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Introduction

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

The oldest exposed strata, which are represented by mudstones and impure limestones of late Jurassic age, occur in a small area lying to the west of Kings Lynn and Downham Market. Overlying these is a Lower Cretaceous sequence comprising the Sandringham Sand, Dersingham, Roach, Carstone and Gault formations. These strata are succeeded by the distinctive red-coloured chalks of the Hunstanton Formation (Early Cretaceous) and then by the more typical grey and white chalks of the Grey Chalk Subgroup and the White Chalk Subgroup (both Late Cretaceous in age). Geographically, the chalks lie to the east of a sinuous line that extends from Holme-next-the-Sea on the north coast to Hockwold near the Suffolk border. Much younger (Neogene to Quaternary) shelly sands and gravel deposits of the Crag Group overlie the chalks in the east of the county, and the pre-Quaternary strata more generally are concealed by a variety of superficial deposits (including glacial tills and alluvial sands, silts and gravels) laid down during Pleistocene and Holocene times. We note that the sediments of the Crag Group are no longer considered by BGS to form part of the ‘bedrock’ succession, but are instead assigned to the Superficial Deposits Supergroup. Indeed, recent mapping has revealed that Crag Group sediments locally intercalate with river terrace deposits. These revised assignments are reflected in the Stratigraphic Table included in this Atlas.

The Cretaceous strata of Norfolk have yielded a range of indigenous stone types suitable for building purposes. None of these can be regarded as ‘good freestones’, however, and large volumes of Middle Jurassic Lincolnshire Limestone and Caen Stone (the latter from Normandy) have consequently been imported into the county from Medieval times onwards.

The Lower Cretaceous succession was an important source of indigenous building stone. The red-brown ferruginous sandstones (Carrstone) and silvery-grey quartzitic sandstones (Leziate Quartzite) yielded by the Sandringham Sand, Dersingham and Carstone formations were used extensively along their respective outcrops. Red Chalk from the Hunstanton area was used very locally as a rubblestone. The Upper Cretaceous white chalks, meanwhile, were quarried across much of their outcrop for blockstone, or ‘clunch’, as well as for flint – which is the most commonly used local building stone. Iron-cemented sandstones and conglomerates (including Ironpan) forming part of the Neogene and Quaternary deposits have also been used for building purposes, as indeed have pebbles of flint, chert and more ‘exotic’ lithologies (including granite, basalt, gneiss and quartzite) obtained from fluvioglacial deposits, modern beaches and ‘stockpiles’ of offloaded ship ballast.

The modern county of Norfolk is administered by Norfolk County Council. Below this tier of local government, the county is divided into seven district councils: Breckland District, Broadland District, Great Yarmouth Borough, Kings Lynn and West Norfolk Borough, North Norfolk District, Norwich City and South Norfolk District. A proposal to give Norwich Unitary Authority status was rejected in 2010.

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 Norfolk 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).

The following ten National Character Areas (NCA) lie wholly or partly within Norfolk:

NCA 46 The Fens
NCA 76 North West Norfolk
NCA 77 North Norfolk Coast
NCA 78 Central North Norfolk
NCA 79 North East Norfolk and Flegg
NCA 80 The Broads
NCA 82 Suffolk Coast and Heaths
NCA 83 South Norfolk and High Suffolk Claylands
NCA 84 Mid Norfolk
NCA 85 The Brecks
Norfolk Bedrock Geology

**BUILDING STONE SOURCES**

- **LONDON CLAY FORMATION** - CLAY, SILT AND SAND
- **PALAEOGENE STRATA (PROJECTED WHERE OVERLAIN BY CRAG GROUP)**
- **WHITE CHALK SUBGROUP** - CHALK
- **MELBOURN ROCK MEMBER** - CHALK AND LIMESTONE
- **GREY CHALK SUBGROUP** - CHALK
- **HUNSTANTON FORMATION** - CHALK
- **GAULT FORMATION** - MUDSTONE
- **CARSTONE FORMATION** - SANDSTONE
- **ROACH FORMATION** - MUDSTONE AND LIMESTONE
- **DERSINGHAM FORMATION** - SANDSTONE AND MUDSTONE
- **SANDRINGHAM SAND FORMATION** - SAND, SANDSTONE AND FERRICRETE
- **ANCHOLME GROUP** - MUDSTONE

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

Norfolk Superficial Geology

- **ALLUVIUM** - CLAY, SILT, SANDS AND GRAVELS
- **COASTAL DEPOSITS** - SANDS, GRAVELS, SILT, CLAY AND PEAT
- **RIVER TERRACES** - SANDS, GRAVELS AND CLAY
- **AEOLIAN DEPOSITS** - SILT AND SAND
- **HEAD** - SANDS, GRAVELS, SILT 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

Derived from BGS digital geological mapping at 1:50,000 scale, British Geological Survey © UKRI. All rights reserved
## Stratigraphic Table

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<td>Various subdivided</td>
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Table 1. Summary (interactive) of stratigraphical and building stone names applied to sediments and sedimentary rocks in Norfolk.
The use of stone in Norfolk buildings

Background and historical context

Norfolk has over 10,800 listed buildings (540 are Grade I and 839 Grade II*). They range from graveyard monuments to the 1960s student accommodation blocks at the University of East Anglia. There are 286 Conservation Areas.

Good building stones are generally scarce in Norfolk. Timber was the main material used for the construction of secular buildings of all sizes throughout the Medieval period. Norfolk is rich in medieval box-framed timber buildings, particularly in the south of the county. The earliest surviving remains of flint-built buildings date from the Roman period. Both Field Flint and Quarry Flint were used extensively for larger medieval structures such as castles, houses of the wealthy and ecclesiastical buildings. In the north west of the county local stone was more much more readily available. Lower Cretaceous Leziate Quartzite, Carr and Carrstone, Upper Cretaceous Red Chalk, Chalk and Ironpans were extracted and used for local building purposes.

Building stone has been imported into Norfolk since at least the Roman period. By the mid C10th Norwich had become fully established as a major town, with its own mint. In the C11th and throughout the Medieval period, Norfolk was one of the mostly densely populated and productive agricultural regions in the country. Norwich was the fourth largest town in England. From the C11th the port established by the Bishop of Norwich at Kings Lynn and Norwich’s port of Great Yarmouth imported stones from overseas and various Lincolnshire Limestones from sources across the Wash. The ports grew rapidly, becoming major trading centres with France, the Rhineland, the Low Countries, Iceland, Scandinavia and the Baltic. The trade was dominated by the Hanseatic League, a confederation of merchant guilds and market towns and ports in north western and central Europe. Great Yarmouth also became a major Herring port and trading centre.

Until the Dissolution, religious communities had a significant influence on the landscape, economy and the extraction and use of building stone in Norfolk. There were over 90 religious foundations in the county. Many such establishments developed between Kings Lynn and Downham Market in ‘Norfolk’s Holy Land’. The important pilgrimage site of Little Walsingham was located a little further east. The construction of Norwich Cathedral began in 1096. Caen Stone from Normandy was extensively used to face the flint structure of the Cathedral.
Churches are the most frequent examples of surviving mediaeval buildings in which indigenous stone is used extensively. Norfolk’s prosperity led to the building of more parish churches than in any other county in England. 659 have survived out of a total of over 1000. Norwich alone once had 62 churches. The long history of alteration, extension, rebuilding and repair of such churches means they frequently exhibit a range of stone of different origins and periods. The earliest surviving churches date from the C10th. 140 of England’s 179 standing round towers are found in Norfolk; they are widely dispersed but concentrated in the west of the county and in the Waveney Valley south of Norwich. Uncoursed rubble and rough coursed flint nodules were the predominant building material used. In west Norfolk, local Carrstone and Ironpans were often a component of the walling, and occasionally Chalk. Various imported Lincolnshire Limestones were used to some extent in virtually all medieval monastic and parish churches, particularly for dressings.

