

***Diversity in Stone in the North Wessex Downs.***  
***Explore the link between building materials and styles and the local geology.***

The North Wessex Downs form the largest designated Area of Outstanding Natural Beauty in southern England, a broad expanse of chalk upland through South Oxfordshire, West Berkshire, Wiltshire and North Hampshire. The natural beauty is enhanced by the man-made attraction of picturesque villages and towns, whose buildings, typically using local materials, vary in style from one location to another.

This variation can be linked to changes in the underlying geology. In past centuries the transport of heavy building stone was expensive, and local masons used what was close at hand. Sometimes this was chalk or flint, sometimes sarsen stones and sometimes clay for brick and tile making, although bricks were formerly an expensive option. Chalk, flint and sarsen stones are not ideal building materials. Builders evolved styles which used these materials in combination, so as best to use their respective properties. Only where extra strength or versatility was needed was building stone such as Cotswold limestone brought in from further afield: a costly requirement considered only for the more prestigious buildings.



Alternating courses of cut sarsen and flints.  
Manor farm at Odbourne Maizey.



Chalk block cottage with brick framing.  
Manor Cottage, Blewbury.

This article guides you through the different combinations of building materials used in the North Wessex Downs AONB. It highlights the key characteristics of these materials, and using photographs, shows the vernacular building styles associated with them.

***Present Day Sources of Building Materials***

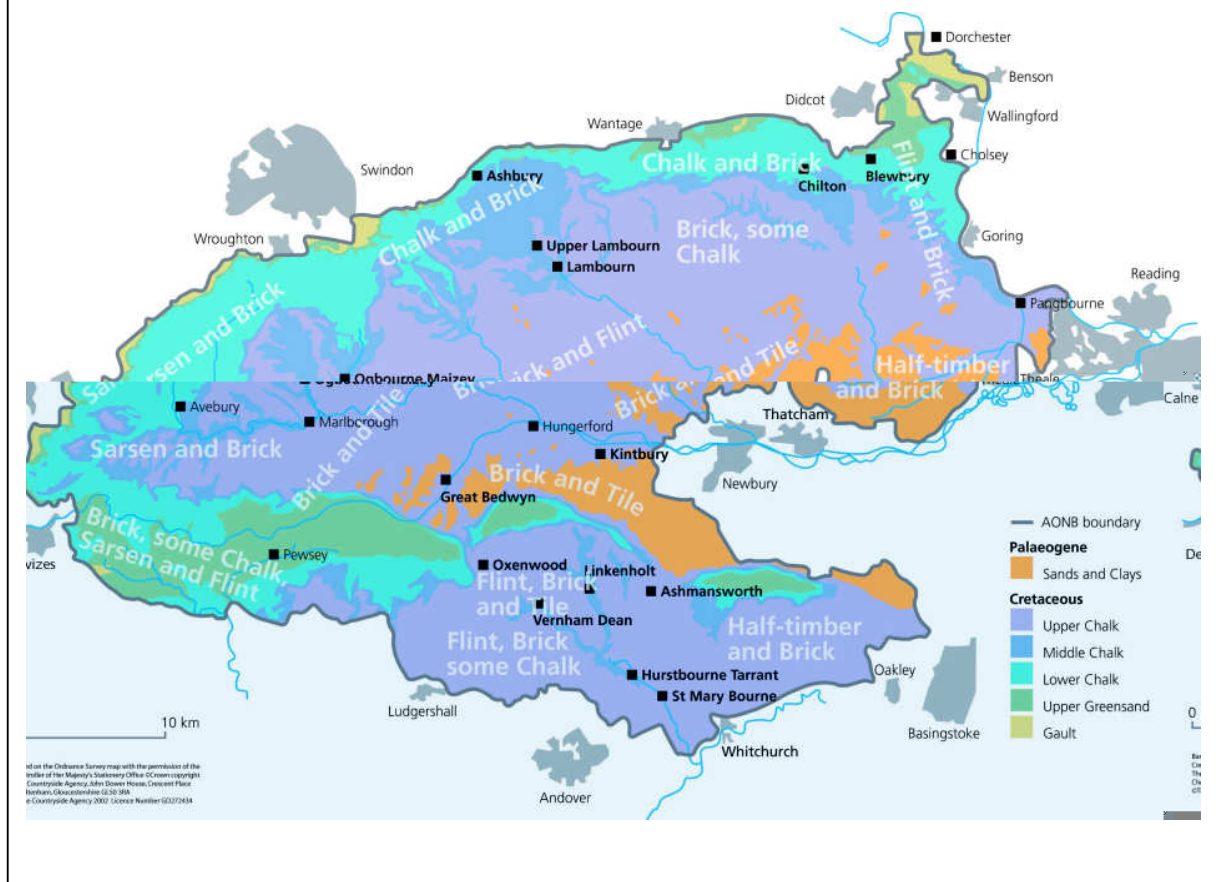
We have not found any working chalk stone quarries, chalk mines or clay pits within the area of the AONB. However, various specialist restoration builders have suggested the following sources in neighbouring counties.

