a range of imported stones. For example, Swanage, Chilmark, Bath and Purbeck stones, were used in the church of St. Katherine at Exbury.
Hythe Sandstone is a medium- to coarse-grained sandstone which varies in colour from pale brown to yellowish-orange, dark green or pale grey; it sometimes exhibits a bluish sheen. Individual sandstone units may be thinly bedded or more massive. Some contain grey cherty layers whereas others are friable and striped with alternating paler (quartz-rich) and darker (glauconite-rich) bands.

Many of the sandstones are bioturbated and contain the fossil burrow structures of *Planolites* or *Macaronichus*, or are iron-stained and exhibit Liesegang banding. The more finely-bedded units often exhibit sedimentary structures including ripple marks and planar and trough cross-bedding on a variety of scales. Hythe Sandstone is typically hard and resistant, although weathering often picks out layers with less calcareous cement. Grey, cherty layers (where present) often remain more prominent.

Hythe Sandstone is employed mainly in the far east of Hampshire in the area extending from Headley south to Petersfield and is used as fine cut or roughly dressed ashlar and as rubblestone (sometimes coursed). Good examples of its use can be seen in numerous buildings including the churches of St. Peter in Petersfield, St. Mary in Sheet, St. Luke in Grayshott, St. Mary in Bramshott and All Saints in Headley, along with Old Holme School in Headley and Passfield Farmhouse near Liphook. The village of Bramshott contains several particularly fine examples of the use of locally quarried Hythe Sandstone.
Sandgate Formation
Bargate Stone (Bargate Sandstone)

Bargate Stone is a hard, relatively durable, medium- to coarse-grained, calcareous sandstone or gritstone, which is characteristically pale orange, honey-brown or pale brownish greyish in colour. It typically weathers with a brown surface.

The sandstone varies from massive to well-bedded. The latter naturally breaks into flaggy layers 10-15 cm thick, enabling it to be easily used as brick-sized blocks. The stone occasionally exhibits cross-bedding or honeycomb weathering textures and contains layers of the ‘macaroni-like’ fossil burrow Macaronichus, which are typically 0.5 cm wide cylindrical structures, each surrounded by a rim of glauconite grains.

Bargate Stone is intermittently exposed along a narrow outcrop which follows the upper edge of the underlying Hythe Formation in eastern Hampshire extending from Petersfield northwards via Liss, Langley, Liphook and Lindford to the west of Churt. It is mainly used as coursed rubble walling, although it is not uncommon to see it employed as roughly dressed ‘brick-sized’ blocks. Examples of its use include the churches of St. Mary at Liss and St. Peter in West Liss (the south wall of the south aisle), and the War Memorial cloisters at Blackmoor.

Folkestone Formation
Carstone (Iron-sandstone, Forest-stone, Clinker)

Carstone is a hard, medium- to coarse-grained, ochreous to dark brown or reddish-black quartzose sandstone or gritstone, containing chert and quartz pebbles set within a matrix of iron oxides and hydroxides. It occurs as irregular shaped masses, thin layers and veins within the ‘typical’ sands that comprise the Folkestone Formation. It may be distinguished from the similarly coloured Burley Rock (a type of Ferricrete) by its lack of orange-stained Flint clasts.
Carstone is often massive, but larger blocks may reveal cross-bedding structures and display Liesegang banding. The surfaces of cut blocks may exhibit a ‘bluish sheen’ caused by veneers of iron oxide. Generally, Carstone is a hard, durable, rock that is resistant to weathering.

Carstone has found widespread use in eastern Hampshire across and adjacent to its outcrop, which comprises a roughly north-north-east to south-south-west trending band from Frensham through Bordon to Petersfield. It is typically employed either as coursEd (often roughly hewn) or uncoursed rubble in walling. Numerous examples of its use can be seen in Greatham (at Gould’s House and around the old church) and at West Liss (the tower of St. Peter’s Church, Burgates Farmhouse and ‘Palmers’ along Warren Road). Many buildings in Buriton have Carstone walls (e.g. the tower of St. Mary’s Church) and it has been used as galleting in walls alongside Malmstone in the Five Bells Inn. Other notable examples of Carstone use occur in Kingsley (e.g. the Church of St. Nicholas), Liss, Blackmoor and in Woolmer Forest.

Selborne Group
Upper Greensand Formation
Malmstone (Malm Rock, Bluestone, Blue Rag, Firestone)

Malmstone is a massive, sparsely fossiliferous, calcareous siltstone which varies in colour from near pure white to pale blue-grey. Some beds are darker with cherty layers which sometimes fill burrow structures. Chert-rich forms are more typically grey or have grey cherty streaks and a sub-conchoidal fracture. Some beds are glauconitic and contain fossil bivalves, echinoids and ammonites as well as trace fossils. Pale-coloured Malmstone can appear similar to Chalk, but it does not powder in the same way and weathers to an attractive cream or pale buff colour.
The best quality and hardest building stone varieties are known as Bluestone or Blue Ragheart. These have a bluish sheen and typically weather with a buff to pale brown, sometimes flakey, crust; they contain more chert and calcite cement than the paler whitish siltstone varieties. The latter varieties are relatively soft and often show concave weathering away from the mortar joints in walls.