Over twenty castles were built in Norfolk during the Middle Ages, the most impressive being Norwich Castle. The keep (1094 – 1121) is built in flint but was faced in imported Caen Stone. It was refaced in Bath Stone in the C19th. The remains of other stone keeps can be seen at Castle Rising (1138), Castle Acre (C11th) and Old Buckenham (1146). Periods of unrest resulted in the construction of further castles and the strengthening of the defences of existing structures. At Buckenham, a new castle with a circular stone keep, the oldest in the country, was built c.1146. Fortified manor houses were also constructed, for example Baconsthorpe Castle (1450), built of knapped flint.

The economy was already in decline when a large percentage of the population died from the Black Death (c.1349). Several settlements suffered a loss of over 70% of their inhabitants. However, in the late C14-C15th, increasing wealth as a result of the profitability of sheep farming and the wool trade, in combination with changes to religious practices and beliefs, resulted in new work being undertaken to most parish churches. The ‘Great Rebuilding’ in the Perpendicular style at first focussed on the reconstruction of naves, and often the rebuilding of west towers. At least 150 towers were rebuilt. However, many round towers were retained, often with a rebuilt or added belfry stage. Many of the churches of the C14-15th are very fine, with large windows, tall arcades and clerestories. From the start of the C14th knapping and squaring of flints to produce flat surfaces became common. ‘Flushwork’ became highly fashionable in the late C15th, particularly as ornamentation to towers, parapets, plinths and new porches.

Medieval Guilds played an important role in Norwich, Kings Lynn and Yarmouth in the C15th. There were over 30 in Kings Lynn for example. Some buildings survive such as St. George’s Guildhall (1410-20) which is built of brick and limestone, and Holy Trinity Guildhall (1422) which has fine external chequered flintwork.
The Dissolution resulted in the fragmentation of monastic estates and their transfer to secular landowners. Several abbey and priory churches became parish churches, for example St. Nicholas, Great Yarmouth (1101), England’s largest parish church and St. Margaret's, Kings Lynn (1095). Monastic and the church buildings were often demolished gradually, and the stone reused.

From the C15th brick was increasingly used, initially for houses of the wealthy. In the late C16th there was a great re-building of old manorial sites, with new house largely built of brick often with imported stone dressings. In the C17th-18th the building of stately homes came into fashion. In the first half of the C18th great Palladian houses were started at Houghton and Holkham. Many smaller houses were built by established families from the C16th to the 1820s. Nearly all were built in brick, often with imported stone dressings.

Few farm buildings other than large timber framed aisled barns survive from before the C17th. With the growth in wealth of the estates and often following enclosure, farm buildings were reconstructed, large estate farms built, and rural housing improved. In most of the county flint was used with brick. Distinctive styles of flintwork developed in various areas. The colour of the flint used also varied considerably depending on its origin. In the north west of the county materials such as Carrstone, Big and Small Carr, Chalk and Red Chalk or other local materials were used extensively. In the late C18th and C19th the use of Clay Lump became popular for cottages, outbuildings and farm buildings in the south of the county.

Non-conformist chapels and meeting houses were built from the C17th. There was a substantial upsurge in evangelism in the mid C18th leading to the building of many new chapels. Most chapels and meeting house were built in brick, often with imported stone dressings, columns and porticos. The use of local stone was more favoured in the north west of the county.

During the Industrial Revolution, Norfolk developed little industry except in Norwich. In the mid C19th the textile industry declined and the agricultural depression of the late C19th affected the entire country, leading to a major depopulation of the countryside and growth of the main urban settlements. Many larger country estates changed hands, were broken up or reduced in size. Land was acquired by farmers and businessmen from outside the county. Sporting estates became established, particularly in the west and south west of the county, including the Prince of Wales’ estate at Sandringham. A significant number of new estate and farm buildings were constructed. At the end of the C19th and in the early C20th, rich businessmen seeking rural retreats commissioned several new houses in the Arts and Crafts style. They were often designed by nationally recognised architects who referenced both regional and historical traditions and used local materials.

In the C19th more than 470 rural schools were built in the county in two periods. Between 1838-1858 British and National Schools were constructed such as at Wells-next-the-Sea, West
Winch and Thornham. From the late 1860s several schools were funded by wealthy landowners and patrons such as at Erpingham and Blicking. They were built variously in brick, flint, Carrstone and corrugated iron.

In the late C19th and early C20th a significant number of prestigious commercial and municipal buildings were constructed in the major settlements such as banks, insurance offices, libraries and town halls. They were often faced in imported Portland Stone or Bath Stone. Occasionally local stone such as Carr or flint were used. Flint continued to be used in buildings in the C20th and C21st. The Eastern Daily Press Building in Norwich uses flint in concrete panels and to face blocks.

The introduction of design guidance by local authorities, AONBs and the Broads National Park from the 1990s has led to a resurgence in the use of flint in new housing, and in the north west of the county, the use of Carrstone has increased.

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 that lies to the west of the Brecks and North West Norfolk. The use of flint in the area is less frequent than elsewhere in Norfolk. Outcrops of Small Carr occur in the Fens at West Bilney and Denver. Much of the land is below sea level, relying on pumped drainage and the control of sluices at high and low tides to maintain its agricultural viability. There are three distinct areas of the Fens within Norfolk - the Silt Fens, the Peat Fens and the Wissey and Little Ouse Fens. Each has its own history of exploitation, settlement, drainage and use of building stones.

The northern Silt Fens lie adjacent to the Wash and the western border of the county and extend south to Wisbech. The area includes the major fen edge settlement of Kings Lynn and villages to its north and south, including South and North Wootton.

In 1086, the Silt Fens were one of the most densely populated areas of Norfolk; by the C15th the suitability of the land for rearing sheep, the proximity to the ports of Kings Lynn and Wisbech and easy access to the large markets of East Anglia led to the Silt Fens being one of the most densely populated areas of the UK.

The medieval wealth of the area is reflected in its fine, large churches. All make considerable use of imported limestones; in the north of the area Lincolnshire Limestones are particularly widely used. The use of Carrstone and other materials such as Leziate quartzite, Big Carr, Ironpans, and Cinderstone from the Cretaceous outcrop of in north-western Norfolk extends into the Silt Fens near Kings Lynn. Carrstone is used in medieval churches such as at Terrington St. Clements and Tilney St. Lawrence. The Church of St. Margaret at Clenchwarton was built of Carrstone, Ironpan, Red Chalk and Chalk rubble with ashlar dressings. Flint cobbles, often with erratic pebbles, are also present in church wall fabrics, such as in Clenchwarton and Wiggenhall.

The Peat Fens were drained later than the Silt Fens. They lie further inland, west of Downham Market, south to the Cambridgeshire border and beyond. From the C17th, the draining of the Peat Fens started to transform them into rich agricultural lands.

Only isolated hamlets and scattered farmsteads occur in the main fenland. They were mainly built of red or buff brickwork. The few churches of the area date from the C19th, such as St. Mary’s Church at Welney (1848) which was built of coursed Small Carr. Fen edge settlements in the Peat Fens are more numerous. They include Downham Market and villages such as Wimbotsham, Hilgay and Denver. A mixture of local building stone brought from north west Norfolk is evident. Cottages in Denver and Hilgay are built of Carrstone with Chalk, Cinderstone, Ironpan, flint and brick. In Stoke Ferry, many buildings are galleted with Cinderstone and Ironbound Sandstone. The Church of St. Mary the Virgin, Wimbotsham (C12th) is built of
Norfolk Strategic Stone Study 9

Cinderstone with some Big Carr and Totternhoe Stone dressings to the C12th south doorway and C19th chancel.

