Contents

Introduction ....................................................................................................................................................... 1
Suffolk Bedrock Geology Map ......................................................................................................................... 2
Suffolk Superficial Geology Map ..................................................................................................................... 3
Stratigraphic Table ........................................................................................................................................... 4
The use of stone in Suffolk’s buildings ....................................................................................................... 5-20
Background and historical context............................................................................................................................................................................. 5
The Fens ......................................................................................................................................................................................................................... 8
The Broads ..................................................................................................................................................................................................................... 8
Suffolk Coast and Heaths .................................................................................................................................................................................................................... 9
South Norfolk and High Suffolk Claylands ...................................................................................................... 11
The Brecks .................................................................................................................................................................................................................... 13
South Suffolk and North Essex Claylands ...................................................................................................... 14
East Anglian Chalk ....................................................................................................................................................................................................... 17
Clay Lump .......................................................................................................................................................................................................................18
Stones in walls ............................................................................................................................................................................................................. 19

Suffolk’s indigenous building stones ........................................................................................................... 21-27
Lower Cretaceous ........................................................................................................................................................................................................ 21
Upper Cretaceous ....................................................................................................................................................................................................... 22
Palaeogene .................................................................................................................................................................................................................. 24
Neogene to Quaternary .............................................................................................................................................................................................................. 25

Imported building stones ............................................................................................................................... 28-33

Glossary .......................................................................................................................................................... 34

Acknowledgements and References ............................................................................................................ 36

The impressive West front of Bury St. Edmunds abbey dates from the Medieval period; a range of houses were built into the structure in the C16th and C18th. The original abbey walls contain a range of stone types including Quaternary Flint pebbles and blocks of Caen Stone and Barnack Stone.
Introduction

The geology of Suffolk comprises sedimentary strata laid down during the Cretaceous, Palaeogene-Neogene (Tertiary) and Quaternary periods of geological time. The succession becomes younger as one travels south-eastwards across the county.

The oldest exposed strata, which are represented by mudstones of late Jurassic age, occur in a very small area north-west of Lakenheath. Overlying these, is a Lower Cretaceous sequence which comprises the Lower Greensand and Selborne groups; the former includes the Woburn Sands Formation, which itself includes cemented yellow-brown coloured, ferruginous sands (Carstone). The bedrock geology of most of northern, western and central Suffolk comprises the Upper Cretaceous Grey and White Chalk subgroups. Palaeogene strata (including the Thames Group) are present in southern and eastern Suffolk, and are locally exposed.

From Bury St. Edmunds and Sudbury eastwards the Chalk is overlain by an extensive series of relatively soft shelly sandstones, sands and gravels and clays that represent the Crag Group; the sands are typically dark green (from glauconite) when fresh but quickly weather bright orange. Much of the geology of central and east Suffolk (including the coastal belt from Lowestoft to Felixstowe) is obscured by a veneer of Quaternary-aged glacial deposits (till) and various river and coastal sands, silts and gravels. Recent research has demonstrated that some Crag deposits occur interbedded with these younger sediments. Consequently, the Crag Group is now also considered to be part of the Superficial Deposits Supergroup (as indicated in the Stratigraphic Table in this atlas).

Cretaceous and Tertiary rocks in Suffolk have provided a limited range of building stones for local use. However, the succession contains no freestones and consequently large volumes of Middle Jurassic Lincolnshire Limestone (and some Caen Stone from Normandy) were imported into the county from Medieval times onwards. Upper Cretaceous strata in Suffolk yielded both chalk and flint for building purposes, the latter being the most common type of building stone encountered in the county. Palaeogene and younger successions provided Septaria and occasional Crag limestones (such as the Bryozoan Rock Bed) and ironstones for local building. Pebbles of flint and more exotic lithologies, derived from glacial till and ships ballast, have also been used for building purposes. No building stone quarries are currently operating in the county.

Suffolk was formed in 1974 by the amalgamation of the counties of West and East Suffolk. 6 parishes north of Lowestoft were transferred to Norfolk. The modern county of Suffolk is administered by Suffolk County Council. Below this tier of local government, the county is presently divided into seven district councils: Babergh, Forest Heath, Ipswich, Mid Suffolk, St. Edmundsbury, Suffolk Coastal and Waveney districts. The mergers of Forest Heath and St. Edmondsbury districts to form a new West Suffolk District, and Waverney and Suffolk Coastal districts to form a new East Suffolk District, take effect on 1st April 2019.

In the far north west of the county one of the two historic parishes of Newmarket was located within Cambridgeshire and the other in Suffolk. In 1888 the entirety of Newmarket became part of West Suffolk, forming an enclave almost entirely surrounded by Cambridgeshire.

Building stones in this Atlas are treated as either ‘Indigenous’ or ‘Imported’ and are described in stratigraphic order. To assist the reader in navigating around the Atlas, entries in the stratigraphic table and the corresponding descriptions are interactively linked (by means of small coloured triangles located in the upper right-hand corner of the relevant pages).

The section of this Atlas summarising the use of stone in Suffolk is based on the relevant National Character Areas (NCAs), the boundaries of which are very relevant to the vernacular-built heritage. The NCAs are defined on the basis of local landscape character, history, cultural and economic activity, geodiversity and biodiversity (https://gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making).

Parts of seven National Character Areas (NCAs) fall within the modern administrative County of Suffolk:

NCA 46 The Fens
NCA 80 The Broads
NCA 82 Suffolk Coast and Heaths
NCA 83 South Norfolk and High Suffolk Claylands
NCA 85 The Brecks
NCA 86 South Suffolk and North Essex Clayland
NCA 87 East Anglian Chalk
Suffolk Bedrock Geology

BUILDING STONE SOURCES

EXTENT OF CRAG GROUP COVER

PALAEOGENE STRATA (PROJECTED WHERE OVERLAIN BY CRAG GROUP)

THAMES GROUP (INCLUDING LONDON CLAY FORMATION) - CLAY, SILT, SANDS AND CEMENTSTONES

LAMBETH GROUP - CLAY, SILT AND SAND

THANET FORMATION AND LAMBETH GROUP (UNDIFFERENTIATED) - CLAY, SILT, AND SAND

THANET FORMATION - SAND

WHITE CHALK SUBGROUP - CHALK

CHALK ROCK MEMBER - CHALK

MELBOURN ROCK MEMBER - CHALK AND LIMESTONE

GREY CHALK SUBGROUP - CHALK

TOTTERNHOE STONE MEMBER - CHALK AND LIMESTONE

GAULT FORMATION - MUDSTONE

WOBURN SANDS FORMATION - SANDSTONE

ANCHOLME GROUP - MUDSTONE

Derived from BGS digital geological mapping at 1:50,000 scale, British Geological Survey © UKRI. All rights reserved
Suffolk Superficial Geology

- **BUILDING STONE SOURCES**
- **TUFAS - LIMESTONE**
- **ALLUVIUM AND LACUSTRINE DEPOSITS - CLAY, SILT, SANDS AND GRAVELS**
- **COASTAL DEPOSITS - SANDS, GRAVELS, SILTS AND CLAY**
- **RIVER TERRACES - SANDS, GRAVELS, SILTS AND CLAY**
- **AEOILIAN DEPOSITS - SANDS**
- **HEAD - SANDS, GRAVELS, SILTS AND CLAY**
- **GLACIOFLUVIAL AND GLACIOLACUSTRINE DEPOSITS - SANDS, GRAVELS, SILTS AND CLAY**
- **GLACIAL TILLS - CLAYS, SANDS, GRAVELS AND BOULDERS**
- **PEAT - PEAT**
- **CRAG GROUP - SANDS, GRAVELS, SILTS AND CLAYS**

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# Stratigraphic Table

<table>
<thead>
<tr>
<th>EPOCH/PERIOD</th>
<th>GROUPS</th>
<th>FORMATIONS</th>
<th>BUILDING STONES</th>
</tr>
</thead>
</table>
| QUATERNARY   | Great Britain Superficial Deposits Supergroup | Variously subdivided | - Chert and Quartzite pebbles and cobbles  
- Quaternary Flint (Fluvio-glacial Flint, Beach Flint, Field Flint)  
- Sarsen Stone |
|              | Crag Group | Includes representatives of the Norwich Crag, Red Crag and Coralline Crag formations | - Red Crag Ironstone  
- Bryozoan Ironstone  
- Suffolk Boxstones (Boxstone Bed) |
| PALAEOGENE   | Thames Group | Includes the London Clay Formation | - Septaria (Cementstone) |
|              | Lambeth Group | Not defined | |
|              | Montrose Group | Thanet Sand Formation | |
| UPPER CRETAUCEOUS | Chalk Group | ‘Upper Chalk’  
‘Middle Chalk’  
‘Lower Chalk’ | - Chalk (Clunch, White Clunch)  
- Quarry Flint  
- Tottenhoe Stone |
|              | White Chalk Subgroup | |
|              | Grey Chalk Subgroup | |
| LOWER CRETAUCEOUS | Selborne Group | Gault Formation | |
|              | Lower Greensand Group | Woburn Sands Formation | - ‘Carstone’ |
| UPPER JURASSIC | Anholme Group | Kimmeridge Clay Formation | |

Table 1. Summary (Interactive) of stratigraphical and building stone names applied to sediments and sedimentary rocks in Suffolk.
The use of stone in Suffolk buildings

Background and historical context

Suffolk has over 13,300 Listed buildings, structures and monuments. They range from graveyard monuments to the Foster and Associates Willis Building (1970-75) in Ipswich. There are 175 Conservation Areas.

Good building stones are generally scarce in Suffolk. Timber was the main material used for the construction of secular buildings throughout the Medieval period and the county is rich in timber framed buildings. The earliest surviving date from the C13th. Flint was the predominant material used in prestigious structures such as castles, houses of the wealthy and ecclesiastical buildings from the Roman period. It was obtained as Quarry Flint from the Chalk and Quaternary Flint from fluvo-glacial deposits and coastal beaches. Chalk was quarried in the East Anglian Chalk area to the north west. Flint was used from the C16th for cottages and farm buildings particularly on the coast. Brick remained expensive, so Flint was used in C16th and C17th as the main component of walls with brick for dressings. Flint became fashionable again with the rise of the Romantic movement and continued to be used into the C19th for the walls of villas, farmhouses, schools and cottages.