Malmstone is very widely employed throughout Hampshire, but especially so in eastern Hampshire where it predominates over any other building stone type used. It was formerly worked all along its outcrop which forms a distinct escarpment running from Binsted in the north, south through Selborne to Langrish, then east to Buriton. In eastern Hampshire many exposures of Malmstone are still visible along roadsides and sunken lanes, particularly in the Selborne area.

Although much of the stone is a freestone and has been used as ashlar, it is generally roughly dressed and laid to course, or used as rubble stone. Harder, chert-rich forms are occasionally used as paving cobbles.

Excellent examples of houses built of Malmstone can be seen in villages all along the foot of the chalk escarpment where many old buildings and boundary walls are made of regular trimmed blocks. Particularly fine examples of the use of Malmstone occur in the villages of Bentley, Binstead (Roxford Cottage), Blackmoor (church of St. Matthew), Buriton (Church of St. Mary, the Five Bells Inn, Brook Cottage and Rose Cottage in North Lane), East Meon, East Worldham (Church of St. Mary the Virgin), Froyle, Hawkley and Oakshott (Oakshott Farm). The village of Selborne also contains noteworthy examples of the use of Malmstone in buildings (e.g. Church of St. Mary, the Old Vicarage) and also as cobbles and paving.
Upper Cretaceous
Chalk Group - White Chalk Subgroup
Quarry Flint (‘Fresh’ Flint)

Quarry Flint is one of the most common and widely used building stones in Hampshire. It originates from bands and nodules of flint that occur within the chalk beds of the White Chalk Subgroup. Quarry Flint was dug from chalk pits and has been used extensively close to and within the outcrop area of the ‘White Chalk’, both on and adjacent to the Downs.

Quarry Flint is an extremely fine-grained (cryptocrystalline) and hard form of silica containing microscopic, quartz-crystal aggregates. It usually occurs as irregularly-shaped nodules that are 10-20 cm across, or as (sub-)rounded pebbles and cobbles; occasionally, it is also found as weakly banded tabular sheets or layers up to 20 cm thick. The colour is very distinctive; fresh flint nodules have a white outer cortex with darker coloured (black, dark grey) interior.

Quarry Flint breaks with a characteristic conchoidal fracture, producing razor-sharp, fine edges; the cleaved surfaces may exhibit banded structures resulting from the alternation of layers of slightly different composition. Flint nodules may contain cavities lined with translucent botryoidal chalcedony or small transparent quartz crystals; some flints contain well preserved fossils with echinoids, sponges, bivalves and burrow-structures being the most commonly encountered types.

Flint is used extensively in walls in a wide variety of ways: it is laid to course as rough tabular ‘sheets’ or as nodules; in squared chequer-work; as knapped, faced, trimmed or cleaved-faced stone in random or decorative arrangements; or as galleting (used to fill interspaces between irregular flint nodules or other stones when the mortar is wet, thus reinforcing the mortar).

The stone is widely used across the outcrop of the White Chalk Subgroup in central Hampshire (within an area bounded by Netherton - Lugershall - West Tytherley - Clanfield - Bordeian - Long Sutton - Basingstoke and Kingsclere). Quarried Flint is employed primarily as coursed and uncoursed nodular rubblestone for walling, but can also be seen roughly knapped, single-faced or trimmed into square blocks for high quality use, especially in churches and larger houses. Flint flakes are commonly used for galletting. Examples of its use in churches can be seen at: St. John the Evangelist at Langrish, St. Peter at High Cross, St. John at West Meon, All Saints at East Meon, St. Michael & All Angels at Chalton, St. Peter & St. Paul at Exton, St. Nicolas at Wickham; and St. Mary at Bishopstoke. Particularly good examples of Quarry Flint use also be found in the villages

Forbes Almshouses at East Meon, constructed in 1864 of locally sourced and knapped Flint nodules. The mullions and dressings are built of Bath Stone.

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of East Meon (e.g. the Alms House) and Bishop's Waltham (e.g. the Bishop’s Palace). Noteworthy examples of dressed flint nodules with flint galletting occur at Church Cottages, Compton and in the western end of Broughton Church in the Winchester district.

The extremely hard and durable nature of Quarry Flint-type nodules has resulted in their having been recycled by natural processes into younger deposits. These ‘Quaternary Flints’ which have distinctive characteristics are described in the Quaternary section of this Atlas.

**Chalk (‘Clunch’)**

The ‘White Chalk’ limestones of the Upper Cretaceous White Chalk Subgroup are amongst the most distinctive and easily recognised building stones employed in Hampshire. They are white to very pale grey, typically structureless, fine-grained limestones, sometimes containing fossil bivalves (inoceramids), echinoids and occasionally crinoids, brachiopods and belemnites. Pale-coloured Malmstone can resemble Chalk but does not powder in the same way.

Chalk is generally unsuitable for exterior stone-work as repeated wetting and drying, coupled with frost action, causes the relatively soft rock to powder and disintegrate into small angular brash. Softer forms of the stone, when used externally, may show concave weathering away from mortar joints. Where used as a building stone in Hampshire, Chalk tends to be protected from rain by wide eaves or is set on a foundation course of a more durable stone.