Downham Market has a significant number of buildings that are constructed of local stones. It was at one time known as the ‘Gingerbread Town’ on account of Small Carr being the dominant building material used in the town, although a range of other materials are also present including Leziate Quartzite, Big Carr, Ironpan, Cinderstone and flint. A wide range of secular buildings were constructed in Small Carr, from C19th terrace cottages to civic buildings. The railway station (1846) is a fine example of the use of coursed Small Carr. Since the late C20th, there has been a revival in the use of Carr in construction and many new houses in the town are faced in the stone.

The third area of the Fens NCA lies between the Rivers Wissey and Little Ouse south west of Downham Market. It is a transitional landscape between the Brecks and the Fens. It was a focus for early settlement from the Palaeolithic period to Iron Age and Roman times. In the Medieval period, the area was exploited as part of extensive, largely fenland parishes, such as Methwold, Northwold and Fetwell. Villages, farmsteads and manors were sited on the higher land on the edge of the floodplain such as West Dereham, Wareham and Stoke Ferry, or on higher ‘islands’ within the valleys such as Southery and Fordham and Santon House on the Little Ouse. Those to the eastern margin such as Northwold, Methwold and Fetwell fall within the Brecks NCA, though their parishes largely fall in the Fens.

Flint, chalk and brick was often used in the east of the area. Chalk was frequently used as coursed blocks on a flint plinth in farm buildings and cottages. From the C18th cottages were often built of flint with brick dressings. Carrstone was often used in settlements that lie near to the outcrop on the northern side of the area. Medieval churches, such as Wereham and Stoke Ferry, have sized flint rubble in regular courses, galleted with Carrstone chips. The chancel walls of the Church of St. Mary Magdalene at Wereham were built of uncoursed flint rubble with random Carrstone nodules. At St. Andrew’s Church, West Dereham, the tower below the c1500 brick octagonal belfry has large, roughly dressed and coursed Ironbound Conglomerate and Cinderstone. St. Mary’s Church at Southery (1858), was built of block Small Carr (Carrstone slips), with Bath Stone dressings.

North West Norfolk

This NCA extends from east of Downham Market to the edge of the Fens east towards Castle Acre and skirts Fakenham before sweeping eastwards adjacent to the Central North Norfolk NCA. North West Norfolk NCA includes Hunstanton, Heacham, Burnham Market, Dersingham, Snettisham, Castle Rising and Little Walsingham.

The area provided much building stone for local use. The Lower Cretaceous strata furnished Carrstones and Red Chalk and the Upper Cretaceous Chalk provided hard chalks and Quarry Flint nodules, particularly in the west and north of the area. The Quaternary sands and gravels were a source of flint cobbles and Ironpans throughout the area, with the use of flint becoming predominant in the east of the area. The use of each type of local stone has a relatively confined, though overlapping, distribution focused on the source and falling away with distance.
The use of flint was dominant in the area. It is less commonly used in settlements on the slopes overlooking the Fens and along the eastern shore of the Wash. Quaternary Flint was present as nodules, water worn pebbles and cobbles. Flint was used in medieval and post medieval buildings in a wide variety of ways, including random, rough coursed, neatly coursed, diagonal and herringbone fashions or as assorted or selected pebbles and cobbles. Well-rounded cobbles, with yellow brick dressings dominate along the north coast. Quarry Flint and Quaternary Flint was used in Roman villas and forts such as at Brancaster, medieval castles (such as Castle Rising), monasteries, churches and medieval and post-medieval houses and farms. C10th-C11th flint round towers are characteristic of many churches of the area. Layer coursing is often found in flint rubble walling of the C11th-C13th. Galleting with flint chips was also common place. Ornamental flushwork and proudwork composed of knapped blocks of flint and carved Lincolnshire Limestone freestone was used in many later medieval churches.

From the C18th, cleft flint with brick was used in place of timber frame in vernacular buildings such as cottages, barns and farm buildings. Flint and brick were used for village and estate walls. Galleting, using a range of materials including shingle pebbles, brick fragments and Carrstone became common.

Carrstone is used throughout the NCA. It is found in buildings east along the north coast as far as Sheringham, and in a wide belt around Kings Lynn reaching west into the Fens and to Southery, near of Downham Market. The Carrstone belt produced two forms - Big Carr and Small Carr.

Big Carr is the dominant form of Carrstone and was used close to the source area and in medieval churches in the chalklands to the east and the eastern area of the Fens NCA. It is also used along the north coast such as Wells-next-the-Sea. Big Carr has been employed in wide range of buildings from the C10th to the present day. It was used in church buildings from the C10th to the C19th. It was often used with other materials including Small Carr, Chalk, flint and brick. It was not widely used in churches until the C13th. Big Carr was widely used in the C19th in church restoration and in new churches. It became fashionable in the C18th to the early C20th for grand landowners to use local Carrstone for estate buildings instead of bringing in stone from outside the county. Generally Big Carr was not employed for major buildings or those of higher status until the C19th, when it was used extensively in Hunstanton and Downham Market and surrounding villages. From the mid C19th, the material was favoured for Gothic Revival buildings such as schools, chapels and railway buildings.

Within the area there are distinctive distributions of the use of different forms of Big Carr – these are described further in the Indigenous Stones section of this Atlas.
Small Carr was generally less favoured than Big Carr, even near to its source. However, the use of Small Carr is dominant in two areas, Downham Market and Denver, and north east of Kings Lynn as far North as Dersingham. From the C13th century buildings were constructed from this material. Its use reached a peak in popularity in the middle of the C19th. It was used for a wide range of structures including boundary walls, agricultural structures, housing, chapels, meeting houses, churches, public and railway buildings. After 1862, when the future Edward VII acquired the Sandringham Estate, much use was made of the stone in the villages of the estate. Its use was revived towards the end of the C20th for new houses built in Denver and Downham Market.

Leziate Quartzite only seems to have been extracted from around Castle Rising, north east of Kings Lynn and was transported by boat along the North Norfolk Coast. It was used in buildings in two distinct clusters of settlements close to the source, namely, between Ringstead and Wormegay and more rarely between Warna to Holme-next-the-Sea. It is well seen at Brancaster. The earliest known use is in the Roman Brandunum at Brancaster and for a fort at Reedham in the Broads. It was used as high-quality dressed facing to walls built mainly of flint. The Keep at Castle Rising (1138) is faced in roughly square and coursed Leziate Quartize blocks between pilasters and quoins of Lincolnshire Limestone.

Leziate Quartzite was also used in several Norman churches as random blocks, and as rubble or coursed in numerous post Norman churches. At Brancaster, Leziate Quartzite was re-used from the nearby Roman fort in six churches of the area. The stone was used in several C19th churches such as All Saints, Roydon (1857) by G.E. Street. Here the dressings are of imported Mansfield Red Stone. Leziate Quartzite was sometimes employed in the post-Medieval period in farm and domestic buildings, outbuildings and boundary walls in several villages on the Fen edge north of Kings Lynn, in the area east of Kings Lynn and that north of Dersingham.

Ironpans have been employed in buildings across the NCA, though their use is relatively rare and often confined to parish churches or monastic buildings. There are concentrations of buildings that use this stone from Kings Lynn to Downham Market and in the Nar, Babingley and Stiffkey valleys. Cinderstone, Ironbound Sandstone and Ironbound conglomerate are plentiful in the west. In the north east Ironbound Conglomerate and Sandstone predominated. The use of Ironbound Conglomerate alone, or combined with Ironbound Sandstone, was largely confined to the northern part of North West Norfolk. The use of Cinderstone spread further south into the Fens, either alone or with other Ironpans.