There was a limited supply of other local building stones available including Coralline Crag, Red Crag, Septaria (Cementstones), Boxstone and Ironpans. Ironpans were used in the Lakenheath area. The use of the others was generally geographically limited to areas of their occurrence close to the east coast. The availability of suitable clays led to the production of brick in the Roman period and then the early re-emergence of the industry in the C12th. Suffolk is important for its exceptional brickwork of the Tudor period. In the north of the county, Clay Lump was used particularly in the C18th-C19th.

Building stone has been imported into Suffolk since at least the Roman period. Caen Stone was used in several monastic and church buildings in the C11th-C12th. Various types of Lincolnshire Limestone were widely used in churches. In the C19th, the lack of good indigenous stone and improvements in transportation led to the importation of a wide range of stones.

Twenty-seven Suffolk castles were built between 1066 and 1200, the majority between the late C11th and mid-C12th, particularly in the civil war between 1136 and 1153. Nearly all of Suffolk’s castles were originally earth and timber. Those that survive were rebuilt in stone before c.1300. They include Orford Castle (c.1173), Bungay (c.1165) and Framlingham (c.1189). Septaria were used extensively in all three. Periods of unrest resulted in the erection of more castles and the strengthening of existing defences. In the C14th, additional castles and fortified manor houses were built, for example at Mettingham (1342), Wingfield (1385) and Little Wenham Castle at Babergh (c.1290).

Until the Dissolution, religious communities had a significant influence on the landscape, economy and the extraction and use of building stone in Suffolk. There were over 80 establishments including abbeys, priories, friaries, nunnery, college, hospitals and small cells. They owned extensive areas of land and manors and controlled many parish churches and market towns such as Mildenhall, Stowmarket and Bungay. The north
and west of the county was dominated by the great Benedictine Abbeys of Bury St. Edmunds and Ely. In the east, land ownership was fragmented amongst several secular lords and monastic foundations, including Norwich. The Bigod family were the dominant feudal lords of the area in the C11th-C12th. About 40 establishments survived until the Dissolution, owning over 200 manors that were handed to the King.

The Abbey church at Bury St. Edmunds was begun in the 1080s and completed by 1140. It was the second largest in England. The Abbey was built mainly of flint rubble. Barnack Stone was extensively used for facings and dressings - Barnack quarry was leased by Abbot Samson in the C13th. St. James’ Tower (The Norman Tower of 1120-1148), one of the largest remnants of the Abbey, is built of Barnack Stone. At Butley Priory (1171) it is thought that the stone used came from the valley of the Yonne in France. After the Dissolution the buildings of many such communities were dismantled or sold for conversion into dwellings. Some buildings survive, such as at Clare Priory and Ixworth Abbey. At Butley Priory, the ruined gatehouse was only converted into a house in 1773.

Over 400 churches were recorded in Suffolk in 1086, the greatest total for any county in England. By the C11th, the use of flint and occasionally, other stone was widespread. There are 38 round towered C11th-C12th churches in Suffolk, the second highest number in any English county. Most lie along the Waveney Valley east of Diss, or in the east between Saxmundham and Beccles. There are also small clusters north of Lowestoft and west of Bury St. Edmunds. Uncoursed rubble and rough coursed whole and/or cut flint were the predominant building material used, occasionally with other materials such as Red Crag, Chalk, limestone, Carrstone, Septaria and exotic pebbles.

In the early C14th, Suffolk was one of the most densely populated, intensively farmed and economically advanced counties in England. The Black Death and economic decline led to a significant reduction in population and changes in land holdings. In the late C14th, the prosperity created by the developing woollen trade, particularly in the south west and in the Stour Valley, led to the rise of towns such as Lavenham and Hadleigh. By the 1470s, Suffolk produced more cloth than any other county. From the early C14th knapping and squaring of flints to produce flat surfaces became common. High quality flint ‘flushwork’ became highly fashionable in the late C15th, particularly as ornamentation to towers, parapets, plinths and new porches. Decorative panels were introduced that often had letters and symbols. Increasing wealth, in combination with changes to religious practices and beliefs, resulted in the
‘Great Rebuilding’ in the Perpendicular style of churches as seen at Long Melford and Lavenham. The open timber roofs of Suffolk’s C14th-C16th churches are remarkable; 21 of England’s surviving 32 double hammerbeam roofs are found in the county together with 53 single hammerbeam roofs.

Brick started to be made in the C12th but did not become widely used until c.1500. From the first half of the C16th, nearly all ‘polite’ houses were built in brick. Large houses tended to cluster around Bury St. Edmunds and Ipswich, reflecting the increase in secular ownership of estates after the Dissolution; many date to the C16th. Large brick-built courtyard and ‘U’ or ‘E’-shaped houses were characteristic. The largest, Hengrave Hall, was built of white bricks in imitation of limestone.

Much of western and central Suffolk had been enclosed piecemeal by the C17th. Between 1500 and 1700 many farmsteads developed within the county, particularly in central and north-east Suffolk. The lighter soils of the coastal favoured livestock grazing and required a range of buildings for livestock rearing and fodder. In the west, arable predominated on the heavier soils and large aisled storage barns were needed. Rising grain prices from the 1760s into the early C19th and the impact of agricultural improvement brought about a significant increase in the extent of arable production. In the Brecks and the Chalk downland area around Newmarket, extensive Parliamentary enclosure was carried out between 1790 and 1840. Many new farm buildings including, barns, stables, granaries and buildings and enclosures for livestock were erected.

Wealth from commerce, office, inheritance and marriage as well as agricultural prosperity led to the construction of many new houses in the second half of the C18th. Nearly all were built of brick, sometimes stuccoed in imitation of stone, generally with imported stone dressings. In the C19th, houses were built or rebuilt for new owners such as Bawdsey Manor (1895). It made some use of Portland Stone ashlar and artificial Pulmanite for garden features. Estate villages (for example at Easton, Somerleyton and Helmingham) were often built in flint and brick; 92 cottages had been built at Helmingham by 1881. In the far west of the county, the development of Newmarket as the national centre for horse breeding and racing led to the construction of many flint and brick buildings.

In the C19th, most churches were restored, re-constructed, or extended and new churches built, largely in the towns. Flint was the predominant material used, with a variety of Lincolnshire Limestones being employed for repairs and new dressings. Several new churches were constructed to serve the expanding populations of Ipswich and Lowestoft. Most were built of red brick such as All Saints in Ipswich (1883) and St. John the Baptist in Felixstowe (1894-99); the latter has Bath Stone dressings. Large Roman Catholic Churches were in constructed the late C19th in Lowestoft, Bungay, Beccles, Ipswich and Bury St. Edmunds. They include the large St. Benet’s Minster (1908) which, unusually, is built of limestone ashlar not brick.

Non-conformism grew rapidly in Suffolk from the C17th. In the 1670s at least 98 towns and villages had congregations. Purpose built chapels and meeting houses started to be built soon after the Toleration Act of 1689. Many new chapels were built in the C19th, mainly in brick. Several chapels in Ipswich were faced in Kentish Ragstone including Christchurch Baptist Church (1858), which has dressings in Caen Stone and the United Reform Church (c1890) at Barrack Corner.

Suffolk’s population grew strongly in the first half of the C19th and many rural schools were built in the country. Between 1833-1860, Parochial, British and National Schools were constructed. Many were built in pebble or knapped flint with brick dressings, such as Hepworth Primary (1852) and Bardwell...
(1855) schools. Some were endowed by local landowners such as Somerleyton's (1845) picturesque estate school. After 1871, the state began to replace churches as the principal source of elementary education. Many Board Schools were built, or existing schools enlarged. When the Local Education Authorities were set up in 1903, there were over 450 elementary schools in the county.

In later C19th, rural depopulation was dramatic, particularly in the north and centre of the county. Urban growth was however substantial, particularly in Ipswich and Lowestoft. The arrival of the railways in the mid C19th to Ipswich (via both Cambridge and Colchester) and Lowestoft in 1859 led to further growth and the increased importation of stone and roofing slate. Several prestigious new municipal and commercial buildings were constructed. They were often faced in imported stones. Aldeburgh, Southwold and Felixstowe were reached a little later. The increased accessibility of the coast enabled the development of the former ports as flourishing seaside resorts with seafront villas and gardens. Thorpeness is an early C20th purpose-made holiday village with Jacobean and Tudor Revival styling. Some houses that made use of imported stones such as Ketton and Ancaster types of Lincolnshire Limestone. St. James' Church (at Bury St. Edmunds) was originally built within the precinct of Bury St. Edmunds in the C11th. It was largely rebuilt in the C16th. It has continued to grow over the centuries with alterations in the C18th to C21st; it was completed in 2005.

There has been a revival in the use of vernacular materials such as flint for domestic architecture in the late C20th - C21st particularly encouraged by Local Authority design guidance.

The Fens

The distinctive, historic and human influenced wetland landscape of the Fens lies to the south of the Wash. They are largely located in Lincolnshire and Cambridgeshire with a smaller area in west Norfolk. Only a very small area, largely that of Mildenhall Fen, lies within Suffolk, west of Mildenhall and Lakenheath. The fen in Mildenhall and Lakenheath parishes was reclaimed after a Drainage Act of 1759. There are few buildings in the area other than isolated modern farmsteads and one church, St. James, Kenny Hill (1895). It is built of mainly of roughly coursed Quaternary Flint with brick and Lincolnshire Limestone dressings.

The Broads

A small area of Suffolk on its north eastern borders between Bungay and Lowestoft lies within the Broads NCA. The market towns of Bungay and Beccles and villages such as Barsham, Mettingham and Barnby lie within the NCA; Bungay and Beccles are bridging points across the Waveney.

Timber frame was the dominant form of vernacular construction until the rise of brick in the C17th. Aisled barns from the C14th survive. Weatherboarding is characteristic. Some have parapet gable ends of flint and red brick, such as the C16th barn near the remains of Barsham Hall.

Many timber framed houses of the C16th and C17th in the towns, and farmhouses on the margins of the Broads were refaced in brick in the C18th. Red brick with glazed pantile roofs and frequently gables is characteristic of the area.