Chalk has been quarried as a local source of building stone across much of its outcrop in Hampshire, although its use is relatively limited, especially in east Hampshire where Malmstone predominates as a near-equivalent building stone. Some Chalk finds localised use as ashlar, but a significant proportion of this is confined to internal use. Its most widespread use (sometimes referred to as ‘Clunch’) is along the west and east Hampshire Downs, notably as a rubblestone in...
exterior walls of cottages, farmhouses and barns in the Meon Valley (where care is needed to distinguish it from Malmstone). Examples can be seen at Soberton, Lower Clatford, The Dell at Kingsclere, Mapledurwell, Wherwell (Winchester Road or Fullerton Road) and Ropley. However, some former examples of buildings featuring ‘Clunch’ have since been demolished since they were first recorded in these areas during the 1900s. Chalk blocks from Brook quarries were used in the construction of Marsh Court, located to the south of Stockbridge.

**Newhaven Chalk Formation**

**Hambledon Chalk**

Hambledon Chalk is a white, uniform, coarse-grained (‘gritty’) chalky limestone with scattered phosphatic grains and occasional small flints. Bioturbation structures are present which weather out leaving a coarse texture. It is a relatively durable form of Chalk, but susceptible to frost action. Hambledon Chalk is similar to some forms of Lavant Stone which is seen in West Sussex and also originates from the Newhaven Chalk Formation.

Hambledon Chalk is restricted to south-east Hampshire. It has been used mainly as ashlar and walling stone in churches at Southwick (St. James) and Hambledon (St. Peter & St. Paul’s); both villages sit on the Newhaven Chalk Formation.
Tertiary (Palaeogene)

Lambeth Group

Upnor Formation

Sarsen Stone (Greywethers, Bridestone)

Sarsen Stones often occur as rounded or elongate pebbles, cobbles, boulders or even metre-scale slabs (up to 2 m in length). They are typically grey to pale brown in colour, becoming distinctly creamy-buff when weathered, and possess a very fine- to fine-grained texture comprising sub-rounded quartz grains set within a silica matrix, which is visible on a fractured surface. Sarsen Stones are very hard and resistant and their surfaces are often smooth and may occasionally show poorly-defined bedding structures.

Sarsen Stones have a relatively local and limited use in Hampshire, and are found mainly as isolated pebbles and cobbles in ancient church and town walls in the south and south-eastern parts of the county. Examples of their use can be seen in walls of the C13th Church of St. Mary, Hayling and the ancient city walls of Southampton.

Reading Formation

Reading Beds Sandstone (Reading Beds, Reading Formation Ironstone)

Typically Reading Beds Sandstone is a fine- to medium-grained, iron-rich sandstone which has a rich reddish-brown or orange-brown colour, although some (glauconitic) sandstones may be grey-green in hue. The reddish coloured stones are very distinctive, with the lighter and richer red colouration of some blocks being a useful means of distinguishing this ferruginous stone from the otherwise similar Carstone.

Reading Beds Sandstone is found along the edge of the Chalk Group outcrop in northern Hampshire (between East Woodhay and Long Sutton), in western Hampshire (adjoining the New Forest National Park between North End and Fordingbridge) and in southern Hampshire (extending from West Dean, near Salisbury, via Bishops Waltham to Horndean).

The tougher, coarser-grained forms of Reading Beds Sandstone are relatively resistant to weathering, and this combined with its attractive colour, has meant that the stone is used as an...
irregular rubblestone along its outcrop and in neighbouring areas, especially in the New Forest. Good examples of its use are provided by the church walls at Ellingham and Fordingbridge and in the church tower at Harbridge (where it is present as occasional blocks).

Thames Group

**Harwich Formation**

**Harwich Formation Siltstone (Basement Bed)**

This thin siltstone unit (formerly known as the London Clay Basement Bed) is only 4 m thick, and occurs in a narrow outcrop in northern Hampshire (from East Woodhay to Old Basing) and southern Hampshire (around Fordingbridge, Shootash to Havant and Rowhams to South Hayling). It comprises grey to brown, fossiliferous siltstones with occasional shelly argillaceous limestones; some beds are packed with small, straight, calcareous fossil burrows of the serpulid worm *Ditrupa*, which may reach up to several cm in length.

Harwich Formation Siltstone has a very local and limited use as an irregular rubblestone. An example of its use is the C13th Church of St. Mary in Hayling. Isolated blocks can also be observed in walls in Up Nately.

**London Clay Formation**

**London Clay Cementstone (Septaria)**

The dominant lithology of the London Clay Formation is clay, although there are layers of concretionary sandstones and cementstones throughout the formation which have been locally used for building in the south and far south-east corner of Hampshire.

London Clay Cementstone comprises ellipsoidal concretions of fine-grained, pale to dark brown mudstone and siltstone, which reach up to 60 cm in diameter. Individual concretions are often septarian and exhibit a transverse network of pale coloured calcite veins or mud-filled cracks. The pale to dark brown colouration of the concretions is distinctive, although upon weathering they sometimes develop a pale greyish, or whitish ‘skin’.

Cementstones have a very localised and limited usage in Hampshire. They were employed as an irregular rubblestone either ‘as found’ (‘in-the-round’) or split and crudely dressed. Examples can be seen in Southampton’s ancient city walls.