Ironpans were used in many C10-12th round towers, often for footings and dressings to predominantly Flint structures. The use of Ironpans was common in many churches and monastic buildings of the Norman period. They were mainly used as either randomised rubble or roughly dressed and coursed. Sometimes very large blocks were used particularly for footings. Most post Norman churches in the Ironpan area contain one of a mixture of Ironpans, including Ironbound Conglomerate and Cinderstone. In the C19th many churches were restored or rebuilt using some Ironpan with re-used Limestone. Farm and domestic buildings made solely of Ironpan are uncommon until C19th. More often such buildings are made from a mixture of materials including Cinderstone, Ironbound Conglomerate, Carrstone and Chalk often with brick dressings.

Hard chalk for building purposes was largely obtained from the Lower Chalk and from occasional hard beds in the Middle Chalk. Chalk buildings are closely associated with the linear outcrop of the Lower and Middle Chalk, including areas such as the valley of the Nar, the north coastal slope and the valleys of the Burn and Stiffkey. In villages on the outcrop it was sometimes the dominant material.

Where employed, chalk was used as irregular rubble or as dressed blocks. Irregular rubble tends to have been used in areas further from the outcrop. It was used in garden walls and the external fabric of buildings and occasionally internally as a decorative material. Dressed clunch was used in a small number of medieval establishments including Greyfriars, Little Walsingham and All Saints, Shouldham. Rubble clunch was

Cottage, Old Hunstanton (C19th) was built using a mixture of building stones including Chalk, Red Chalk, and Big Carr. The Chalk blocks have been galletted with flakes of Carr
much more widely used. From the early C19th to the early C20th dressed clunch was used in a considerable number of buildings including cottages, houses, farmhouses and outbuildings in numerous villages on the outcrop. Chalk block was often used in combination with other materials such as Red Chalk, Ironpans, Carrstone, flint and brick. Sometimes it was used in rough chequerwork. It was frequently galleted with a mixture of materials including Red Chalk, Carrstone, Ironpan and even clinker. Rubble was rarely used for housing but was used for outbuildings and boundary walls. There has been a revival in the use of Chalk rubble and block from the late C20th for housing in the villages of the north coast and south to Heacham and in Burnham Market.

Red Chalk was not much used for buildings except very locally on the northern part of the outcrop from Hunstanton to Snettisham. The rock does not weather particularly well and was usually used in combination with other materials. It is found in a few late medieval churches in the NCA such as the ruined St. Edmund’s Chapel at New Hunstanton, St. Mary’s Church at Snettisham and St. Andrew’s Church at Little Massingham.

Red Chalk was also occasionally used in C18th-C19th farm and domestic buildings. There are several buildings in Old Hunstanton and Ringstead which exhibit galleted courses of Chalk and Carrstone. The Church wall and tower of St. James at Runcton Holme contains small quantities of Inoceramus Bed Stone along with Red Chalk and ‘normal’ white Chalk.

### North Norfolk Coast

This NCA occupies a narrow strip of land between the North West Norfolk NCA and Central North Norfolk NCA to the south, and the shallow coastal waters of the North Sea and the Wash. The southern boundary is the A149 coastal road.

The majority of the NCA consists of coastal grazing and saltmarshes and the spit systems of Blackney Point and Scolt Head. Settlement in the area is primarily clustered in small coastal villages and former ports that are now largely isolated from the sea. The ports of Blakeney, Cley, Morston and Burnham Overy Staithe and Wiveton have declined owing to silting caused by the westwards progress of the spits. In the Medieval
period these thriving ports exported grain to Europe and the Baltic and imported timber and iron and later coal. Occasionally, imported ballast was re-used in buildings, in for example Wells-next-the-Sea.

Flints are a common feature in the upper layers of the Chalk and a major component of the river and beach gravels of the area. Flint was the dominant material used in medieval churches and monastic foundations of the area; Lincolnshire Limestones were often used for dressings. Several medieval monastic estates developed along the coast including Burnham Norton Priory (1241), Blakeney Priary (1296) and Weybourne Priory (c1200). Here the Priory Church became the parish church at the Dissolution. Occasionally Ironbound Conglomerate was used for quoins as, for example, in the C12th nave of Burnham Norton church. Flint flushwork and fretwork are found for example at St. Margaret’s Church, Cley-next-the-Sea (C14th-C15th) in the south aisle parapet (C15th) and porch fretwork (C15th).

Flint with brick and pantile roofing are the dominant building materials found in the secular historic buildings of the area. Along the coast, flint has largely been used with the rounded and often white exterior showing with red brick dressings. Inland, walls more often consisted of ‘knapped’ flints that display a cut, black face outwards. Flint walls were often galleted with flint flakes. Flint was laid random or coursed. Squared flint was used less frequently, but is found, for example, in Quay House, Blakeney (C18th). Erratic cobbles were also often used, for example in walls in Burnham Norton with chalk, brick and scattered flint and in buildings in Wells-next-the-Sea, Holme-next-the-Sea, Blakeney and Cley.

Local Chalk and a little Red Chalk are used in the west of the area including in the Burn valley. Chalk was extracted from quarries to the south of Holme-next-the-Sea and Thornham. In the C19th and early C20th dressed Chalk was used in cottages, houses and farm buildings in the west of the area. Red Chalk was used either coursed or as rubble in cottages at Holme-next-the-Sea. In Burnham Norton rubble Chalk is often used with nodular Quarry Flint, cobbles and brick.

In the extreme west of the area, Carrstones, Ironpans and Chalk from adjacent North West Norfolk NCA are used. At Holme-next-the-Sea, Vine Cottage has dressed Chalk and Carrstone in rough chequers. Snecked Big Carr was also used in the village. The Church of St. Mary the Virgin, Holme-next-the-Sea was extensively rebuilt in 1778; the north wall is built of Big Carr and a range of various exotic pebbles and cobbles. In the late C19th and early C20th, some use of Big Carr was made in Wells-next-the-Sea. Several houses, the Post Office and the extension to the Friends’ Meeting House (1913) are faced in ‘normal’ randomised Big Carr. The Lifeboat house (1869) is built of snecked Big Carr with Holkham white brick dressings.

**An C18th cottage, Holme-next-the-Sea. Built of roughly squared and coursed Chalk and Red Chalk blocks with a little flint, Carrstone and red brick dressing.**

**The C15th Church of St. Mary the Virgin, Holme-next-the-Sea. The tower is built of squared and knapped Quaternary Flint and some Quarry Flint with Lincolnshire Limestone dressings. The south wall of the C19th nave is constructed in Lincolnshire Limestone ashlar. The rubble north wall is built of Lincolnshire Limestone, Carrstone, various flints, exotic pebbles and Ironbound Conglomerate.**
Central North Norfolk

This NCA stretches from Norwich in the south, north to the coast at Mundesley, then west along the coast to Sheringham. The northern suburbs of Norwich fall within the NCA. The area includes several relatively isolated market towns, such as Aylsham and Holt, the coastal settlements of Cromer and Sheringham and former coastal ports such as Cley-next-the-Sea and Salthouse.

Timber frame was the dominant form of vernacular building during the Medieval period. Flint was the main material used for medieval churches and monastic buildings. There are several monastic sites in the area including the Priory of St. Mary in the Meadow, Beeston Regis (1216) and Montjoy Priory, Haverlingland near Norwich. The NCA is unusually rich in medieval churches. Round-towers are numerous, particularly between Holt and Aylsham. They were usually constructed of whole or knapped flint. In C10th-C11th churches, large flints were often used for the footings and dressings and sometimes for jambs. The flintwork can be random or coursed. Lincolnshire Limestones were often used for dressings.