Flint, often with accompanied by Septaria and other pebbles were used in churches, monastic buildings and castles, for example in the stone keep of the castle at Bungay (1164). C11-12th round towered churches occur at Bungay, Mettisham and Barsham. Bungay had five churches at the time of the Conquest, two survive today. Holy Trinity Church, Bungay has a round tower built of cut uncoursed flint with some herringbone work. The tower also contains some sandstone and other exotic pebbles. St. Mary’s Church, also in Bungay, was originally the church of the town’s Benedictine Nunnery. The remains of the conventual buildings are attached. The walls are of cut flint with Septaria, limestone, brick and pebbles with Lincolnshire Limestone dressings. The C15th tower has fine flushwork and proudwork to the plinth, buttresses and parapet. The church

The Church of St. James, Kenny Hill (1895) built of roughly coursed Quaternary Flint and brick with Lincolnshire Limestone dressings. It is now incorporated into the New Testament Baptist Church for USAF personnel based at RAF Lakenheath
was rebuilt after Bungay suffered a devastating fire in 1688. The Church of the Holy Trinity at Barsham is thatched; its C11th tower is built of flint rubble. Large erratic stone blocks were used as footing stones in places. Uniquely, the east end of the chancel is decorated with a lozenge grid of flint flushwork, the design being carried through as tracery across the whole of the window. It probably dates from the early C17th when the chancel roof was renewed.

Beccles also suffered from a series of fires. St. Michael’s Church has a detached bell tower (C16th) faced in Lincolnshire Limestone ashlar. The main church is largely of flint with various pebbles and brick and areas of chequerwork. The two storey C15th south porch is of ashlar with a fine base frieze. The north porch is also two stories high and has a flushwork panelled front. St. Benet’s Roman Catholic Minster (1898-1908) is a very large church faced in Lincolnshire Limestone ashlar. Other C19th churches and chapels were largely built of brick often with Lincolnshire Limestone dressings. For example, the Church of St. Edmund’s, Bungay (1888-1901) is built in red brick with an abundance of Bath Stone dressings, pinnacles and decoration.

Occasionally flint was used for other buildings. The C16th-C17th Beccles & District Museum originated as a free school. The front is of worked flint with many brick headers and yellow brick jambs and quoins.

**Suffolk Coasts and Heaths**

This NCA lies on the North Sea coast between Great Yarmouth in the north and Felixstowe in the south, forming a long, narrow band that extends between 10 and 20 km inland. The coast is interrupted by five estuaries (Stour, Orwell, Deben, Alde/Ore and Blyth). Settlement is generally sparse in the area with small, isolated villages and farmsteads. Larger urban settlements include Lowestoft and the coastal towns of Aldeburgh, Southwold and Felixstowe and estuarine port towns such as Woodbridge. The once important medieval port of Dunwich is now almost entirely lost due to coastal erosion. The eastern suburbs of Ipswich also fall within the NCA.

Timber frame was the dominant form of vernacular construction until the adoption of brick in the C17th. The use of brick, clay tile and render became characteristic for vernacular buildings. A significant Dutch influence became a feature of the coastal towns, particularly the use of shaped gables. Flint was the predominant material used in churches and monastic buildings of the area, though a wide range of other stones often
form a more minor constituent of the fabric. They include Coralline and Red Crag, Boxstones and Septaria. Caen Stone was used for dressings at Greyfriars Priory, Dunwich. Dunwich Leper Hospital was mainly built of Caen Stone and Septaria with various exotic and ballast pebbles and occasional isolated blocks of Paradoxica Bed Stone.

Flint is used in the round towered C11-12th churches that lie within the area. They occur particularly north of Lowestoft, such as at Blundeston, Ashby, Heeringfleet and Lound and south west between Lowestoft, Becles and Yoxford, such as at Mutford and Thorington. Whole, split and knapped flint was used, either coursed or uncoursed. In coastal areas beach cobbles were often used for rubble walls, sometimes faced in dressed stone, such as at Leistone Abbey. Lincolnshire Limestone dressings were often used in medieval churches. Such stone was used as ashlar and for capitals and decoration in some of the larger churches and monastic foundations of the area.

The Suffolk Coast was a very wealthy area in the C14th-C16th. Many churches were built or rebuilt in the Perpendicular style, such as Aldburgh, Lowestoft, Southwold, Walberswick and Woodbridge. Flint was the dominant material used but the adoption of high quality flushwork with decorative panels and chequerwork became features of churches of the area. Many C14th-C15th churches in exhibit flint walls with exotic pebbles. For example, St. Mary’s Church at Wherstead (C15th) has walls containing granite, gneiss and quartzite pebbles (some derived from Scotland and Scandinavia) incorporated in the largely flint fabric. In the C19th many churches were restored, rebuilt and a number built using knapped flint.

Coralline Crag limestone was used as a building stone in some of the area’s Medieval buildings, and for example in the boundary wall of Greyfriar’s Priory; it was occasionally also used in churches. At Wantisden and Chillesford, the towers of both churches were built of sawn blocks of Crag during the C14th. St Mary’s Church at Stoke by Nayland exhibits Coralline Crag blocks randomly used amongst flint. C E Lamb’s C19th Church of St. Margaret in Leistone uses single courses of squared crag alternating with bands of a roughly coursed mix of knapped flint and other exotic pebbles. Coralline Crag was often used in farm outbuildings and walls, but rarely for domestic buildings. Smthy Cottage, Snape (late C18/early C19th) is a rare example. Here, it was used with yellow brick dressings.

Red Crag outcrops widely over the southern half of the NCA. At St. Mary’s Church at Ufford, rough blocks of Red Crag Ironstone were used in herringbone pattern courses in the north wall of the nave, and for forming quoins. At All Saints Church, Eyke, the south side of the chancel contains many Red Crag cobbles. Shelly Red Crag cobbles can also be seen in Falkenham and Newbourne churches.

All Saints Church, Sutton has walls containing Quaternary Flint nodules that originate from the Red Crag – they sometimes have barnacles or marine shells adhered to them. Other stone types include Boxstones, Septaria, Lincolnshire Limestone and exotic pebbles.
Boxstones were used in the 1859 restoration of All Saints Church, Sutton, and St. Margaret's Church, Shottisham (1867). Both are faced in coursed and random rubble Flint with ashlar dressings. Many of the flints used are barnacle encrusted or with Red Crag shells adhered to them. Septaria were used from the late C12th in a substantial number of churches, for example at Orford, Chelmondiston, Earwarton, Harkstead and Felixstowe. Orford Castle is largely built from Septaria with Lincolnshire Limestone and some Coraline Crag on a Caen Stone plinth.

Kentish Ragstone was used in several C19th churches including St. Botolph's, Iken (1853) and St. Andrew's, Melton (1868). At Melton, Caen Stone was used for dressings. Bath Stone was used for dressings to several C19th brick churches such as St. John the Baptist and St. Felix at Felixstowe (1899).

The use of natural flint fragments selected for uniformity of size and set uncoursed and projecting from the backing mortar are a characteristic of some C19th secular buildings between Aldeburgh and Southwold. Examples also occur at Bramfield, Theberton and Westleton. The local flint (better regarded as Chert) is often brown or amber in colour, or sometimes nearly white – and lack the usual grey or black flint colouration. Many buildings in Southwold have carefully coursed, regular sized, close-set, grey flint walls with occasional galleting. At Blythburgh, the flint is often less rigidly coursed and wider set with blue grey, amber and light grey random colouring.

From the C17th, trade with Europe and aristocratic connections with London increased wealth in the area. Several imposing houses and large estates developed on the fertile soils of the larger southern river valleys and claylands, for example, at Broke Hall, Stutton Hall and Crowe Hall on the Stour. Most were built in brick, but Woolverstone Hall on the Orwell (1776) has a Portland Stone basement.

The ‘ancient countrysides’ of the inland river valleys and claylands had undergone extensive piecemeal enclosure by 1700 and few new farms were built after 1750. In the coastal strip the enclosure of some of the extensive Sandlings heaths in the C18th to mid-19th led to the construction of substantial new farmsteads, generally in brick, such as for the large estates of Benacre, Henham and Sudbourne. The area became renowned for its sheep-breeding.

Anti-invasion coastal defences were established from the Roman period. Felixstowe's Landguard Fort was constructed (1624-30) and rebuilt in 1711 and c.1871, when granite was used as facing stone. In the Napoleonic wars, Martello towers (1809-12) were built. Towers remain at Aldeburgh, Alderton, Bawdsey, Felixstowe, Shingle Street and Shotley. For example, Aldeburgh Martello tower (1808-10) is built of red brick on a granite plinth with ashlar dressings.

South Norfolk and High Suffolk Claylands

This NCA occupies much of central East Anglia stretching from just below Norwich in the north, to the River Gipping in the south. The NCA includes the market towns of Eye, Debenham, Framlingham, Halesworth, Saxmundum and Wickham Market.

By 1066, the area was one of the most densely populated in England. Most of the present villages and many isolated farmsteads and hamlets had been established. The expanding population in the C11th-early C14th led to the development of ‘secondary’ settlements on the central plateau. These often gathered around the edges of large grazed commons or greens. Most of the area was enclosed piecemeal in the Medieval period.

Timber-framed farmhouses and barns are characteristic of the area. It has one of the highest concentrations nationally of surviving pre-1750 farmstead buildings. The frames of farmhouses are mostly concealed behind colour washed plaster. Most barns are clad with black-painted weatherboarding. Roofs are mainly red clay tiles or thatched. Slate became common from the C19th. Brick was increasingly used from the C15th, initially for high status buildings and then for vernacular buildings. Close to the boundary with Norfolk, Clay Lump became popular for cottages, outbuildings and farm buildings in the C18th-C19th.

Many moated sites were established on the plateau. Significant numbers of houses, cottages, barns and occasional cattle housing (locally termed ‘neathouses’) and other farm buildings built before 1750 survive. As the area’s woodlands were cleared timber became an increasingly scarce resource. Its use was gradually replaced by flint and brick. From the 1790s, the area gained a national reputation for its barns. In the south of the area where woodland remained more extensive, timber framing continued to predominate into the C18th.