- Chalk block (ashlar for carving), chalk rubble, chalk clunch and lime mortar are available from H.G. Clarke and Son, Weston Underwood, Olney, Buckinghamshire. This comes from the Totternhoe Stone which is a fine-grained limestone occurring in the Lower Chalk.
- Flints are obtained from quarries in the Upper Chalk as a by-product of quarrying for lime. Several builders source flints from the Hindhead Quarries, Fifield, Maidenhead, Berkshire.
- There appears to be no current source of sarsen stone. The scatters of sarsen stones which we have referred to are now protected. However, sarsen stones and flints can be obtained from reclamation companies in the area.
- Specialist brick companies producing a wide range of glazed, coloured and hand-made bricks can be found in Swindon, Devizes and Reading. These are still centres of brick-making today.

***AONB***

The North Wessex Downs Area of Outstanding Natural Beauty covers 1,730 sq km and was created in 1972 to give a protective coherence to one of the largest tracts of chalk downland in southern England which is least affected by development. The AONB aims to recognise and celebrate the rich diversity of archaeology, ecology, landscape and culture in the North Wessex Downs and conserve and enhance its special qualities for everyone to enjoy.

## Map of the North Wessex Downs AONB showing simplified geology and distribution of typical building materials



This map shows the predominant building materials used across the North Wessex Downs AONB in relation to the local geology. You can clearly identify areas across the region where different building materials have been used. This diversity gives each area its own contrasting and unique character.

Upper, Middle and Lower Chalk underlies most of the region. Generally, the chalk is too soft, porous and friable to be used as a building stone. However, chalk is used as a building stone along the northern edge of the region where, historically, chalk block was quarried from locally occurring harder bands of chalk in the Lower and Middle Chalk.

The use of flint as a building material matches well the distribution of Upper Chalk. This pure, soft, white chalk locally contains thin bands of flint and flint nodules which weather out easily and are found scattered in fields across the Downs.

Not shown on this geology map are the scattered remnants of locally hardened sandstone of Palaeogene age called sarsen stones. These durable, cemented sandstones are found as isolated boulders overlying the Chalk in the valleys west of Marlborough and around Lambourn and other areas in West Berkshire. Sarsen stone is used as a building stone in the west of the region.

The use of Palaeogene clays for brick and tile making corresponds well to their distribution on the map. With the opening of the Kennet and Avon canal and later the railway, coal could be imported for firing the brick kilns and bricks could be manufactured more cheaply and transported more widely to all areas within the region.

Gault Clay & Upper Greensand have not been used as building materials in the North Wessex Downs.

### **Chalk block**

Harder bands of chalk such as the Melbourn Rock (occurring at the boundary between the Lower and Middle Chalk) have been quarried in the past and cut into regular creamy-white blocks for use as a building stone in the north of the region.

Chalk block cottages have resisted the weather for centuries by having "good shoes and a hat," that is a plinth of stone or brick to stop rising damp and overhanging eaves of thatch to resist the weather.