The late C13th gatehouse (God’s House) in Southampton City Walls is constructed mainly of Bembridge Limestone but occasional blocks of Sarsen Stone, Bognor Rock, Ferricrete and Septaria (London Clay Cementstone) also occur within the wall fabric.
Quaternary Flint

Quaternary Flint occurs in large quantities in Hampshire and deposits are present across large parts of the Downs and coastal plains. This widespread availability, combined with its hardness and durability, means that Quaternary Flint is one of dominant types of building stone used in the county. It typically occurs as irregularly-shaped nodules or as sub-rounded pebbles and cobbles (depending on the flint type). The colour is variable; less weathered flint nodules or pebbles have a cream outer cortex with darker coloured (greyish) interior; weathered flints or those that have lain in soil or superficial deposits for a long period, may be variously discoloured or bleached, often with brown stained interiors due to the precipitation of iron hydroxides from percolating ferruginous water.

Quaternary Flint is used extensively as a walling stone in a wide variety of ways: as nodules or pebbles laid roughly to course; as squared blocks as part of chequer-work; as knapped, faced, trimmed or cleaved face stone in random or decorative arrangements; or as galleting (when flaked flints are used to fill the spaces between irregular flint nodules or other stones).

Two main types of Quaternary Flint were used in Hampshire.

Field Flint (Brown Field Flint)

This type of flint typically occurs as irregularly-shaped nodules within the soil of fields on the Downs. The size of the nodules varies from 10-30 cm but larger nodules can occur. The outer cortex of the nodule is usually cream coloured with a darker brownish or greyish interior which becomes white on old fractured surfaces exposed to weathering. This ‘lightly weathered’ appearance helps distinguish Field Flint from the much

Walls of the C12-14th Brewery and Bakehouse at Bishop’s Waltham Palace, constructed substantively of Field Flint nodules laid roughly to course
‘fresher-looking’ Quarried Flint, which has a white outer cortex and very dark grey or black interior.

Field Flint is a very common and widely used stone in Hampshire, and was employed in a wide variety of buildings and structures across the area of the Downs and (to a lesser extent) along the coastal plains. It was used extensively in walls in a variety of ways, with nodules often being selected for their shape and size, and laid in either a random or coursed manner.

Field-picked flint also much used to maintain field tracks and as a source of decorative dressed flints for buildings. Many flint-built buildings and walls provide sporadic examples of the use of this variety of flint e.g. the Brewhouse and Bakehouse building at Bishop’s Waltham Palace and the Church of St. Peter at Bishop’s Waltham itself (especially the south wall of the chancel) and the Church of the Holy Trinity at Blendworth. Other good examples occur at Silchester Fort, Boarhunt, Southwick, North Waltham, Crondall, Up Nately, Mapledurwell, Ellisfield, Farleigh Wallop and Warnford.

Beach Pebble Flint (Beach Cobble Flint)

Beach Pebble Flint typically occurs as pale to dark greyish, rounded pebbles and cobbles up to 10 cm in size, but are occasionally larger. The pebbles often exhibit a ‘frosted’ surface appearance or ‘chatter-marks’ (small surface cracks) caused by impacts with other beach pebbles.

Beach flint was typically used as and where it was found, mainly in the southern Hampshire towns and villages within the coastal strip and adjoining low-lying coastal areas between Milford on Sea / Lymington eastwards as far as Hayling Island. It was employed mainly in walls in a variety of ways, although pebbles and cobbles obtained from the beach were often sorted for size and laid to course. To the east of Portsmouth, flint pebbles used for walling purposes were often supplemented by Sarsen Stones and erratic pebbles obtained from the same source. A notable example of the use of Beach Flint cobbles is provided by the walls of the Parish Church at South Hayling.

The tower of St. James’ Church, Southwick displays fine chequer work of Flint with blocks of Malmstone, Caen Stone and occasional Hambledon Chalk.
Ferricrete (Heathstone, Iron Pan, Ironstone-conglomerate, Ferrells)

Ferricrete is the generic name given to iron oxide-cemented, coarse-grained sands, gravels, conglomerates and breccias which have formed within soil and superficial sediments due to the percolation of ferruginous groundwaters. It often occurs on sandy heaths overlying Palaeogene strata in irregular layers up to 50 cm thick. It is relatively soft when first excavated, but hardens upon exposure to air.

Ferricrete is variable in colour although it typically occurs in various orange-red, dark reddish-brown or purplish-brown hues. The distinctive conglomeratic or brecciated texture, created by clasts of flint, chert or occasionally sandstone set within an iron oxide-rich sandy matrix, readily distinguishes Ferricrete from the otherwise similar, dark reddish-brown coloured Carstone.

Ferricrete is typically seen as isolated, rounded blocks as part of rubblestone walling or as roughly hewn blocks in medieval church walls in the areas where it was worked, mainly over sandy heath areas in northern and southern Hampshire. It was widely employed in the New Forest area where, along with other Palaeogene ironstones, it forms strikingly coloured patches in the rubblestone walls of many of the local churches, e.g. the Church of St. Mary at Ellingham.