Ironbound Conglomerate is often found within the fabric of round towers; such material was frequently used for quoins and dressings. Sometimes it was used more extensively. For example, the nave of All Saints, Gresham is built largely of this conglomerate. The tower of St. Mary’s church at Roughton (C11th-C14th) has large Ironbound Conglomerate blocks and smaller blocks laid in a herringbone pattern. Flint flushwork is found in C14th churches and as additions to earlier structures. For example, flushwork battlements were added to the round tower at St. Andrew’s church, Wickmere. The tower includes unusually white, rough squared flint and Ironstone blocks. Rough-squared flint was used from C14th. Carefully squared flint was used from the C15th, for example in the Church of St. Peter and St. Paul at Cromer (C15th, restored 1887-9).

A rich abundance of minor country house estates developed in the C17th-C18th, such as Blickling and Felbrigg. Most houses were built of brick. Flint was often used for estate buildings. Rationalisation and further enclosure of fields took place in the later C18th. Many isolated farmsteads were constructed or rebuilt. Flint with red brick dressings and steeply pitched thatched or pantile roofs replaced timber frame as the predominate material used in such farms.

The arrival of the railway to Norwich in the 1840s and Cromer and Sheringham in the 1870s and 1880s led to the further importation of building materials and signalled the beginning of mass tourism. The coast became a fashionable resort area. Several Arts and Crafts architects built holiday homes for rich business men using local materials on or near the coast. Sheringham and Cromer developed as holiday resorts. Much new building was carried out in flint and red brick. Occasionally Carrstones from North West Norfolk were also used.

The use of coursed and uncoursed Quaternary Flint cobbles became widespread in C19th and early C20th buildings in Sheringham, Clay-next-the-Sea and Holt. Galleting was rare until the late C19th. The use of flint ovals was also popular, particularly in Sheringham. In some cases, each oval is meticulously ringed with white flint gallets. In the early C20th the use of flint flakes as a facing applied to the surface of buildings became fashionable for a short period, particularly in Overstrand, West Runton and Crossdale Street.
North East Norfolk and Flegg

The coast forms the north eastern boundary to this NCA, which extends from Gorleston-on-Sea in the south to Mundesley in the north. To the west the NCA is bounded by the flood plains of the five major rivers that form the Broads NCA.

The area includes the settlements of North Walsham, Stalham, Worstead, Bradwell, Burgh Castle, Filsby, Hemsby, the Ormesbys, Martham and West Casiter along with the market town of Acle, the enlarged commuter villages of Brundall and Blofield, and rural villages such as Little Plumstead, Hemblington, Strumpshaw and Upton. The NCA also includes Great Yarmouth and the seaside resorts of Gorleston-on-Sea, Caister-on-Sea and Winterton-on-Sea.

Flint and red brick were the dominant building materials used. Colour washed render was also common. Roofs were of Norfolk reed thatch or pantiles. In the larger settlements many buildings exhibit a distinct Flemish influence reflecting the influx of Flemish weavers in the C14th. Brick became more dominant in the C19th. Locally sourced building materials have included Quaternary beach and fluvio-gravel Flint and Ironpans, including Ferricrete and Ironbound Conglomerate.

Churches are generally built of flint often with thatched roofs. Flint round towers are found in many localities. The use of uncoursed flint and flint quoins in such towers was characteristic of the Saxon period. Some flint and early brick jambs survive. Octagonal brick belfries were often added in the C13th-C14th. Ironpans were used in several round towers, including the Church of St. Margaret, Witton (C10th) where conglomerate is used for quoins and as scattered pieces in the tower’s fabric. In the C14th-C16th several fine churches were built funded by the wealth generated by the wool industry. All Saints church, Happisburgh (C15th-16th) is of flint with ashlar dressings. It has fan arrays of bricks and knapped flint above windows and proudwork to the base frieze of the tower and flushwork to the battlements.

Outside of Great Yarmouth there were few monastic establishments. At Broomhill Priory, Bacton (1113) the ruins of priory church and chapter house (C12th-C13th) and the C15th gatehouse survive. The effects of the Dissolution were relatively limited due to the relatively sparse distribution of monastic settlement in the area.

Enclosure in the C18th resulted in the loss of common land/heathland and led to further prosperity and the rebuilding of many farmsteads. A high concentration of pre-1750 farm buildings remain in the isolated farmsteads scattered across the area. They were often built of flint and brick such as Manor Farmhouse, Bacton (C16th), sometimes with ashlar dressings such as Paston Great barn (1581). In the C17th-C18th, halls and minor parklands developed such as at Rollesby Hall and Ashby situated above the Broads valleys. Other small houses are relatively frequent, such as a Little Ormesby (C18th) and Scratby Halls (C18th), Old Hall, Ormesby St. Margaret (C17th) with its associated C17th red brick perimeter wall and Caister Old Hall (C18th). Nearly all are built of brick, though flint was sometimes used in ancillary and garden buildings. Norfolk’s only canal between North Walsham and Great Yarmouth was opened in 1779.
Several Arts and Crafts Movement houses were built at the turn of the C19th-C20th. For example, Happisburgh Manor (now St. Mary’s) and St. Anne’s at Happisburgh designed by Detmar Blow. Both use Quaternary Flint pebbles and cobbles with brick dressings and scattered patterning and chequerwork.

The Broads

The Broads NCA lies between the peripheral urban areas of Norwich in the west and Great Yarmouth and Lowestoft in the east. It comprises of the wide valleys of the Rivers Waveney, Yare, Wensum, Bure, Ant and Muck Fleet. In the north-east the NCA is bordered by the North Sea along the 14 km stretch of coast between Happisburgh and Winterton-on-Sea.

A large estuary occupied today’s river valleys in the Roman period until it silted up during the Anglo-Saxon period. By the late C11th, eastern Norfolk was one of the most densely populated areas in Britain, with Norwich the second largest city in England after London. The demand for fuel was so high that peat was dug from the river valleys. The Broads are the result of the large-scale extraction of the peat during the Middle Ages. The lakes that characterise the area formed in the abandoned and flooded peat workings as sea levels rose in the C13th-14th.

Settlements mainly developed around a parish staithe, riverside common, ferry or bridge. The area’s wool, weaving and agricultural produce were exported throughout the world from the port of Great Yarmouth. Access to the river-based transport network was critical. Crossing points became established such as at Ludham, Potter Heigham, Wroxham, near Acle and Wayford Bridge.

The predominant vernacular building materials used in the area were flint, pebble and brick, with pantiles and occasionally Norfolk reed thatch roofs. The Romans used flint extensively as rubble in mortar for the core of the massive walls to the coastal fort at Gariannonum (Burgh Castle), at the mouth of the Waveney. The walls were faced in flint with brick banding courses. Leziate Quartzite was transported 130km from North West Norfolk for a fort at Reedham built to guard the then estuarine approach to Venta Icenorum, the regional centre located near to the later site of Norwich.

Monastic sites were established in Broadland with parishes appropriated to provide livings. They included Hickling Priory (1185), the Priory of St. Faith (1105), Langley Abbey, Loddon (1195) and St. Benet’s Priory (AD 800 and 1019), the earliest Benedictine foundation in Norfolk. At St. Benet’s the remains of the C14th gatehouse of knapped flint with ashlar flushwork and red brick and parts of the knapped and galleted flint perimeter wall and of the church survive.