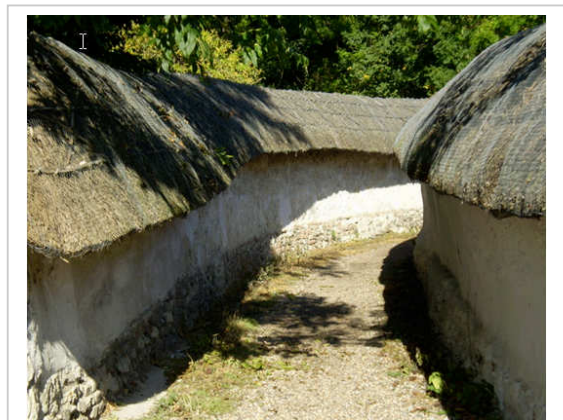
A more ambitious chalk block building is Ashdown House in Upper Lambourn. Stronger limestone has been used for the corner stones, window frames and balustrades. During a restoration programme in 2005, the chalk quarry at nearby Compton Beauchamp was reopened to provide new chalk blocks quarried from the original Melbourn Rock.



Chalk block cottage with brick and sarsen foundations and wooden lintels. Ashbury.

### **Chalk clunch**

This poorer quality, flaky chalk is used in some northern areas of the Downs. It has low strength and weathers badly, especially during winter freezing. Rough clunch is used in combination with other materials such as flints and brick for church, cottages and even boundary walls.



Lime-washed cob walls at Blewbury protected from the weather by a thatch capping and from rising damp by a stone base.



Ashdown House, Upper Lambourn

### **Ground chalk or cob**

Ground chalk is mixed into slurry with chalky clay, chopped straw, horsehair and other binders. This material known as cob is compacted to form broad boundary walls with rounded outlines. Cob is an ingredient of wattle and daub.

### **Lime Mortars**

Chalk stone was suitable for burning for lime which was used for agriculture and building. The relatively pure chalk produced lime which would only harden slowly after mixing with water and exposure to air. These limes were traditionally described as "air limes" and were more lime-rich than those used today.



### Flint

Thin bands of flint and flint nodules weathered out of the chalk are found scattered in fields across the Downs. Flint is a very hard glassy material made of silica. Geologists believe it is formed from the breakdown and redeposition of silica in the chalk released from the decomposition of the skeletons of marine organisms such as sponges.

Rough field flints are used in their original nodular form to give a rubble appearance, or they can be shaped or “knapped” to give a glassy surface which is then arranged to face outwards. In skilful hands flints can be knapped into rectangular blocks which can be laid in courses like bricks. Newly excavated nodules have an outer coating of porous whiter “cortex” which may become orange and yellow stained from prolonged exposure to clays or soils. The shiny impervious surfaces of fully knapped flints do not bond as well with mortar as do the flint nodules which still retain their porous cortex.

The small size of flint nodules precludes their use as corner stones or as window and door surrounds, so another material, usually brick or limestone is used for these parts of the building, with flint restricted to the wall facings. Such combinations of materials also represent the most cost-effective option, especially historically, when transporting materials was more difficult and expensive.

### Sarsen stone

Sarsen stone has been used for building in the west of the region, close to areas where surviving scatters of sarsen stones can be found in the landscape such as at Lockeridge Dene, west of Marlborough and near Ashdown House in the Upper Lambourn valley.

Sarsen stone is a locally hardened sandstone of Palaeocene age which occurs naturally as large blocks up to several metres across. Sarsen stone being very hard has resisted weathering for thousands of years. It has been used as a building stone since Neolithic times – the best known example in the region being that of the megalithic monuments at Avebury. However, sarsen stones have also been used over the centuries for domestic buildings and walling.

Geologists believe this localised hardening of the sandstones relates to hotter climates in places where the water table was nearer to the surface. High levels of evaporation would have drawn silica-rich ground water upwards leading to silicification of these sandstones nearer the surface. During post-glacial times most of the loose Palaeocene sands and clays were washed away by glacial meltwaters which carved out the dry valleys we see today. The harder, heavier sarsen stones were left behind. Sarsen stones are difficult to cut and shape. They are commonly used in their original state as roughly broken blocks of sarsen fitted together in a hiasaw pattern. Rough sarsen is used in combination with other building materials such as brick, flint, chalk and limestone. However, by the mid-nineteenth century, a sarsen cutting industry was flourishing in this area and sarsen stone was being cut into regular blocks suitable for walls, corner stones and paving.