Several distinct varieties of Ferricrete are now recognised in the New Forest area:

**Sopley Stone** is a homogenous, relatively fine-grained variety with a distinctive dark mauve-purple colour. It has an even texture and colour distinguishing it from the otherwise similar Carstone. The best example of use of Sopley Stone is above the main entrance porch to the Church of St. Michael and All Angels at Sopley. The source of this stone type remains unknown.
Burley Rock (or Puddingstone) is a dark purplish-brown to purplish-black variety of Ferricrete containing sub-angular to sub-rounded flint pebbles and flakes which are often whitened internally and stained pale brownish or orange by iron hydroxides. Burley Rock was originally quarried around Burley village and it can be seen in several buildings and walls within the village; a particularly fine example of its use is in the churchyard wall of St. Mary’s at Ellingham.

Hasley Hill Heathstone is a relatively homogenous, medium-grained pale orange or ochreous coloured variety of Ferricrete that occurs at Hasley Hill. The developments of this stone overlie sands and clays assigned to the Bracklesham Group.

Tufa (Travertine)

Tufa is a whitish or pale grey coloured, highly porous limestone formed by the precipitation of calcium carbonate (lime) from springwaters which have passed through calcareous rocks (such as limestone or Chalk). Surfaces often exhibit a fibrous or mammilated structure or show faint traces of banding.

Tufa has seen only very localised and occasional use as a rubblestone in medieval church walls in south-eastern Hampshire. It occurs as isolated blocks in the C13th Church of St. Mary at Hayling along with a very wide range of other ‘unusual’ and little used building stones including Quarr Stone, Nettlestone Sandstone, Harwich Formation Siltstone, Bognor Rock and Sarsen Stone.
Imported Stones

Overall, Hampshire has a relatively limited range of locally-sourced building stones and no quarries currently extract building stone in the county. Although fairly extensive use was made of these locally sourced stones in the past, a roughly equivalent number of different types of stone was imported for building purposes in the county. Most of these imported stones originate from Dorset, West Sussex and the Isle of Wight.

A summary of the significant imported building stone types seen in Hampshire (with brief descriptions) follows below. Relatively minor and less commonly used imported stone types encountered in the county are listed in Table 2.

Further detailed descriptions of all imported stones relevant to Hampshire can be found in several of the publications listed in the Further Reading section of this Atlas and in the corresponding Strategic Stone Study atlases covering the neighbouring county areas, notably Dorset, the Isle of Wight and West Sussex.

Caen Stone
Normandy, France
Middle Jurassic
Calcaire de Caen

A high quality, creamy or yellow coloured limestone (freestone). Has been employed in Victorian ‘new build’ churches, especially as ashlar walling, ornate decorative column or arch work and mouldings for doors and windows. Examples of its use in Hampshire include churches at West Meon (St. John), Blendworth (Holy Trinity) and Andover (St. Mary).

Left: Church of St. Mary, Andover, rebuilt in 1840 in the Early English (Salisbury) style with knapped Flint walls and Caen Stone dressings

Bath Stone
Bath, North-east Somerset
Middle Jurassic
Chalfield Oolite Formation, Great Oolite Group

A creamish to ochreous, oolitic limestone (freestone). Much used in Victorian new build and church refurbishment, especially as ashlar for walling and mouldings for doors and windows. Examples of its use in Hampshire include churches at Hinton Ampner (All Saints); Farlington (St. Andrew), Denmead (All Saints) Bishopstoke (St. Mary) and Brockenhurst (St. Saviour’s).

Left: St. Saviour’s Church, Brockenhurst, built 1895-1903 of squared Purbeck Stone with extensive dressings and tracery of Bath Stone

Chilmark Stone
Wiltshire
Upper Jurassic
Portland Stone Formation, Portland Group

Pale grey, fine-grained, shelly limestone, often showing sections of the fossil bivalve Trigonia and cross-bedding. In Hampshire, it is typically used as an ashlared freestone or for dressings (mouldings) in churches owing to its uniform nature. It has also been employed for effecting repairs to churches and more extensively for Victorian restoration work. Examples of its use include Headley (All Saints, for window repairs); Blendworth (Holy Trinity, for the porch windows); Selborne (St. Mary, for window repairs) and Micheldever, Winchester (All Saints).

Left: The Church of St. Mary, Selborne, has window repairs of Chilmark Stone
Purbeck Stone
Isle of Purbeck, Dorset
Lower Cretaceous
Durleston Formation, Purbeck Group

A buff to pale grey limestone, sometimes with shelly fragments or voids; fresh surfaces often cream coloured. A good general purpose building stone, used as a rubblestone and as squared or ashlar blocks for walling. Dressed blocks often exhibit a rusticated or cut diagonal-trough finish. Notable examples of its use in Hampshire are the Church of St. Catherine in Exbury and Lepe in the New Forest and Ibsley Bridge near Harbridge.

Left: Ibsley Bridge near Harwell, rebuilt and expanded in 1930, is constructed of dressed Purbeck Stone blocks

Purbeck Stone-slate
Isle of Purbeck, Dorset
Lower Cretaceous
Durleston Formation, Purbeck Group

A grey or buff, heavy, fossiliferous, slabby limestones, typically employed in the form of a narrow strip or broad edging along the eaves of the roof adjoining clay tiles or pantiles. Examples can be seen in Burgates Farmhouse, West Liss and St. Mary’s church, Ellingham.