The Waveney and Yare Valleys were particularly well populated at the time of the Conquest. The valleys contain many C10th-12th round-tower churches, including those at Hales, Hassingham, Moulton St. Mary, Freethorpe, Burgh Castle, Clipsby, Rollesby, Repps and Potter Higham. Some are thatched. The majority are built of uncoursed flint. Often flint was used for the window dressings. Stone for dressings was imported. Some churches used an uneven mixture of anything hard that could be found locally. The Church of St. John the Baptist, Reedham is built of a considerable range of materials. The church is thought to be the second to have been constructed on the site of a Roman fortlet. Leziate Quartzite is dominant in the C15th tower in rough chequers with knapped rounds or rough squared flint. The base has squared knapped flint flushwork. Roughly coursed blocks of Leziate Quartzite, Chalky Hardpan, Ironpan, Lincolnshire Limestone, roughly knapped Quarternary Flint nodules and other stone types together with much re-used Roman brick are found in the remainder of the fabric. Northamptonshire and Lincolnshire limestones were used for dressings. Roman opus signinum (tile) is also reused in the north wall, in places in a herringbone fashion.
Leziate Quartzite is also found to a lesser extent in a few other churches nearby, including Hassingham, St. Botolph, Limpenhoe, and St. Andrew, Wickhampton, where it is also found rarely in the Norman chancel. The stone is used in other churches in the area in C13th-C15th elements of their structure, particularly in their towers, as seen at St. Mary’s church, Cantley and St. Peter and St. Paul’s church at Halvergate.

During the C12th-C13th large-scale drainage and enclosure of the marshlands commenced, usually being undertaken by monastic institutions. The increasing wealth of the area resulting from drainage led to the rebuilding or addition of porches and clerestories to many churches, though the round towers were often retained. Fortified manors were built, such as Caxton Castle (1333), where part of the precinct wall and hall survive built of brick with limestone dressings.

By the C16th there was a move towards cattle production in preference to sheep grazing on the many areas that had been reclaimed. Many farmsteads were rebuilt or developed into courtyard plans around barns. In the Wensum and Yare Valleys, merchants, lawyers and financiers built a significant number of new brick halls. Some enclosure took place during the C16th-C18th with substantial amounts of enclosure caused by the Parliamentary Act occurring during the early part of the C19th. Around 1840, steam drainage pumps were introduced. The reclamation of the marshland resulted in an increase in grazing cattle. New buildings were added to some surrounding farms and new farms were built in the drained areas, generally in brick, sometimes with flint plinths. The use of brick in village houses became commonplace, though flint with brick was often mainly used at the rear or for outbuildings. In the west of the area brick with flint was particularly used for cottages close to the sources of the material where Chalk was extracted in the Waveney and Yare valleys, such as on the Coleman Estate. Knapped flint and brick were used in municipal buildings such as the Library, Loddon (1857).

Suffolk Coast and Heaths

This NCA lies on the North Sea coast between Great Yarmouth in the north and the port town of Harwich in the south, forming a long, narrow band that extends between 10 and 20 km inland. Only a very small part of the NCA south of Great Yarmouth around Bradwell and the eastern outskirts of Gorleston-on-Sea lies within Norfolk.

In addition to Bradwell, now greatly expanded by modern development, there are a few scattered hamlets and farmsteads and associated cottages. A range of vernacular building materials including red brick and clay pantile were used in the area. Timber frame was used in the Medieval period and into the C19th particularly for farm buildings, often with brick plinths and gables.

St. Nicholas’s Church, Bradwell has a C12th round tower with a C14th nave, aisles and chancel. It is built of knapped and Quaternary Flint pebbles with Lincolnshire Limestone blocks, rough and random coursed with ashlar dressings and some brick. The porch (1889) gable end is faced in knapped flint rounds with Lincolnshire Limestone dressings. The buttresses were repaired with roughly squared flint and areas of brick.

Much of the area was common land until it was enclosed and improved in the C18th and 19th. Small C18th country houses and their parklands such as Caldecott Hall, Hobland Hall and Bradwell Hall (C18th) are characteristic of the area. All were built of brick with Welsh Slate roofs. Red brick was used for farms and cottages associated with the estates.
South Norfolk and High Suffolk Claylands

This NCA occupies a large area of central East Anglia stretching from just below Norwich in the north, to the River Gipping in the south. The area includes small market towns such as Attleborough, Wymondham, Diss, Harleston and Scole. They are located in the river valleys on the major transport routes. A wide range of historic buildings survive within these towns. By the Saxon period a dispersed pattern of settlement was already established on the plateau that forms much of the NCA. The area retains much of its medieval character. There are farmsteads and moated manorial sites and groupings of farmsteads around the margins of former common pastures which are known as greens or commons.

The area was more wooded than much of Norfolk and timber-frame was the dominant material used for buildings in the early Medieval period. Such frames are often concealed under colour-washed plaster. 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 become 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, for example in Wymondham, Diss and Harleston.

Flint was commonly used for the construction of medieval churches and monastic buildings. This NCA has the greatest concentration of round towers in the country, particularly in the south east in the Yare and Waveney valleys. Most churches were built of irregular Field Flint nodules and pebbles set in mortar either uncoursed or as rough coursed rubble. Dual coursing is occasionally found. Flint was often used for jambs and arches. Imported Lincolnshire Limestone was generally preferred for dressings and quoins from the C12th. Occasionally chalk and Ironpans were used particularly in the footings of west towers. From the late C13th the use of knapped Flint and galetting became common place in the area.

Monastic establishments included Old Buckenham Priory (1146), and the Chapel of the Holy Cross (C14th) and the College of the Holy Cross (C15th), Attleborough. At Wymondham, an Abbey was founded as a dependency of St. Albans Abbey in 1107. The Abbey church (1130) was built in flint and Caen Stone. Chalk was used for a carved arch in the Chapel of St. Thomas Becket, now Wymondham Arts Centre.

Wymondham Abbey (C14th-C16th) was largely built of flint with Caen Stone dressings. The two eastern bays of the clerestory display flint proudwork; the remaining five bays are of flint flushwork.
Planned settlements were established in the C12th including New Buckenham and Wymondham, in association with construction of a new castle and at Wymondham, the Priory Abbey. At New Buckenham a castle was constructed in 1140. The keep is the oldest circular keep in England. It was built of rough coursed flint nodules. Expanding populations in the C11th-C14th led to the establishment of ‘secondary’ settlements on the central plateau, often on the edges of large grazed commons or greens such as at Mellis, Burgh and Old Buckenham. The mixed arable and dairying economy that evolved encouraged the concentration of wealth by lesser gentry and yeoman farmers. Many sizeable moated farmhouses were established. In the mid C14th significant number of churches and settlements were abandoned as a result of economic decline and the Black Death. However, with the economic revival in the late C14th, farm sizes grew. Brick started to be used in the more prestigious buildings, often with flint or terracotta. In the C15th, fortified manor houses such as Baconsthorpe Castle, Attleborough (1460-86) became popular. It was built of knapped and galed flint with brick.

From the C13th, the valleys of the Waveney and Little Ouse became the main centre for linen weaving in Norfolk. The wealth generated by the industry in the later C14th and C15th helped fund the embellishment of many churches. Octagonal belfries were added to many round towers and naves and chancels rebuilt and porches, chapels and clerestories added. From the C15th, flushwork became commonplace in churches such as St. Peter’s, Hedenham and in the fine porch of St. Mary’s, Pulham St. Mary. Proudwork also became popular. At Wymondham Abbey the two eastern bays of the clerestory are in proudwork and the remaining five are in flushwork.