Knapped wall with brick framing, Ashmansworth.



Flint and brick house, St Mary Bourne



Scatter of sarsen stones near Ashdown House, Upper Lambourn



Cut sarsens laid in courses, Avebury Manor Stable

### **The Kennet Sarsen Cutting Industry**

In 1850 Edward Free, a young man working sarsen stones at Huchenden in Buckinghamshire heard of the great quantity of sarsen in the Kennet Valley. He moved to Fyfield and set himself up in business as a stonemason. He introduced new techniques developed over the years in the High Wycombe area. The Cartwright firm also began operating in the industry at this time. In 1920 two partners, Thacker and Johnson established a stone crushing plant at Hursley Bottom in West Woods. The sarsen stones were first broken up by explosives and the fragments used for road metalling when the Bath Road was widened and repaired.

The industry's output went for house building, walling and road mending. This more accurate method of stone cutting gave a more structured character to the buildings. Houses built in the Kennet Valley since 1850 show standardised blocks which is a useful guide to dating housing in the area.

In 1890 the Free family moved to Marlborough. Edward Free died at the early age of 40 (an occupational hazard) and was succeeded by his son. His wife, however, lived to the ripe old age of 104! The industry reached its peak at this time due to fresh demand for tram sets and pavement curbing. Then in the 1920s and 1930s the industry gradually declined with the introduction of concrete which was a cheap and practical alternative.

The Cartwrights gave up the business and moved away when their experienced stonemason and cutter, Walter Bristow, died in 1915. The Free family continued to cut stone until the firm became unprofitable and went bankrupt in 1939, though not before they had cleared about a quarter of a mile of sarsen stones in Hursley Bottom. Cecil Waite was the last stonemason working in the industry. Just before the industry died, he executed an order of four wagon loads of sarsen blocks for the repair of

### **Brick**

Brick is the dominant building material used across the region. Houses built solely of brick with clay roof tiles dominate the clay areas. However, in areas where chalk, sarsen and flint building materials are available, brick has been used for framing and strengthening these materials.

The Palaeogene clays were dug extensively for brick making, especially around Inkpen, Kintbury and Hermitage. A minimum of 25% chalk needed to be added to these iron-rich clays to ensure they moulded well and didn't break up in the kiln. This chalk was either sourced from small local quarries or from chalk mines sunk below the level of the clays. Bright, red-orange bricks and tiles are characteristic of this area, although different coloured bricks were produced by changing the chalk/clay mix. By varying the oxigen mix during firing, a blue-grey glazed finish could be formed on the outer surface of the brick. Hence, we see elaborate patterns of glazed and unglazed bricks being used for decorative effect.

Local brick making began around the 15<sup>th</sup> century with kilns fired using wood or charcoal. By the 16<sup>th</sup> and 17<sup>th</sup> centuries, brick, although still expensive, was being used in timber-framed buildings to replace earlier wattle-and-daub infills and for plinths, chimney stacks, fireplaces, cornerstones, windows and door frames. Modifications and extensions to existing flint or chalk built houses were often in brick, built at a time when brick had become less expensive.



The Old School House, Hurstbourne Tarrant with thatched roof, rough flint walls and brick framing.



Timber-framed house with elaborate chevron-patterned brick infill and tile hunchable. Chilton House, Chilton.



By the 18<sup>th</sup> century, cottages were being built entirely of brick, often using combinations of unglazed red brick and glazed blue-grey brick in chequered style or with window and door surrounds in a contrasting colour to the walls. Red clay tile-hanging on gable ends became popular. From the early 19<sup>th</sup> century, coal brought by canal or railway was used to fuel the kilns and the now-cheaper brick became the dominant building material. This was the hey-day of the local brickworks.



Combined red and grey patterned brickwork. Great Bedwyn. This brick pattern known as Flemish bond was very popular in the 19<sup>th</sup> Century. The unglazed red bricks are laid horizontally (stretchers) and the grey bricks are laid end on (headers).