Thetford and Bury St. Edmunds abbeys were major landowners although they were located just outside the NCA. There were over 20 monastic establishments within the area in the NCA.
including at Eye, Hoxne, Ixworth, Rumburgh and Sibton. At the Dissolution, the latter continued in use as St. Michael and St. Felix's Parish Church (C13th-C15th). It was built of random flint with limestone dressings. Other former churches were adapted as domestic buildings or gradually demolished. Flint was commonly used for the construction of medieval churches, monastic buildings and castles.

The NCA has the greatest concentration of round towered medieval churches in the country. They are most frequent in Norfolk, but also occur in Suffolk along the Waveney valley, such as at Barsham, Mettingham, Bungay, Syleham, Stutson, Weybread and Wortham. Most churches were built of irregular Quaternary (Field) Flint set in mortar, either uncoursed or as rough coursed rubble. Flint was often used for jambs and arches. Imported limestone was generally preferred for dressings and quoins from the C12th. In the late C13th the use of knapped flint and galetting became common place.

Framlingham Castle is an exceptionally well preserved late C12th structure. Built by Roger Bigod, Earl of Norfolk, it was home to the dukes of Norfolk for over 400 years. The flint and rubble Septaria 10m high curtain walls and towers replaced an earlier castle. Other remnants of stone castles can be found at Eye (C12th) and the fortified manor houses of Wingfield (C14th) and Mettingham (C14th). At Eye, parts of the C12th flint curtain wall survive. The Gatehouses of Wingfield and Mettingham also survive, both were built of flint rubble with limestone and brick dressings.

In the C14-C16th, the area grew wealthy as a result of the wool trade. Many churches were rebuilt in the Perpendicular style. Flint was the dominant material used in their construction. Particularly fine churches include those of St. Peter and St. Paul at Eye (C15th) with its west tower panelled in flint flushwork from its foot to the parapet top and an ashlar and brick flushwork south porch. Other examples are the churches of St. Michael at Framlingham (C15th), St. Mary at Halesworth (C15th) and St Mary at Woolpit (C13th-C15th) with its opulent ashlar fronted two storey south porch built in 1430-55. The west tower was replaced in 1853-4 with a tower of Quaternary Flint pebbles and cobbles with Bath Stone dressings topped by a ‘Nene Valley’ spire. Flint was extensively used in C19th restorations and rebuilding; the Church of St. Mary at Huntingfield is a particularly fine example of a Victorian restoration with outstanding painted internal roofs and the Church of St. Mary and St. Peter at Kelsale was restored by Norman Shaw and E. S. Prior. After the Dissolution, monastic lands were sold off and their new owners often built new houses, particularly around Norwich. From the C15th, the use of brick became common place in vernacular buildings. Many earlier houses were rebuilt from the C17th. Brick stepped and Dutch gables were frequently adopted in the C16th-C18th. C16th-C19th estates and parks developed, particularly in the Waveney Valley, close to Bury St. Edmunds and along the edge of the Sandlings from Ipswich to Henham. Several imposing houses, parks and large estates developed, including Badley Hall (C16th), Brome, Helmingham Hall (C16th) and Letheringham Abbey (C17th). All were built of brick with imported stone dressings.

Linen weaving developed as a cottage industry developed in the C16th-18th particularly in the north of the area including the Waveney Valley. Locally grown hemp and flax was processed. There were several markets for linen, sailcloth and sackcloth close to the main growing area between Eye and Beccles. In the C16th and C17th, the wool and linen trade and connections with London increased wealth in the area.

From the late C18th century the high price of grain and the urban demand for foodstuffs led to the conversion of dairying pastures into more lucrative arable units. Many fields were rationalised. New farm buildings were created. Greens were also enclosed, and linear greens were often built on to accom-
moderate the rapidly rising population. Several country houses were rebuilt in the period particularly in the Waveney Valley and the eastern boundary of the NCA along the edge of the Sandlings. They included Heveningham Hall (1778-80), Suffolk’s only major Palladian house. It was designed by James Wyatt and built in brick and stucco with artificial Coade Stone detailing.

In the C18th and C19th, timber framed buildings were often refaced or encased in brick in the countryside and in the market towns. Much of the area suffered substantial rural depopulation in the latter half of the C19th. Brick was the predominant material used for new buildings, though Clay Lump was also quite commonly used in the north of the area for farm buildings, cottages and some farmhouses in the first half of the C19th when there was a tax on fired bricks.

In the north east of the area, Welsh Slate was used from the early C19th, imported by boat along the Waveney. After the construction of the railways the use of such material became common place. Other building stones were imported for use in commercial and municipal buildings in the area’s towns. In the C19th there was a revival in the use of flint in church restoration, rebuilding and construction.

The Brecks

The Brecks occupy much of south-western Norfolk and part of north-west Suffolk, together with a small part of north-eastern Cambridgeshire. Brandon and Mildenhall are the main towns of the area. Settlement is relatively sparse in the central area of the Brecks, with estate villages such as Santon Downham, Elveden and Euston dominant. More villages and hamlets such as Lakenheath, Beck Row, and Freckenham are clustered on the Fen edge to the west and in the Lark and Little Ouse valleys to the north of Bury St. Edmunds, such as Culford, Icklingham, West Stow and Great Livermere.

Most historic buildings in the Brecks date from the C18th and C19th. Flint and brick had become the dominant materials used for vernacular buildings by the C17th. In the Fen edge communities such as Lakenheath, Chalk and Carrstone were used in churches and vernacular buildings. Few medieval timber-framed buildings survive from before c.1700. Those that do are largely located towards the margins of the area such as Eriswell Hall, Lakenheath (C15th-16th) and Wangford Hall (C16th). Sometimes they have been encased in brick. Flint beds in the White Chalk Subgroup have been quarried since the Neolithic Period (as at Grimes Graves near Brandon) and from the Chalk exposed close to the Fen edge. Elsewhere, flint was obtained from the surface, often from the glacial drift. Irregular flint nodules or pebbles were largely used as random rubble or less frequently were rough coursed.

Much land within the Brecks was controlled by the abbeys at Bury St. Edmunds and Thetford that lie immediately outside the area. Many medieval churches in Brecks are relatively small and built in a simple style that reflects the relative poverty of their parishes, such as All Saints Church at Wordwell (C11th). It is mainly built of rough coursed flint rubble. The dressings are of Lincolnshire Limestone. There are many exotic pebbles including quartzite, andesite and Rhineland (Niedermendig) Lava. Larger churches are found in the then more prosperous Fen edge and river valley settlements. They are mainly constructed of flint. At St Mary’s Church at Mildenhall (C13th-C14th) the C13th north chapel is of limestone ashlar. St Mary’s Church at Lakenheath (C12th-C14th) is built of more varied materials including ‘Carstone’, Quaternary Flint and Chalk with dressings of Lincolnshire Limestone (including Barnack Stone).

Quaternary Flint was used for all the known warren lodges found in the Brecks. They were the dwellings of warreners who were responsible for management of the warrens where rabbits were farmed for their fur and meat. The warrening industry dominated the Brecks landscape for over six hundred years and was a mainstay of the local economy. Mildenhall Warren Lodge (c1400) is a surviving example. It is constructed of mortared Quaternary Flint pebbles and nodules with limestone quoins. Mildenhall was the largest parish in Suffolk, its medieval prosperity was based on rabbits and fish from the Fens.
By the late C14th sheep farming had become extremely profitable. Several churches were built, rebuilt or embellished, often with new west towers, clerestories or porches funded by wealthy patrons. Knapped, cut flint and flushwork became common. New or largely rebuilt churches include All Saints Church, Icklingham, built of flint rubble with limestone dressings where the tower and south aisle were added, and St. Mary’s Church in Mildenhall with its fine west tower (C15th) with fan faulting, porches, clerestory and hammerbeam ‘angel’ roof. At the Church of St. Mary, Santon Downham, the tower dates from the C15th. Impressive houses such as Hengrave Hall, one of the most important and largest courtyard houses of the late C15th in Suffolk, were also built around this time. It was constructed in white brick with Lincolnshire Limestone (possibly Kingscliffe Stone) dressings. It incorporates material from the dissolved monastic houses at Bromehill Abbey, Ixworth and Thetford.

Flint was also used widely in secular buildings. In domestic and farm buildings random or rough coursed flint was the most frequently used material before 1700. Coursed cobbles projecting from the mortar are found in many barns, cottages and farmhouses in the area. Large houses such as Hengrave Hall (1525-40) were built in white brick in imitation of limestone. The use of brick trickled down to larger vernacular houses from the C16th. The production of off-white and yellow shades of brick started in the C18th and became the dominant and characteristic building material of the area. Flint with brick was most commonly used towards the west of the Brecks; buildings of flint alone are rather more widely distributed.

Chalk was used in Fen edge communities such as Lakenheath, particularly as rubble for farm buildings, walls and cottages. It was used in some churches such St Mary’s Church at Lakenheath and All Saints Church at Worldwell. Burwell Rock (Tottenhoe Stone) was bought from Cambridgeshire for use in some churches in the Fen edge communities; for example, the arcade of St. Lawrence’s Church, Lackord (C14th) includes this stone. ‘Carstone’ was used in some buildings in the Fen edge communities. For example, the chancel (C12th) and south aisle of St Mary’s Church at Lakenheath are partially built of the stone. At Brandon, the former National School and Workhouse (1778 with possible core of 1673) is built of coursed, squared Chalk Block with gault and red brick quoins.

In the C18th-C19th there was an expansion in enclosure and in the number and extent of landed estates, such as at Euston and Elveden. Many estate buildings and cottages were built in flint and brick. Galleting became popular in the C19th. New flint mines around Brandon were developed in C19th to support the gun flint industry, particularly during the Napoleonic Wars. The industry produced significant quantities of black knapped flint that was used for extensively for building in the town and nearby. Fine knapped flint is found in quite modest buildings which also employ shaped flint ovals and squares. There are many boundary walls of knapped flint fragments, a waste product of the industry. Knapped flint was used extensively in C19th church restoration and building work. For example, at St James’ Church, Icklingham (C13th) in the 1860s the nave and chancel were refaced in squared, knapped flint. Several estate churches were extensively rebuilt, such as the Church of St. Andrew and St. Patrick at Elveden (1906 & 1922) by W.D. Caroe in Art Nouveau Gothic style. It has two towers, two naves and a cloister. Flint, Bath Stone and Cotswold Slate roofs were used. The nearby WW1 Memorial is a 39 m high Corinthian column of Lincolnshire Limestone (Weldon Stone) with a Portland Stone urn. Flint was used in several modern buildings in Brandon, such as Barclays Bank, and for facing many modern housing developments in the area.