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 C16-18th. C16-C19th estates and parks developed, particularly in the northern of the area where there was easy access to Norwich. In the C18th and C19th, timber-framed buildings were often refaced or encased in brick in the countryside and in the market towns.

From the late C18th, brick was the predominant material used for new buildings, though Clay Lump was also quite commonly used in the south of the area for farm buildings, cottages and some farmhouses in the first half of the C19th. From the C19th the use of pantiles became commonplace, imported from the Netherlands, or a little later from Humberside. In the south east of the area Welsh slate as 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 and construction. For example, St. Margaret, Kirstead (1864) made much use of coursed flint ovals laid lengthways. St. Andrew’s church in Framlingham Pigot (1859) was largely faced in coursed, squared flint. The offset tower is built of coursed limestone blocks with limestone dressings surmounted by a steeple, it is one of the most ornate Gothic Revival churches in the county.
Mid Norfolk

This NCA occupies the northern section of the East Anglian Plain between Swaffham in the west and Norwich in the east. The landscape consists of a flat plateau that is dissected by the upper reaches of the rivers Wensum, Tud and Yare and their numerous tributary streams valleys that flow east to Norwich and the headwaters of the Nar that flow West to the Great Ouse. The NCA also includes much of the historic centre of the City of Norwich and its south and south western suburbs. East Dereham and Fakenham are the only significant market towns within the area. The area includes large villages such as Hingham, Reepham and Watton.

Flint, red brick and frequently black-glazed pantiles are the predominant materials used in the historic buildings of the area. In Fakenham and East Dereham, brown orange and yellow flint and chert is dominant, generally used with brick. There are some rare survivals of earlier timber frame.

By the time of the Conquest the area was prosperous as a result of farming and wool-production. The cloth industry sustained the area’s wealth into the C19th. The economy and buildings of the area were significantly influenced by religious establishments including those located nearby outside the NCA such as Little Walsingham, Castle Acre, Wymondham, Thetford and Norwich and foundations within, such as Great Massingham Priory, (1267), Hepton Priory, Fakenham (1135), Normansburgh Priory (c1160), Sporle Priory (c.1123) and Wendling Abbey (1267). Most of the parishes of the Wensum Valley and those around Thetford and Norwich provided livings to such establishments.

The area is rich in medieval churches. A few early Saxo-Norman round towers are present such as West and East Lexham. They are built of uncoursed flint with flint quoins. The internal walls are faced in chalk. Ironpans are often found in churches of the upper Wesum valley south of Fakenham including in St. Nicholas, Sherford (C11th), St. Andrew, Great Ryburgh (C11-14th and the now ruinous Church of St. Margaret, Pudding Norton (C12-13th). The Bishops Chapel at North Elmham (C11th) has well laid blocks of Ironbound Conglomerate, Ironbound Sandstone and a little Cinderstone. There is a particularly notable cluster of later medieval churches around Reepham. St. Peter and St. Paul, Salle is a particularly fine C15th ‘wool church built of flint with fine flushwork. Proudwork is a characteristic of churches in the Tud Valley. Mattishall, North Tuddenham and Shipdham churches all exhibit tower parapets in proudwork.

Brick was increasingly used from the C16th century for vernacular buildings, though during the C17th increasing wealth led to the building of many timber-frame farmhouses and barns. Medieval manors formed the basis of the large number of C17th-18th country house estates of various sizes that can be found throughout the area. Country houses from the C17th were mostly built in red brick, but later white or grey brick became popular. Raynham Hall near Fakenham (C17th) is the paramount house of its date in Norfolk. It was built of brick with Ketton Stone dressings supplied in 1621.

Late C18th enclosure, particularly in the west of the area between Swaffham and Fakenham, was associated with large estates, such as Raynham and Elmham. The estates often developed parkland and their own churches and villages, such as at Heydon, part of the Heydon Hall (1581-4) estate. Many new estate buildings were constructed in the period, generally in red brick. In the C18th and C19th older timber frames were often refaced in locally produced brick both in the countryside and in the market towns.
In the C19th there was a revival in the use of flint in church restorations such as St. Michael the Archangel, Booton, were dressed flint was used, unusually with some flint scales. St. Mary’s Church in North Elmham was refaced in flint in 1864. Flint and brick were occasionally used for C18-18th non-conformist chapels such as Mattishall, though brick was more common.

In the south of the area around Watton, Clay Lump was used for cottages, some farmhouses and farm buildings in the middle of the 19th century.

The arrival of railways from the mid-1800s connected Norwich, Fakenham, Dereham, Great Yarmouth and Kings Lynn to London, the Midlands and the north. Much of the area experienced rural depopulation. Norwich and Dereham especially grew rapidly. The opening of the railways enabled the importation of building materials such as Welsh Slate, brick and some stone. In Dereham, Edward Boardman’s Cowper Congregational Church (1873) and Trinity Methodist Chapel (1880) are faced in imported Kentish Rag with Bath Stone dressings. The use of light-coloured bricks, mainly in the major towns including Fakenham and Norwich, became common after the opening of the rail network.

The Brecks

The Brecks occupy much of south-western Norfolk and north-west Suffolk, together with a small part of north-eastern Cambridgeshire. Thetford and Swaffham are the main towns of the area. There is little settlement in the middle of the Brecks; villages are clustered along the river valleys to the north and south and the Fen edge to the west. Thetford is the largest settlement in the Little Ouse valley. Other villages include in the north in the valley of the Wissey and its tributaries, Ickburgh, Cokley Cley, Gooderstone, Oxborough, the Cressingham, Bodney and Hilborough. A small part of the Nar Valley falls within the area including West Acre and Castle Acre as do the Fen edge communities of Methwold, Northwold and Feltwell.

Flint and brick, sometimes with Chalk, had become the dominant materials used for vernacular buildings by the C17th. Few medieval timber-framed buildings survive from before c.1700. Those that do are largely located towards the margins of the area. Large nodule flint occurs in the Chalk exposed close to the Fen edge. Elsewhere, flint was usually 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. The latter is more common in the Fen edge communities.
Much land within the Brecks was controlled by the abbeys at Bury St. Edmunds and Ely. Flint was the dominant material used in the construction of monastic foundations in the area, such as Castle Acre Priory (1090) in the Nar Valley and in the Fen margins, such as Slevesholm Priory Methwold and St. Winwaloe, Wereham (1199). By the C11th, Thetford had become one of the largest and most important towns in England. The Priory of Our Lady of Thetford (1103-4) was one of the largest and richest religious foundations in medieval East Anglia. Flint was used for most of its buildings with Lincolnshire Limestone dressings. Rubble chalk is also found in the surviving walls of some of the buildings.

Many medieval churches in Brecks are small and built in a simple style that reflects the relative poverty of their parishes. Larger churches are found in the then more prosperous Fen edge settlements. They are mainly constructed of flint. Round towers are relatively rare except to the north east of the area, such as at Threxton, Stanford, and Breckles. 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 St. Peter and Paul’s Church, Swaffham and St. James, Castle Acre. Both are constructed largely of flint with Lincolnshire Limestone dressings with some reused materials. The tower at Swaffham is of Lincolnshire Limestone ashlar.

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 and farmhouses in the area. Flint with brick was most commonly used towards the west of the Brecks. Buildings of flint alone are rather more widely distributed.

In the C18-19th there was an expansion in enclosure and in the number and extent of landed estates. Many estate farm buildings and cottages were built in flint and brick. Buildings of ‘brick and flint’ are more widely dispersed; coursed flint was less common, and with a tendency to be found in buildings lying towards the west of the Brecks. Galleting became popular in the C19th, though its use is largely restricted to the Fen edge settlements in the Brecks. Carrstone chips are occasionally used for galleting flint work, such as in cottages in Northwold and Beachamwell. Unusually the Beachamwell Estate also built several cottages in Big Carr with brick dressings.