Glazed and unglazed patterned brickwork. South View Villas. 1896. Kintbury. Glazed and unglazed stretchers are grouped to form distinctive patterns.



Tile-hung gable end. Butts Cottage, Kintbury.



By the 19<sup>th</sup> century, brick and flint were being used in combination for decorative effect. Mid-19<sup>th</sup> century use of flint with interspersed brick courses and brick framing. Oxenwood.



Almshouses, Lambourn

Victorian builders used elaborate and colourful brick designs on public and prominent buildings. Machine-made bricks appeared in the late 19<sup>th</sup> century and brick making became more centralised, leading to a gradual decline in the local hand-made brick industry. One of the last brickworks in the area (the Pinewood Estate Brick and Tile Company) closed in 1967 in Hermitage.

These almshouses in Lambourn show diamond patterns in red and grey brick dated 1852. The initials are those of the benefactor, Henry Hibbislew.

### Limestone

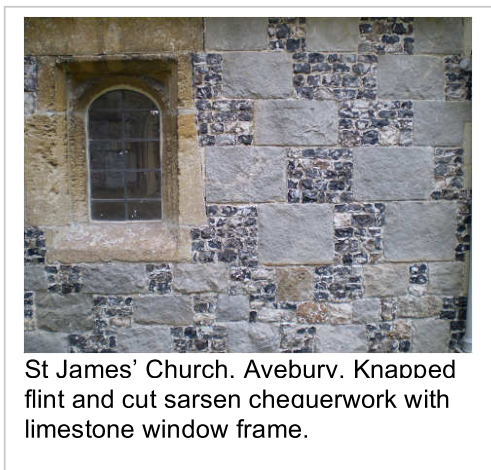
Limestone used for building in the North Wessex Downs AONB is sourced from outside of the area. The Jurassic oolitic limestones quarried in the Cotswolds of Wiltshire and Oxfordshire are the most commonly used in this region. However, the need to import limestone makes it an expensive material to use. Hence, traditionally it was only used for prestigious buildings such as churches and wealthy merchant or manor houses and then only for parts of the buildings which could not be constructed of other local materials.



St Mary's Church, Great Bedwyn is built of rough field flints with limestone dressings for windows, buttresses and basal plinth.

The use of flint with limestone characterises the majority of church buildings across the North Wessex Downs. The limestone is used primarily for dressings such as the basal plinths, cornerstones, window and door frames and buttresses which require larger-sized blocks, strong enough to support loads without cracking, resistant to weathering and with freestone properties which allow the carving of ornamentation.

Local field flints, embedded in mortar, were used to build the rough walls of Saxon and Norman churches, although the cornerstones and window surrounds had to be made of larger blocks of cut Jurassic limestone brought from outside of the area.



St James' Church, Avebury. Knapped flint and cut sarsen chequerwork with limestone window frame.

By the 13<sup>th</sup> and 14<sup>th</sup> centuries, the flints were being laid in horizontal courses and were often knapped to give a shiny outer-facing surface. In later church building, the flints were more carefully selected and often fully knapped to give squared blocks which could be laid in regular courses, or used together with squared limestone blocks to give decorative, chequerwork patterns. Limestone continued to be used for dressings.



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The Oxfordshire Geology Trust (OGT) was funded by the North Wessex Downs AONB to complete the Diversity in Stone project. In addition to a programme of guided walks and talks around the region to promote the unique character of the building materials and styles to be found there, we have produced exhibition packs and trail guides to explain the link between the building materials and the local geology. These are available from tourist offices and visitor centres and from the OGT and the North Wessex Downs AONB directly. Please see contact details below.

To find out more information about the North Wessex Downs AONB, please visit their website [www.northwessexdowns.org.uk](http://www.northwessexdowns.org.uk)

**The OGT**

The Oxfordshire Geology Trust was launched in 2000. We are a non-profit making organisation with two main aims - to protect and conserve geological sites and our landscape and to raise awareness of the county's rich and varied Earth Heritage and geology. We are the only dedicated geoconservation organisation in Oxfordshire.

**Where to find us:**

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