Left: The walls of the Church of St. Nicholas at Brockenhurst have been extensively rendered, but the eaves of the roof feature Purbeck Stone-slate tiles

Portland Stone
Isle of Portland, Dorset
Upper Jurassic
Portland Stone Formation, Portland Group

Very pale, white, fine-grained limestone. Used as a freestone in classical façades, pillar work, ornate dressings and in Victorian ‘new build’ churches and restoration works. Examples of its use include Calshot Castle, the Midland Bank at Portsmouth, the Guildhall and Park Building of Portsmouth University and the Nelson Monument at Boarhunt. It has also seen use in Hampshire churches including: Bishop’s Waltham (St. Peter), Swanmore (St. Barnabas, especially for windows and string course) and West Meon (St. John).

Above left: The Guildhall, Portsmouth, built in 1886-90 in Italianate Classical style of Portland Stone ashlar

Left: The Nelson Monument at Boarhunt, constructed in 1807 of Portland Stone ashlar on a granite base, commemorates Lord Nelson and the Battle of Trafalgar
**Green Ventnor Stone**  
*Isle of Wight*  
Lower Cretaceous  
Upper Greensand Formation, Selborne Group

A distinctly green-coloured variety of Ventnor Stone with a higher concentration of green glauconite grains. Has seen occasional use in the southern part of Hampshire, principally in churches. Generally found as single blocks, but sometimes as ashlar walling. Examples of its use include churches along the western edge of the New Forest NP (e.g. All Saints Church, Harbridge) and St. Mary's College, College Street, Winchester.

*Left: The base of the tower at All Saints Church, Harbridge, is built of squared blocks of Ventnor Stone, Malmstone and occasional ironstone*

**Ventnor Stone**  
*Isle of Wight*  
Lower Cretaceous  
Upper Greensand Formation, Selborne Group

A massive, grey-green, glauconitic, fossiliferous sandstone, often bioturbated and iron-stained which tends to weather badly. Quite widely used in Hampshire, especially as a general walling stone. It was mostly dressed into rectangular or square blocks, but was less commonly employed as ashlar. Examples of its use include churches along the western edge of the New Forest NP (e.g. All Saints Church, Harbridge) and St. Mary's College, College Street, Winchester.

*Left: The Church of St. James, Southwick; the lower courses contain squared blocks of Green Ventnor Stone, Malmstone and occasional ironstone*

**Mixon Stone**  
*West Sussex*  
Palaeogene  
Selsey Sand Formation, Bracklesham Group

A tough, coarse-grained, pale grey to honey-yellow bioclastic limestone or calcareous sandstone containing numerous microfossils, especially disc-shaped foraminifera Fasciolites (*Alveolina*). In Hampshire, the use of Mixon Stone is essentially limited to the Langstone area, where it is employed mainly for coursed rubble walling. Its uses include the construction of the Hayling Island bridge in 1824, the east wall of the Church of St. Thomas a Becket at Warblington, the remains of the old sea wall and Old Hayling Bridge on the north foreshore of Hayling Island and garden walls in Langstone.

*Left: Garden wall in Langstone High Street built mainly of Mixon Stone*

**Horsham Stone-slate**  
*West Sussex*  
Lower Cretaceous  
Weald Clay Formation, Wealden Group

Medium- to dark grey slates which are finely laminated but are otherwise mostly structureless; they readily split into 2-3 cm thick slates. Has seen only occasional and isolated use as a roofing slate in Hampshire. An example of its use is the porch roof at Holy Cross Church in Binsted, East Hampshire.

*Left: Horsham Stone-slate tiles employed for the porch and adjoining roofs at Holy Cross Church, Binstead*
**Quarr Stone**  
*Isle of Wight*  
*Palaeogene*  
Bembridge Limestone or Headon Hill formations, Solent Group

A pale grey to buff, porous, open-textured, shelly limestone; the fossils typically present as internal moulds. Quarr Stone can often be seen in the Saxon and Norman remnants of several churches in Hampshire, especially those in the southern part of the county. It is mainly employed as ashlar in walling and buttresses, although usually only scattered pieces have survived later rebuilding works. It is recorded from churches in Bishop's Waltham (St. Peter), Boarhunt, Corhampton (of Saxon age), East Meon, Fareham, Headborne, Hinton Ampner, Little Sombourne, Tichborne, Titchfield, Southwick (St. James, in the buttresses); Worthy and Wymering (St. Peter & St. Paul). Quarr Stone was also used in medieval military architecture at Portsmouth, Portchester and Southampton forts/castles and in surviving medieval walls and buildings in Southampton. It is recorded in Bishop’s Waltham Palace (Brewhouse and Bakehouse building) and was occasionally used for carved work (e.g. the font in St. Peter’s Church in Bishop’s Waltham).