Clay Lump construction became popular from circa 1790 to circa 1860. It is commonest in the eastern margins of the area towards the boulder clay soils north Suffolk and south Norfolk, where property tended to be owned by small proprietors, rather than large estates.

The use of thatch is surprisingly rare in comparison to that in the rest of Suffolk. From the C18th pantiles and slate had become relatively cheap. Improvements in the river and road system had also reduced transport costs. Pantiles were produced locally from the C18th. Black glazed tiles were introduced from the mid C18th. The use of slate in the C18th and early C19th was more frequent in the fenland edge area, where water transport was available. Once the railway network had developed the use of slate became widespread, particularly in towns and for estate buildings.

South Suffolk and North Essex Claylands

This NCA covers much of south and western Suffolk from Bury St. Edmunds to Ipswich, north Essex, east Hertfordshire and a relatively small part of the south east of Cambridgeshire. The area has a long history of settlement including Palaeolithic finds, Roman sites, medieval monasteries and castles, isolated moated farmsteads, barns and several large country houses.
There are many notable medieval towns and villages, such as Bury St. Edmunds, Stowmarket, Needham Market, Lavenham, Long Melford, Hadleigh, East Bergholt, Sudbury, Clare and Haverhill. The centre and west of Ipswich also falls within the NCA. Ipswich was established in the C6th-C7th and was a significant international trading port throughout the Medieval period. By the late C11th-12th St. Edmund’s shrine at Bury St. Edmunds had developed into one of Europe’s premier pilgrimage sites.

Many vernacular buildings from the C13th to C17th survive. Often elaborate timber frame buildings with exposed timbers, colour-washed render and steeply pitched roofs with peg tiles or long straw thatch are characteristic of the area. Pargeting was popular in the C17th century.

There were several C11th motte and bailey castles in the area. At Clare Castle (1090) a shell keep was built of rubble flint in the C13th. Fortified manor houses were built within the site at Haughley Castle. The fortified manor of Little Wenham Hall (1270-80) was largely built of brick with flint and Septaria used for the plinth and Caen Stone for the dressings and buttresses. It is one of the earliest uses of brick in medieval England.

Smaller priories and hospitals existed at several locations; many controlled parishes and manors. Clare Priory for example enjoyed rents from 17 Suffolk parishes. After the Dissolution, several were incorporated into houses, such as at Ixworth where the west range was incorporated in Ixworth Abbey. Its stone was also used to build Hengrave Hall, north of Bury St. Edmunds, in the early C16th. At Great Bricett, the Church of St. Mary and St. Lawrence (C12th) incorporates the remains of the Priory church. It is built of random flint, rough coursed rubble with limestone blocks and dressings. The Priory’s timber framed hall (C13th) also survives attached to the church, converted to domestic use.

The churches of the area are generally built of Quarry Flint and/or Quaternary Flint with pebble rubble and sometimes Chalk. A few C11th-C12th round towered churches are found, particularly to the east and west of Bury St. Edmunds such as at Risby, Little Saxham. Little Bradley, Beyton and Onehouse. They are built of whole and cut flint. Risby and Little Saxham churches have flint jambs and heads to its belfry windows; Little Bradley church has long and short work with a C14th octagonal belfry added.

Chert and Quartzite pebbles and cobbles were used as part of the fabric with Quaternary Flint nodules, usually laid uncoursed or rough coursed. For example, the tower of Hawstead church has a coursed mixture of black and grey knapped flints and brown Chert or Quartzitic pebbles. Chalk was used for some dressings to flint churches such as at All Saints Church, Gazeley (C13th) and St. Lawrence’s Church at Great Waldingfield (C14th). The latter also makes use of Quartzite pebbles, Lincolnshire Limestone and a range of other exotic stones. Septaria were used with flint and limestone rubble in several churches such as St Andrew’s Church at Brockley (C13th) and St. Mary’s church at Combs (C14th-C15th). The Chapel of St. Nicholas, built as a private chapel c.1474-80 for Sir James Tyrell of Gipping Hall, has walling entirely of a chequerboard pattern of squared limestone rubble and knapped flint or brown Septaria.
The wool and cloth trade of the C13th to C17th generated much wealth. Guilds played an important part in the social and religious life of parishes. Rich merchants and their families such as the Clapton’s at Holy Trinity, Long Melford (C14-15th – west tower 1903) and the Springs and Branches at St. Peter and St. Paul’s Church at Lavenham (C14th – C15th), endowed the reconstruction and embellishment of ‘wool’ churches. Both are of knapped Quarry Flint with richly ornamental flushwork and limestone ashlar and dressings. Casterton Stone was used at Lavenham. On a lesser scale, the funding of new towers, porches, clerestories and chantry chapels was particularly favoured. Towers were rebuilt for example at Kersey, Rougham, Stoke by Nayland and porches added to churches in Boxford, Stratford St. Mary, Woolpit and Yaxley. Many of the medieval masons involved are known.

The woollen/cloth trade declined in the C17th outcompeted by northern and western England. Consequently, development in much of the area largely stopped. During the C18th – C19th arable farming replaced dairying, particularly to serve the London market. Many estates were amalgamated. Grand houses such as Ickworth, Flixton, Shrubland Hall, Tendering Hall and Barham (1770) were built. Brick with imported Lincolnshire Limestone dressings and stucco were primarily used.

Most churches in the area were restored or rebuilt in the C19th. Refacing in knapped flint was commonplace. New churches were particularly erected in the larger towns. They include St. Peter’s Church at Bury St Edmunds (1856-8), which is built of flint with Caen Stone dressings. Roman Catholic churches were also built, for example St. Edmund’s, at Bury St. Edmund’s (1836-7) which has a Greek classical stone façade. Several new Church of England and Roman Catholic churches were built in Ipswich. Nearly all were in brick with imported Lincolnshire Limestone dressings. New rural churches include St Stephen’s Church at Higham (1858-61) by G.G. Scott, in flint with Ancaster Stone dressings and St. Mary’s Church (1878) by H.J. Green of Norwich. The latter is built of flint and Septaria rubble with freestone dressings.

In the C18th-C19th, many Non-Conformist chapels were built in the area. Most were in brick, sometimes with imported limestone dressings. Occasionally other materials were used such as for the Baptist Chapel at Wherstead (1844) which has a front in uncoursed flint and Septaria rubble with gault brick quoins. Many rural schools and parish workhouses were also constructed in the area in the C19th. Most were of brick. Occasionally knapped flint with brick was used such as Barrow School and School House (1846), Packenham School (1842) and the town workhouse, now 60 College Street in Bury St. Edmunds.
In the C19th, the population of the urban centres increased while that of the rural hinterland declined. Civic, municipal and commercial buildings were erected. They were generally built in brick with imported stone dressings such as the Old Shire Hall, Bury St Edmunds (1906-7) where Ketton Stone was used and the Corn Exchange in Bury St. Edmunds (1836) that employed Ancaster Stone.

Clay Lump (large unfired clay bricks) was also used as a building material in the 19th century, mainly for farm buildings and cottages. Other forms of clay construction, such as cob or rammed earth, are also found. There is a concentration of clay buildings, for example in Buxhall, where the Reverend Copinger Hill was a strong advocate of clay building in the 1840s.

**East Anglian Chalk**

The East Anglian Chalk of Bedfordshire, Cambridgeshire, Hertfordshire, Suffolk and north-west Essex is part of the narrow ridge of Chalk that runs south-west to north-east across southern England from Devon to the eastern edge of The Wash. Only a small area of north west Suffolk around Newmarket falls within the NCA; the area includes Newmarket and the villages of Exning, Landwade to its north and Moulton and Kentford in the Kennet Valley to its east.

The East Anglian Chalk was historically sparsely populated due to a shortage of wood and water. Villages developed where water was available. C16th-C17th timber frame farmhouses, outbuildings and dwellings survive. From the C17th brick increasingly became the dominant vernacular material used in the villages north of Newmarket and in the town itself. Flint was used in the churches of the area. The Church of St. Nicholas at Lanwade (1445) is built of flint and pebble rubble with some reused Lincolnshire Limestone dressings. St Martin’s Church in Exning (C12th-C14th) is built of flint rubble with much use of rough shaped Chalk blocks to raise the roof level of the nave, chancel and north transept. Chalk is also used in in C17th-C19th for extensions, farm buildings and walls in the area. For example, Street Farmhouse, Freckenham was extended in the C19th in Chalk. Exeter Hall Barn Exning (C17th) and Exning Dovecote are built of Chalk with brick quoins.

Newmarket was established as Exning’s market on the Icknield Way in c. 1200. It developed as a horse racing and breeding centre from the C17th. When James I built Newmarket Palace, Training studs became established on the heaths of the east of the area. Much of the open Chalk heathland was enclosed in the early C19th. The industry expanded considerably in the C19th and early C20th. Many new buildings were constructed to meet the needs of the horse breeding industry, often in brick or flint with brick dressings. Flint is sometimes mixed with Chalk Block and Clay Lump. Rapid growth in the C19th led to the construction of many fine Regency Victorian and Edwardian buildings. Brick was generally used. Sometimes flint was used for rear and side walls such as Ragotsky House and for boundary walls. Knapped flint was used for some buildings such as the Girls and Infants School (1869) and the Mount Public House.

The Church of St. Mary the Virgin, Newmarket (C14th) was heavily restored in the C19th. All Saints Church was rebuilt in 1875-7 in flint with limestone dressings. As the town grew in the C19th, several new churches were built mainly in brick with limestone dressing. The Church of St. Philip and St. Etheldreda (1895), was built as a workhouse chapel; it is constructed of flint with brick dressings. The C19th cemetery chapels at Exning and Newmarket cemeteries are of knapped flint.