*Left: The medieval Keep and adjoining walls of Portchester Castle include Nettlestone Sandstone and Quarr Stone*

**Bembridge Limestone**  
*Isle of Wight*  
*Palaeogene*  
Bembridge Limestone Formation, Solent Group

Buff, fine-grained, shelly limestone. The fossils include the gastropod *Galba* and alga *Chara*. Bembridge Limestone (and its varieties) typically provides a good freestone which has been used in Hampshire as large ashlar blocks and as a walling stone often laid to course. It is commonly used for quoins. It typically occurs in medieval buildings in the southern part of the county, principally churches including those at North Stoneham (St. Nicholas), Chalton (St. Michael & All Angels), Droxford (the tower of St. Mary & All Saints) and Southwick (St. James). It is also recorded in Bishop’s Waltham Palace (Brewhouse and Bakehouse building) and the former Blacksmiths near Sopley. Bembridge Limestone was also employed for fortifications at Portsmouth, including C17-18th harbour defences, and in the Norman and medieval city walls of Southampton.

*Above: Former Blacksmiths at London Lane, near Sopley, built from several stone types (many reused) including Bembridge Limestone. The roof displays fish-scale roof tiles*
<table>
<thead>
<tr>
<th>Stone Name &amp; Place of Origin</th>
<th>Source Stratigraphy</th>
<th>Stone Characteristics and Selected Examples of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exotic stones</strong></td>
<td>Various</td>
<td>Highly variable owing to their having many different origins, including reused ships ballast. Ranges from dark coloured igneous rocks such as dolerites and basalts, to paler coloured metamorphic quartzites. Sporadic use in southern Hampshire as rubblestone walling, e.g. the Norman and medieval city walls in Southampton.</td>
</tr>
<tr>
<td>Tournai Marble</td>
<td>Tournai, Belgium</td>
<td>Black, very fine-grained limestone, which takes a high polish. Occasional fossils are preserved in white calcite. Resistant to weathering and normally used for interior memorials. One of the best known examples is the font in All Saints Church, East Meon.</td>
</tr>
<tr>
<td><strong>Binstead Stone</strong></td>
<td>Isle of Wight</td>
<td>Variety of Bembridge Limestone (see above). Little used in Hampshire, but employed for some blockwork and dressings at Sopley Church and as a walling stone at Le Breton Farmhouse in Gosport.</td>
</tr>
<tr>
<td>Bognor Rock</td>
<td>West Sussex</td>
<td>Dark grey, glauconitic, carbonate-cemented sandstones which typically weathers to a distinctive, light ochreous-brown colour. <em>Glycymeris</em> bivalve and <em>Rotularia</em> coiled serpulid worm fossils are diagnostic. Seen only occasionally with very limited and sporadic use in walls in the far south-east corner of Hampshire, usually as coursed and random rubble.</td>
</tr>
<tr>
<td>Beer Stone</td>
<td>Devon</td>
<td>A pale grey to buff, gritty chalk limestone containing fine shell debris. One of the best examples of its use is in Cardinal Beaufort’s residence (The Court House) at East Meon.</td>
</tr>
<tr>
<td>Purbeck Marble</td>
<td>Isle of Purbeck, Dorset</td>
<td>Dark grey to buff, shelly limestone, containing fossil <em>Viviparus</em> shells and other finely-broken shell material. Used mainly for internal church memorials, ledgers, columns, bases and capitals, such as the effigy stones standing in the inner doorway at Sopley Church.</td>
</tr>
<tr>
<td>Tournai Marble</td>
<td>Tournai, Belgium</td>
<td>Black, very fine-grained limestone, which takes a high polish. Occasional fossils are preserved in white calcite. Resistant to weathering and normally used for interior memorials. One of the best known examples is the font in All Saints Church, East Meon.</td>
</tr>
<tr>
<td>Plymouth Limestone</td>
<td>Plymouth area, Devon</td>
<td>Pale to dark grey, occasionally pinkish limestone which may contain irregular white calcite veins and fragments of fossil corals and shells. Extremely local use in Hampshire, mainly in churches in the south of the county around Totton, Southampton and Hayling Island.</td>
</tr>
</tbody>
</table>

Table 2. Summary table of the minor building stone types imported into Hampshire.
Glossary

Argillaceous: A sedimentary rock which contains a significant proportion of fine-grained clasts, such as a clay or mudstone. These rocks often weather into flakes or fine layers.

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

Bioturbated: Sediments that have been reworked or disturbed by burrowing organisms such as worms.

Bivalve: A mollusc with two shells, which may be marine or freshwater. Examples are cockles, clams, scallops, oysters.

Botryoidal: A mineral, often chalcedony, which has formed with a smooth, grape-like structure.

Breccia: A rock that comprises broken up, angular rock fragments or clasts, set in a finer-grained matrix.

Calcareous: A sedimentary rock containing a significant amount (10–50 %) of calcium carbonate.

Cementstone: See Concretion.

Chalcedony: A pale coloured type of flint or chert, often found inside a flint nodule.

Chalk: A soft, white limestone, sometimes powdery, which was formed at the bottom of a sea during Late Cretaceous times.

Chert: An opaque, extremely fine-grained sedimentary rock composed of silica (quartz). It occurs as nodules (Flint), concretionary masses, or occasionally as layered deposits.

Clast: A particle of rock or single crystal which has been derived by weathering and erosion. The basic ‘building block’ of a clastic sediment.

Conchoidal fracture: A smooth fracture surface, often occurring in a fine-grained rock such as flint, which shows a curved pattern of fine concentric rings or ripples.