To the east of Newmarket, the villages tucked into the more undulating terrain. Rendered timber frame is dominant in the surviving houses and cottages that date from the C16th-C17th. Flint was used in the Medieval period in churches and for the rubble flint packhorse bridge (C15th) at Moulton. St. Peter’s Church at Moulton (C14th-C16th) is of random flint rubble with Chalk rubble and limestone dressings; it was heavily restored in the C19th. St Mary’s Church at Kentford (C14th) is of rough coursed flint rubble with dressings in Chalk and Lincolnshire Limestone. Many C18th – C19th village houses are built of flint with gault brick dressings with either slate, peg tile or thatched roofs. Boundary walls were also often built of flint. Moulton Rectory School (1849) is built in Gothick style in knapped flint with gault brick dressings.
There is evidence of clay walled buildings in Suffolk from at least the Roman period; they were common place in the Medieval period across much of East Anglia. Generally, cob or shuttered clay was used. However, few cob or shuttered clay buildings survive. Cob continued to be used into the C19th, though latterly at a much-reduced level, as the use of Clay Lump became more prevalent.

Clay Lump buildings are found in the chalky Boulder Clay areas of Bedfordshire, north Hertfordshire, south Cambridgeshire, north Suffolk, south Norfolk and Essex. In the west of the area the material is named ‘Clay Batt’. In Norfolk, Suffolk and Essex, it is more commonly called ‘Clay Lump’. Most extant clay lump buildings in Norfolk date from circa 1790 to circa 1860, a period that largely coincides with that of the Brick Tax.

They are also associated with rapidly rising population and the enclosure and development of former common land. The Tax was introduced in 1784 and abolished in 1850. After its abolition Clay Lump continued to be used, particularly for agricultural buildings.

Clay Lump was made from chalky Boulder Clay, broken and/or ground chalk, sand, gravel, silt and straw in varying proportions moulded into blocks and allowed to dry in the sun. The clay was dug from local pits. Clay Lump walls, particularly those of agricultural buildings, were often coated in coal tar and sand externally. Most Clay Lump buildings had footings of brick and/or flint. The lumps often have a modular size relationship to that of the footing bricks.

Clay Lump buildings are found primarily in South Norfolk and High Suffolk. 160 listed buildings are recorded as having some element constructed in the material. In Suffolk they occur in an area bounded by Hargrave west of Bury St Edmunds to Homersfield in the eastern Waveney Valley, and from the Norfolk boundary in the north to Great Waldingfield in the south. The greatest concentration lies to the south of Diss. Villages such as Redgrave, Botesdale, Rickinghall, Wrotham, Mellis, Palgrave, Buxhall, Stutson, Wyverstone and the town of Eye have several buildings built of CVlay Lump.

Buildings built of Clay Lump range in size from relatively large and high-status houses, through two-storey houses, terraces and single storey cottages, to large barns and small agricultural buildings. Buildings were usually lime rendered, although more prestigious houses were sometimes stuccoed. Sometimes the buildings are fronted by brick elevations while the remaining walls are in Clay Lump. Earlier timber-framed buildings were often extended in Clay Lump in the C18th and C19th.

The East Anglian Earth Buildings Group founded in 1994 has encouraged the conservation of historic earth buildings and the construction of new buildings using earth materials.
Stones in walls

Suffolk’s built heritage displays a diverse range of stones and styles of usage in walls; representative images of the county’s main indigenous building stones (and a few imported stone types) are provided on the following pages.

Roughly coursed blocks of ‘Carstone’, Church of St. Mary, Lakenheath

Rounded brown-coloured Suffolk Boxstones, All Saints Church, Sutton

Roughly squared and randomised blocks of Chalk clunch, churchyard wall, Lakenheath

Dressed tabular blocks of Coralline Crag (Bryozoan Rock Bed), Church of St. Peter, Chillesford

Dressed blocks of London Clay Septaria, some bored by marine organisms, Dunwich Leper Chapel

Red Crag Ironstone (arranged in herringbone fashion) and Quaternary Flint nodules, Church of St. Mary of the Assumption, Ufford
Roughly coursed and arranged Chert and Quartzite pebbles and cobbles, churchyard wall of Church Cottage, Lakenheath

Knapped Quarry Flint and occasional Totternhoe Stone blocks, Church of St. Mary the Virgin, Santon Downham

Knapped Quaternary Flint (Field Flint) nodules, churchyard wall at Long Melford

Quaternary Flint (Field Flint) nodules, churchyard wall at Long Melford

Knapped pale-coloured Quaternary Flint nodules, All Saints Church, Hemley

Knapped Quaternary Flint (Beach Flint) pebbles with occasional marine shells and exotic pebbles, All Saints Church, Sutton

Squared flint and Ancaster Stone chequerwork, Church of St. Mary, Woolpit
Indigenous building stones

Lower Cretaceous

Lower Greensand Group

Woburn Sands Formation

‘Carstone’

The outcrop of the Woburn Sands Formation in Suffolk is confined to an extremely small area lying to the north-west of Lakenheath, which adjoins the county boundary with Cambridgeshire. The strata comprise distinctive red-brown to orange-brown, highly ferruginous sandstones and ironstones, which are typically medium- to coarse-grained.

‘Carstone’ is rarely encountered in buildings in Suffolk. One of the few examples of its use is in the walls of the nave of St. Mary’s in Lakenheath. Here, some weathered blocks strongly resemble Quaternary-age Ironpan and, based on current (albeit very limited) evidence, a different stratigraphic origin for the Suffolk ‘Carstone’ cannot be discounted. Also, given the very small outcrop area of the Woburn Sands Formation in north-western Suffolk, it is possible that at least some of the ‘Carstone’ employed in Lakenheath has been imported from neighbouring Norfolk.

The Medieval Church of St. Mary, Lakenheath, is built of Quaternary Flint, Chalk and ‘Carstone’ with dressings of Lincolnshire Limestone (including Barnack Stone)

The walls around the North door at St. Michael’s Church, Lakenheath are composed of very roughly coursed Chalk and more regularly coursed ‘Carstone’. Dressings are of Lincolnshire Limestone
Upper Cretaceous

Chalk Group - Grey Chalk Subgroup

‘Lower Chalk’

Totternhoe Stone

The Totternhoe Stone is a distinctly harder unit within the Grey Chalk Subgroup. It typically comprises creamy to pale brownish-grey, fine-grained calcarenite. It often appears ‘sandy’ or ‘gritty’ due to the presence of coarse fossil fragments. Totternhoe Stone is usually compact and well jointed.

In Suffolk, Totternhoe Stone was traditionally hewn from quarries using a type of two-edged battle-axe or sawn into blocks. It was easily carved, but weathers readily and was therefore mostly used for interior work. However, if properly dried, traditionally during the summer months, Totternhoe Stone became harder and more durable and was occasionally used externally. A particularly fine example of its use can be seen at Santon Downham church.

Chalk Group - White Chalk Subgroup

‘Middle Chalk’ and ‘Upper Chalk’

Chalk (Chalk Block, Clunch)

The white chalky limestones of the Upper Cretaceous White Chalk Subgroup are amongst the most distinctive and easily recognised building stones employed in Suffolk. They are white to very pale grey or pale buff, typically structureless chalky limestones, which in places contain fossil oysters (inoceramids) and echinoids, and occasionally crinoids, brachiopods and belemnites. When freshly quarried, Chalk is easily worked. However, it is generally unsuitable for exterior stonework as repeated wetting and drying (coupled with frost action) causes the relatively soft Chalk to powder and disintegrate into small angular brash. Softer forms of the stone, when used externally, may show concave weathering away from mortar lines.

Rough Clunch walling is relatively common in many west Suffolk villages and farm buildings. It can be seen in Lakenheath, both in the church and surrounding churchyard walls, and in Kentford church (where the stone is deeply weathered). At Exning church, Clunch has been employed to infill former doors and arches. A particularly fine example of the use of dressed and coursed Chalk Block is provided by the Victoria National School (established 1813) in Brandon.
Quarry Flint

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

Quarry Flint breaks with a characteristic conchoidal fracture, producing razor-sharp, fine edges; the cleaved surfaces may exhibit banding 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 nodules contain well preserved fossils, with echinoids, sponges, bivalves, burrow-structures and occasionally belemnites being encountered.

Quarry Flint is one of the most commonly encountered and extensively used building stones in Suffolk; it is often seen in association with Quaternary Flint. Quarry Flint was employed in a wide variety of ways, including as knapped, faced, trimmed or ‘cleaved-faced’ stone and sometimes in squared chequer-work and flushwork. Further details regarding the form and geographical extent of its use are included in ‘The use of stone’ section of this Atlas.

The extremely hard and resistant nature of Quarry Flint-type nodules has resulted in them having been recycled by natural processes into younger deposits. These reworked types of Flint, which show specific characteristics, are described in the Quaternary section of this Atlas.
Palaeogene

Thames Group

Septaria (Cementstone)

Sediments of the Eocene-aged Thames Group crop out along the Suffolk coast from Bawdsey southwards and along the lower reaches of the rivers Deben and Orwell. These include dark brownish-grey, fine-grained, calcareous mudstone concretions known as Septaria or Cementstones. The Septaria have been used as a building stone in Suffolk, having been either collected from the foreshore or removed from the low cliffs that are present locally. Septaria were also obtained through offshore dredging, and were once used for the manufacture of Roman cement. Impressions and borings by marine organisms can be seen in many of the blocks that have been incorporated into the walls of churches, and these testify to their origins. Unfortunately, Septaria fracture and weather relatively easily, sometimes leading to the collapse of the sections of walling in which they occur (e.g. the churches of Orford, Bawdsey and Alderton).

Septaria are widely used in Suffolk’s Norman churches, most often in conjunction with Caen Stone (as seen in the Leper Chapel at Dunwich). Orford Castle (commenced in 1165/66) provides one of the most impressive examples of the use of Septaria as a building stone in Suffolk. Adjacent to the castle earthworks is an old quarry from which some of the stone used in the construction of the keep is thought to have been obtained. Other examples of the use of Septaria include the churches of St. Ethelburt at Falkenham and All Saints at Hemley; Septaria also occur in the ruined remains of Blackfriars in Ipswich.
Neogene to Quaternary

Crag Group

Coralline Crag Formation

Bryozoan Rock Bed (‘Rock Bed’)

This golden yellow to yellow-brown coloured shelly sand deposit within the Coralline Crag Formation has become cemented to form a hard limestone known as the Bryozoan Rock Bed (‘Rock Bed’). This stone is unique to Suffolk and occurs along the south-eastern coastal strip from just north of Aldeburgh to Gedgrave near Orford. The stone is readily cut and dressed into tabular blocks.