Concretion (or Cementstone): A rounded or elliptical mass of harder rock occurring within a (usually softer) sedimentary rock.

Conglomerate: A sedimentary rock that comprises broken up, rounded rock fragments, pebbles (>2 mm), cobbles or boulders set in a finer-grained matrix.

Cortex: The outer layer on a nodule. Often refers to a Flint nodule, where the outer thin cortex is white coloured.

Cretaceous: A period of geological time that lasted from approximately 145 million to 65 million years ago. Sedimentary rocks deposited during the Cretaceous have yielded a number of important types of building stone such as Greensand, Flint and Chalk.

Cross-bedding: A structure in the layers (beds) of a sedimentary rock formed by the movement of water or air. The term is usually applied to sandstones and the feature itself typically resembles sets of lines which are either inclined with respect to the bedding planes or form regular arc-shaped patterns.

Cryptocrystalline: A form of texture in a rock, in which the constituent grains are extremely small, invisible to the naked eye. Flint is a typical example of a cryptocrystalline rock.

Echinoid: A type of marine organism, commonly called a sea urchin, formed of calcareous plates. Often found in Chalk sediments.

Facies: A term describing the principal characteristics of a sedimentary rock that help describe its mode of genesis.

Ferricrete: A dark reddish-brown coloured iron-oxide cemented layer formed in soil profiles or superficial deposits of Quaternary age. Typically, it contains rounded or angular pebbles of flint, chert or sandstone up to 6 cm in diameter.

Ferruginous: A sedimentary rock which contains a significant amount of iron, often giving a distinct red, orange or purple colour to the rock.

Flaggy: A sedimentary rock, often a sandstone, which splits into slabs and may be used for paving.

Flint: A form of very hard, micro-crystalline quartz. Typically occurs in Chalk deposits as rounded or irregular shaped masses (nodules) and has a dark grey or black coloured inner ‘core’, with a white outer ‘skin’.

Foraminifera: A very small single-celled marine organism that can be an abundant fossil in sedimentary rocks.
Freestone: Term used by masons to describe a rock that can be cut and shaped in any direction without splitting or failing.

Galleting: Flakes (often of Flint or Carstone) set in mortar and used to fill the spaces between irregular flint nodules or other stones.

Gastropod: A mollusc with one shell, which may be marine or freshwater. Examples are whelks, snails, limpets.

Glaucinite: A mineral composed of iron and silica. It often occurs in Cretaceous and Tertiary sedimentary rocks as small greenish coloured specks or grains. It gives the green colour to the rock type Greensand.

Greensand: A sandstone so-called because of the presence of the mineral glauconite.

Gritstone: A coarse-grained sedimentary rock composed mainly of grit-sized particles, typically with a diameter of between 2-4mm.

Ironstone: A hard sedimentary rock cemented by iron oxide minerals. Often dark brownish or rusty coloured.

Knapped flint: Worked flint which has been fractured (cleaved) to reveal the interior of the nodule.

Lamination: Fine-scale layering that occurs in sedimentary rocks.

Liesegang banding (Rings): Reddish or brownish stained patches usually see on the weathered surfaces of sandstones or chalky rocks. It results from the precipitation of iron oxides, and typically exhibits convoluted patterns of parallel or concentric bands.

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

Mammilated: A type of texture in a rock or mineral comprising clusters of rounded, smooth ‘grape-like’ structures.

Massive: Describes a sedimentary rock which is homogeneous and lacks any internal structures (such as cross-bedding or ripple-marks) or fractures.

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

Nodule: A small, hard, rounded or elliptical mass within a sedimentary rock. Resembles a pebble or larger cobble.

Palaeogene: A period of geological time (also informally called the Lower Tertiary) lasting from the end of the Cretaceous Period (65 million years ago) to the beginning of the Neogene Period (23 million years ago).

Phosphatic: A sedimentary rock which contains a significant amount of phosphor, often present as small, dark brown or black coloured clasts.

Quartz: A hard mineral composed of silica, usually white or pale grey in colour. One of the most common constituents in sedimentary rocks.

Quaternary: A period of geological time lasting from approximately 2.6 million years ago to the present Day.

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

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

Sarsen Stone: A very hard sandstone formed mainly of silica-cemented quartz grains. Often found as boulders or rounded pebbles.

Septaria, septarian nodules: A type of nodule which contains angular cavities or cracks which are partially or wholly filled by the mineral calcite.

Serpulid: A fossil marine worm, with a straight, curved or coiled tube.

Siltstone: A fine-grained sedimentary rock composed mainly of silt-sized particles, intermediate in grain-size between a mudstone and a sandstone.

Stone-slate: A fine-grained sedimentary rock which can be split into thin layers (usually around 2 cm thick) and used as slates for roofing or paving.

Superficial deposits: Varied sedimentary deposits, usually unconsolidated, which accumulated during the Quaternary period.

Tertiary: A period of geological time lasting from approximately 65 to 2.6 million years ago.

Well-bedded: A sedimentary rock which displays well defined bedding planes or lines, usually in a linear, parallel pattern.
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BGS Memoirs, Sheet Explanations and Mineral Resource Reports


Further Reading


Birch, R. & Cordiner, R. (2014). Building Stones of West Sussex. Published by the authors. 349 pp.


Websites