One of the best examples of the use of Coralline Crag ‘Rock Bed’ is provided by the mid-C14th tower of the Church of St. Peter at Chillesford. Blocks of Coralline Crag required for recent restoration works at Chillesford came from Crag Farm Pit, near Sudbourne (some 5 km to the east). Other examples of the use of Coralline Crag include the churches of St. John the Baptist at Wantisden, St. John the Baptist at Butley, a C15th extension to the chancel of All Saints’ Church at Eyke and the boundary wall of the Medieval Greyfriars Priory at Dunwich (repaired in 2013). With the possible exception of Orford Castle, the ‘Rock Bed’ was seemingly not used by the Normans, but was employed mainly during the C14th-C16th for lesser farm-related structures, general walling (such as along Quay Street and enclosing the churchyard in Orford) and for repair work (for example at Iken and Bawdsey).

Suffolk Boxstones (Boxstone Bed)

Boxstones are pale brown to pale grey coloured, rounded pebbles of Miocene sandstone found within an impersistent remanié deposit at the base of the Coralline Crag Formation in south-eastern Suffolk and north-eastern Essex (most notably around the rivers Orwell and Deben). They represent the vestiges of marine sediments of Miocene age that were deposited in this general area. Boxstones pebbles are considered to represent the waste material from mid-C19th coprolite (phosphatic nodule) excavations, and formed a cheap, readily available source of local building stone.

Boxstones have a very restricted and localised use in Suffolk. They were used in the 1859 restoration of All Saints’ Church in Sutton (where they comprise 7-18% of the wall fabric); they are also recorded in the church walls at Alderton (restored 1864) and Shottisham (restored 1867), and in the vestry of Melton church (restored post-1868).

The tower of St. Peter’s Church at Chillesford is constructed of dressed blocks of Coralline Crag ‘Rock Bed’. Where not rendered, the church walls also contain Quaternary Flint nodules, Septaria and exotic pebbles including Quartzites.

The walls of the C16th All Saints’ Church, Sutton (largely restored in 1859), contain a wide range of pebbles including Quaternary Flint, Suffolk Boxstones and Quartzite ‘exotics’ along with pieces of Septaria.
Red Crag Formation

Red Crag Ironstone

The Red Crag Formation crops out in southern coastal districts of Suffolk and in northern Essex. In some places, the relatively soft Red Crag sandstones have become impregnated and cemented by iron oxides to form decalcified ironstones. These are typically medium-grained, dark purple-red in colour and are sufficiently hard and durable to be employed as a building stone.

Red Crag Ironstone has a rather restricted area of use in south-eastern Suffolk. At the Church of St. Mary of the Assumption in Ufford, roughly shaped blocks of the ironstone occur in herringbone pattern courses in the north wall of the nave and as occasional quoins. At the nearby All Saints’ Church in Eyke, up to 10% of the wall fabric on the south side of the nave is of Red Crag Ironstone pebbles.

Various lithostratigraphic units

Sarsen Stone

Sarsen Stones are loose blocks of hard quartzitic sandstone which typically occur as rounded or elongate boulders, but sometimes as metre-scale slabs. They are grey to pale brown in colour, becoming distinctly creamy-buff when weathered, and possess a very fine-grained, saccharoidal (‘sugary’) texture comprising sub-rounded quartz grains set within a silica matrix (which is visible on fractured surfaces). Sarsen Stones are very hard and resistant to weathering; their surfaces are often smooth and may occasionally show poorly-defined bedding structures.

Sarsen Stones are seldomly encountered in Suffolk. They can be seen within a rockery at the Lower Arboretum in Christchurch Park, Ipswich. These are believed to originate from excavations at Ipswich Dock during the 1840s. Many large Sarsen Stone boulders were also extracted from the bed of the Orwell River during work on the Ipswich flood protection scheme in 1975. They were arranged to create a riverside feature upstream of Stoke Bridge, by the Dock, in Pocket Park.

Quaternary Flint (Fluvioglacial Flint, Field Flint, Beach Flint)

Quaternary Flint typically occurs as irregularly-shaped nodules which are found lying on the surfaces of fields or as pebbles in Fluvioglacial sands and gravels and tills. The size of the nodules typically ranges from 8–20 cm. The colour is variable: less weathered flint nodules or pebbles have a cream outer cortex with darker coloured (greyish) interior; weathered flints, in contrast, or those that have lain in soil or superficial deposits for a long period of time, may be variously discoloured or bleached, and often have brown stained interiors due to the precipitation of iron hydroxides from percolating ferruginous waters. The ‘weathered’ appearance of Quaternary Flint helps distinguish it from the much ‘fresher-looking’ Quarry Flint.

A combination of its hardness, durability and resistance to weathering has resulted in Quaternary Flint being much used as a building stone in Suffolk. Many walls and buildings across the county include Quaternary Flint in one form or another. As a walling stone, Quaternary Flint was mainly employed as little-dressed nodules or pebbles laid randomly or roughly to course. Knapped, faced, trimmed or cleaved faced forms of

The late C12th Church of St. Mary of the Assumption, Ufford is constructed mainly of Quaternary Flint and Quarry Flint with blocks of Red Crag Ironstone and occasional Bryozoan Rock Bed
Quaternary Flint, used in a random fashion or as part of decorative arrangements, are also encountered with some regularity, however. Further details are included in ‘The use of stone’ section of this Atlas. Particularly fine examples of the use of Quaternary Flint are provided by the garden walls and buildings surrounding St. Edmondsbury Cathedral in Bury St. Edmunds.

**Chert and Quartzite pebbles and cobbles**

Accumulations of Quaternary Fluvioglacial deposits in Norfolk encompass a diverse range of poorly sorted, relatively soft and unconsolidated sediments. These vary in composition, but sometimes contain harder pebbles and cobbles, which mainly comprise orange-brown to brown coloured chert and quartzite. The latter are typically encountered in walls as hard, rounded, ovoid pebbles that may have been derived from the Triassic Chester Formation of the West and East Midlands.

Suffolk’s Fluvioglacial deposits were formerly exploited for construction materials on mainly a local scale and the harder Chert and Quartzite pebbles and cobbles yielded as a by-product of this activity served as a convenient source of stone for nearby buildings and other walling. The use of Chert pebbles and cobbles in Suffolk walls is not especially common but quite widespread nonetheless; where seen, such pebbles have often been used in conjunction with Quaternary Flint. A particularly fine example is provided by the east-facing wall of Church Cottage in Lakenheath.

The garden wall in the grounds of St. Edmondsbury Cathedral, Bury St. Edmunds, displays a range of mixed Quaternary Flint pebbles alongside Barnack Stone blockwork

The east-facing wall of Church Cottage, Lakenheath, contains many Chert and Quartzite pebbles and cobbles; other walls mainly employ (knapped) Quarry Flint and Quaternary Flint nodules

The C15th tower and adjoining walls of St. Ethelbert’s Church, Falkenham, employ a wide range of pebbles of Quaternary Flint, exotic stones, Chert and Quartzite along with Septaria in their construction
Imported building stones

Although the Cretaceous bedrock succession and younger sedimentary deposits of Suffolk have yielded a variety of indigenous building stones, ready supplies of good quality building stone are limited in some areas and extensive use has therefore been made of stones imported into the county from other parts of England.

A summary of the main imported building stone types which have seen use in the county follows below. Additional descriptions of imported stones relevant to Suffolk can be found in the references listed in the Further Reading section of this Atlas and in the Strategic Stone Study atlases covering the source areas of these various stones.

Sedimentary stone types

Carboniferous Sandstone
Derbyshire

Carboniferous
Marsden Formation, Millstone Grit Group

A fine- to medium-grained sandstone, with a buff, light orange or pink colouration; it is well-bedded to massive, some layers exhibit cross-bedding. Historically, over many centuries, several hundred quarries have been opened in Derbyshire for the extraction of this stone type which has achieved a national reputation for its durability and aesthetic qualities.

This Boer War Memorial to the Suffolk Regiment stands in Christchurch Park, Ipswich. It was constructed in 1906 and comprises a bronze figure of a soldier standing on a pedestal of pink Carboniferous sandstone (possibly from Darley Dale)

York Stone (general sense)
West / South Yorkshire

‘Upper’ Carboniferous
Elland Flags, Pennine Coal Measures Group

Buff to pale grey or greenish grey, typically fine-grained sandstones, which are often micaceous and laminated, but occasionally show small-scale cross-bedding features. Usually weathers evenly but may separate along mica-rich horizons. In Suffolk, York Stone (or ‘Yorkshire Flags’) is employed mainly as paving stones or as plinths.

Yorkshire Flagstone paving to the entrance of Christchurch Mansion, Christchurch Park, Ipswich
Mansfield Red Stone  
*Mansfield*, Nottinghamshire

*Permian*  
Cadeby Formation, Zechstein Group

A distinctive, uniform, red-brown dolomitic sandstone that has seen very occasional use in Suffolk as a facing or decorative stone.

*Mansfield Red Stone used as decorative dressings around an entrance doorway and windows, Café Rouge, Bury St. Edmunds*

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Rockingham Forest Lincolnshire Limestone  
*Northamptonshire/Rutland*

*Middle Jurassic*  
Lincolnshire Limestone Formation (Upper Lincolnshire Limestone Member), Inferior Oolite Group

The name ‘Rockingham Forest Lincolnshire Limestone’ is employed here as a general term that applies to a variable ‘suite’ of Lincolnshire Limestones imported into – and very widely used – in Suffolk. The name encompasses several named varieties of Lincolnshire Limestone (including Weldon Stone, Kings Cliffe Stone, Stanion Stone, Casterton Stone) which cannot reliably be distinguished for a number of reasons. Ancaster Stone and Barnack Stone are provisionally retained as distinct, named varieties of Lincolnshire Limestone (and are described separately below) on account of the features they typically and ‘consistently’ exhibit when seen as isolated blocks in buildings. However, further analysis may demonstrate that their distinction also cannot be justified.

Rockingham Forest Lincolnshire Limestone incorporates a continuum of pale cream to pale grey coloured limestones, which weather to shades of buff-yellow; textures may be ooidal and/or bioclastic. The stone may or may not display cross-bedding features, and it is variably porous. The stone has seen common use throughout Suffolk, especially for the church dressings and quoins of churches.

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*St. Edmundsbury Cathedral, Bury St. Edmunds, was largely rebuilt in the C12th and C16th. It comprises a range of Lincolnshire Limestones and Clipsham Stone*

*The C14th Church of St. Peter and St. Paul, Lavenham is one of the finest examples of Late perpendicular Gothic architecture in England. The church is built of mainly of knapped flint and Casterton-type Stone*
Ancaster Stone  
_Ancaster, Lincolnshire_

Middle Jurassic  
Lincolnshire Limestone Formation, Inferior Oolite Group

A medium to coarse-grained, creamy-white to pale yellow coloured (though rather ochreous in places) ooidal and bioclastic limestone. Weathered surfaces commonly display a distinctive ‘streaky bacon-like’ patterning. In Suffolk, Ancaster Stone (along with other types of Lincolnshire Limestone) tends to have been used in the construction of prestigious buildings, especially in the construction of cathedrals, churches or chapels.

*The front face of the Corn Exchange, Bury St. Edmunds (1861-62) includes Ancaster Stone and Portland Stone (for pillar bases) in its construction*

Barnack Stone  
_Barnack, Cambridgeshire_

Middle Jurassic  
Lincolnshire Limestone Formation (Upper Lincolnshire Limestone Member), Inferior Oolite Group

Barnack Stone is a typically hard, pale buff coloured, medium- to coarse-grained, shelly limestone cemented with sparry calcite. The stone usually displays cross-bedding and differential weathering of its constituent grains (ooids and peloids of varying sizes and fossil shell debris up to 5mm in size) imparts a ‘rough feel’ to exposed surfaces. In Suffolk, the stone has been employed mainly for the dressings of churches and other ecclesiastical buildings that pre-date the Reformation.

*The C14th Abbey Gate at Bury St. Edmunds, constructed mainly of Barnack Stone*

Bath Stone  
_Bath, NE Somerset and possibly Corsham area, Wiltshire_

Middle Jurassic  
Chalfield Oolite Formation, Great Oolite Group

A creamy-white to buff-yellow, ooidal limestone (freestone). This stone has been used occasionally in Suffolk for prestigious administrative buildings and in connection with Victorian new-build and church refurbishment schemes, especially as ashlar and window and door mouldings. A particularly noteworthy example of its use as ashlar is Ipswich Town Hall, which was constructed in 1878 in a grand Victorian architecture style.

*Ipswich Town Hall (1878) constructed mainly of Bath Stone ashlar with Red Mansfield Stone pillars*
**Caen Stone**  
*Normandy, France*

Middle Jurassic  
Calcaire de Caen Formation

An off-white to pale creamy-yellow coloured limestone with a fine-grained texture and few large fossils. It may exhibit spalling and individual blocks of Caen Stone may also show uneven weathering. It has been employed only occasionally in Suffolk, and even then in ecclesiastical buildings or fortifications dating to Norman times.

*Founded in the late C12th, the Leper Chapel at Dunwich features finely carved Caen Stone windows and arches, with darker brown London Clay Septaria, flints and other materials*

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**Portland Stone**  
*Isle of Portland, Dorset*

Upper Jurassic  
Portland Stone Formation, Portland Group

A near-white or very pale coloured limestone that (in its ‘Basebed’ guise at least) is typically a fine- and even-grained freestone. It has seen widespread use across Suffolk especially in urban areas in carved form. It has been used for monuments, war memorials, gravestones, fountains and columns. Portland Stone is also employed as high quality walling, notably in civil, administrative and financial buildings.

*The Exchange Chambers (1878-82) in King Street, Ipswich are built of Portland Stone ashlar, ornate carved panels, pilasters and pediments*

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**Kentish Ragstone**  
*Weald of Kent*

Lower Cretaceous  
Hythe Formation, Lower Greensand Group

A medium- to coarse-grained, pale greenish-grey or pale brown limestone which contains greater or lesser amounts of quartz, glauconite and fossil shell debris. Kentish Ragstone has been employed only occasionally in Suffolk, and usually for the walling of ecclesiastical buildings; it may be found as dressed (typically rock-faced) tabular blocks or forming irregular random rubblestone patterns.

*The Methodist Church in Museum Street, Ipswich was constructed in 1860 using randomised Kentish Ragstone with Bath Stone dressings*
**Paradoxica Bed Stone**  
*Norfolk*

**Upper Cretaceous**  
Grey Chalk Subgroup, Chalk Group

One of the ‘Lower Chalk’ hardgrounds, the Paradoxica Bed Stone is a pale grey to pale cream or pink coloured, splintery, chalky limestone. It is characterised by the presence of a ramifying network of fossil burrows (formed by small crustaceans). These ‘Lower Chalk’ hardgrounds are used only very occasionally and locally as building stones in Suffolk. Where encountered, they usually occur as isolated rubblestone blocks in the walls of ecclesiastical buildings.

*A water-worn block of Paradoxica Bed Stone (and associated Septaria) in the south-eastern wall of the C12th Leper Chapel, Dunwich*

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**Igneous and Metamorphic stone types**

**Granite**  
*Various sources (including Devon and Cornwall)*  
*Neoproterozoic to early Permian*

A coarse-grained igneous rock, often pale grey coloured (but other coloured varieties occur), comprising an interlocking network of grey quartz and white (though sometimes pink) feldspar crystals; the latter may form distinctly larger crystals (termed phenocrysts) and display good morphologies. Smaller amounts of darker iron- and magnesian-bearing minerals and glinting flakes of mica are also usually present. Granite is very durable and various types are employed in Suffolk. This stone has been put to various uses in Suffolk, and can be seen in dressed and polished form as a facing stone (on buildings such as banks, offices etc.) or roughly dressed as paving setts, kerb stones and memorial stones, or within the fabrics of military fortifications.

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**Rhineland Lava (Niedermendig Lava)**  
*Niedermendig or Mayen, Eifel, Germany*

**Pleistocene**

Lavas in the Niedermendig-Mayen region of western Germany have been quarried since Roman times for the production of querns and grinding stones. These were transported to Britain from the Roman period onwards and were imported into East Anglia until well into the post-Medieval period. Lava quern fragments are often recovered from mid and late Saxon sites; large quantities of such materials have been recovered from several mid Saxon sites in Ipswich. Occasionally, lava quern fragments have been included in the wall fabrics of Medieval buildings, especially churches. Pieces of Niedermendig Lava quern stone are very distinctive – they comprise a dark grey to black coloured, basaltic rock that is distinctly vesicular and rough-surfaced.
Several different types of roofing slate have been imported into – and used all across – Suffolk, especially since mid-Victorian times. Purple and grey Welsh Slate, for example, has been widely employed in many of the county’s villages and towns.

*Shakespeare Lodge off Back Street, Lakenheath, exhibits a roof of Welsh Slate*
**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.

**Breccio-conglomerate:** A type of Conglomerate that contains a mixture of angular and rounded rock fragments or clasts.

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

**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.

**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.

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

**Cretaceous:** A period of geological time that lasted from approximately 145 million to 65 million years ago. Sedimentary rocks of this age are the source of 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 inclined with respect to the bedding planes or form regular arc-shaped patterns.

**Dolostone:** A sedimentary carbonate rock (often a limestone) that contains a high percentage of dolomite (a calcium and magnesium carbonate mineral).

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

**Exfoliation:** A type of weathering pattern, often seen in relatively sedimentary rocks, in which the surface layers of rock are weathered and split away as thin layers.

**Feldspar:** A mineral similar to quartz but slightly softer and often coloured white or pale pink depending on its chemical constituents. Occurs in both sedimentary rocks (e.g. sandstones) and igneous rocks (e.g. granites).

**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’.

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

**Glaucnite:** 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.

**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:** A small scale sequence of fine layers that occur in sedimentary rocks.

**Liesegang banding:** A type of banded structure which is characteristic of ironstones and iron-rich rock. In individual stone blocks it is often seen as different colour patterns, typically shades of red, orange, brown or purple.

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

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

**Oolitic:** A type of limestone that contains ooliths or ooids which are sand-sized (<2mm) rounded grains of mineral or fossil material coated in successive concentric layers of calcium carbonate (limestone).

**Peloidal:** A type of limestone that contains peloids which are similar to ooids (see oolitic limestone) but typically are formed of very fine-grained mud which lack any discernable internal structure or concentric layering.
Quaternary: A period of geological time that lasted from approximately 2.6 million years ago to the present Day. It includes the last Ice Age.

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.

Superficial deposits: Surface deposits and sediments of various types formed during the Quaternary period.

Syncline: A downward, U-shaped fold or trough in the layers of rock in the earth’s surface.
This study, written by Dr Andy King (Geckoella Ltd., andy@geckoella.co.uk) and Phil Collins (Phil Collins Associates, phil@phil-collins.co.uk), is part of Suffolk’s contribution to the Strategic Stone Study, sponsored by Historic England.

This report incorporates data from several sources, including local geological (GeoSuffolk) and heritage building reports, BGS memoirs and references (listed below) along with independent fieldwork by the authors. Use has also been made of the BGS on-line lexicon of named rock units (www.bgs.ac.uk/lexicon).

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Acknowledgements and References

BGS Memoirs, Sheet Explanations and Mineral Resource Reports


Further Reading


Websites

GeoSuffolk Built Environment
(webpage accessed 14 March 2019)
Summary of building stone uses in Suffolk with examples and links to location descriptions and leaflets.
http://geosuffolk.co.uk/index.php/built-environment

The Historic Environment Record, Suffolk County Council
(webpage accessed 14 March 2019)
Links to the register of all known archaeological and historical sites (including listed and heritage buildings) in Suffolk.

Victoria County Histories (VCH)
Suffolk (webpage accessed 14 March 2019)
https://www.victoriacountyhistory.ac.uk/counties/suffolk