New flint mines around Brandon just over the border in Suffolk from Thetford, were developed in the C19th to support the gunflint industry, particularly during the Napoleonic Wars. The industry produced significant quantities of black knapped flint that was used for building. Knapped flint was used extensively in church restoration work from the C17th, for example in the very early Gothic Revival restoration of All Saints Church at West Acre. C19th restorations were far more common and include churches such as St. Andrew’s Church, Brettenham (1852). St. Andrew’s Church in Northwold (C13-15th) has regular coursed flint rubble, galled with Carrstone chips.

Chalk was rarely used in medieval churches in the area such as at St. Mary the Virgin, Beachamwell in the north of the area and St. George Methwold (C14-15th) in the Wissey Valley. Flint faced, mortared chalk rubble and occasionally dressed chalk was used in Castle Acre Castle, one of the largest motte and bailey castles in England. Weeting Castle (1180) is built of chalk rubble with Lincolnshire Limestone ashlar. The oldest examples of vernacular chalk buildings date from the C17th. They are particularly found in the Fen edge villages west of Thetford, such as Hockwold cum Wilton and Methwold. Most surviving buildings date from the C18th or C19th.
On the fen edge and in the Nar Valley, Ironpans were sometimes employed with chalk in early churches. The remnants of St. Nicholas, Feltwell (C12th) has much Ironpan in the tower with chalk and flint. The C11th Castle Acre Priory has alternating courses of rubble chalk and Big Carr with unusual spirals of the materials in piers.

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.

**Clay Lump, Cob and Shuttered Clay**

There is evidence of clay-walled buildings in Norfolk 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; evidence for the use of such materials comes from the excavation of deserted villages such as Pudding Norton, Rougham and Tittleshall and from estate records such as those for Blickling. Cob continued to be used into the C19th, though 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 south Norfolk as well as Bedfordshire, north Hertfordshire, south Cambridgeshire, north Suffolk and Essex. In the west of this 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 c.1790 to c.1860, a period that largely coincides with that of the Brick Tax. They are also associated with rapidly rising populations 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 or ground chalk, sand, gravel, silt and straw in varying proportions moulded into blocks and allowed to dry in the sun. 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.

Clay Lump buildings are found primarily in the South Norfolk and High Suffolk Claylands, Mid Norfolk and Brecks NCAs. In Norfolk they occur in an area bounded by Watton in the north west, Wymondham in the north, Harleston to the east, Diss to the south and Thetford to the south west. In the South Norfolk and High Suffolk Claylands NCA, Clay Lump buildings are found in many villages between Wymondham and Diss. A new town comprising several villages was built of Clay Lump at Attleborough by Gaymers Cider up to 1860. Diss has a history of clay construction. Parts of the town have many Clay Lump buildings. They range in date from 1790 to 1860. In the eastern Brecks Clay Lump buildings are found in villages of the Waveney and Thet Valleys such as Garboldisham, Kentishall and East Harling and south of Watton in Thompson and Carston. In Mid Norfolk they are found in the south of the area between Watton and Attleborough including villages such as Great Ellingham, Ovington, Carbrooke and Scoulton.

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. On occasion, the buildings are fronted by brick elevations while the remaining walls are in Clay Lump. Timber-framed buildings were sometimes extended in Clay Lump.

Thetford Rural District Council attempted to revive the use of Clay Lump after WW1 from 1919. Several Clay Lump housing estates were constructed around 1919 and 1920 such as at Watton and Garboldisham, but these have since been demolished. Clay Lump estates exist at East Harling (where The Crescent is listed) and Blo’ Norton, west of Diss.

![The Crescent, East Harling (1919-20), built for Thetford Rural District Council and designed by G.J. Skipper in rendered clay lump](image-url)
Stones in walls

Norfolk’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.

Large footings and roughly dressed blocks of Leziate Quartzite, Church of St. Lawrence, Castle Rising

Roughly dressed and coarsed, tabular blocks of Big Carr, wall along School Road, Snettisham

Coarsed tabular blocks of paler coloured Small Carr, Estate wall, Sandringham

Randomised blocks of Big Carr, Old Church Road, Snettisham

Irregularly coarsed tabular blocks of dark coloured Small Carr, Sandringham church wall

Roughly dressed and coarsed, tabular blocks of Big Carr with galletting, School Road, Snettisham
Irregular blocks of Red Chalk with White Chalk ‘clunch’ in wall, Sea Lane, Old Hunstanton

Irregular and nodular blocks of Red Chalk with White Chalk ‘clunch’ in wall, Sea Lane, Old Hunstanton

Irregular blocks of Inoceramus Bed Stone, Church of St. James, Runcton Holme

Irregularly dressed blocks of Chalk, house wall along Kirkgate, Holme-next-the-Sea

Irregular and randomised blocks of Cinderstone and Ironbound Sandstone, All Saints Church, North Runcton

Blocks of Ironbound Conglomerate, Church of St. Mary, Fordham

Irregular blocks of Chalky Hardpan (and Leziate Quartzite), Church of St. John, Reedham
Knapped and galleted (flaked) Quaternary Flint, Norwich Guildhall

Knapped Quarry Flint, house wall along Magdalen Street, Thetford

Flush chequerwork of knapped Quaternary Flint and Lincolnshire Limestone, Castle Acre Priory

Quaternary Flint beach pebbles in wall, Blakeney

Squared, knapped white Quaternary Flint, entrance porch of Church of St. Mary, Roughton

Chert pebbles and cobbles, with some Quaternary Flint pebbles, wall of Shipdham churchyard
Imported exotic pebbles (including granite, dolerite and quartzite) in wall of Mariners Tavern, Howard Street, Great Yarmouth

Large exotic pebbles, cobbles and ballast in church wall, Holme-next-the-Sea

Imported exotic pebbles (including gneiss, basalt and quartzite) in wall at Stearmans Yard, Wells-next-the-Sea
Indigenous building stones

Lower Cretaceous

_Sandringham Sand Formation (Leziate Member)_

Leziate Quartzite (Silver Carr, Sugar Stone, Sandringham Carstone, Sandringham Sandstone)

The Leziate Member – the source of Leziate Quartzite – occurs only in western Norfolk, with an outcrop extending from near Heacham southwards to Downham Market. Leziate Quartzite has correspondingly seen only localised and minor use, especially in comparison with the types of Carrstone described below. The stone itself, often referred to as (Blue) Sandringham Carstone, Silver Carr or Sugar Stone, is an off-white to pale grey coloured, fine- to medium-grained quartzitic sandstone that is poorly cemented with quartz. It weathers to a distinctive iron-grey colour. The alternative name Sugar Stone is very apt, as the individual block faces appear granular and tend to sparkle, particularly in direct sunlight.

Leziate Quartzite was employed mainly in ecclesiastical, farm and domestic buildings at various locations, usually close to its source. Further details are provided in ‘The use of stone’ section of this Atlas under North West Norfolk NCA.

_Dersingham and Carstone formations_

_Carrstone (Carr Stone, Carstone, Gingerbread Stone)_

Carrstone is the general name applied here for a distinctive orange-brown or dark purple coloured, ferruginous sandstone that has been widely used as a building stone in western Norfolk (and occasionally elsewhere). It has been employed in several forms along the entire outcrop length of the Dersingham and Carstone formations, although the paucity and degraded state of the quarry exposures present today seriously...
Small Carr (Shell Carr, Block Carr, Carstone slips)

Small Carr is a hard, fine- to coarse-grained, ferruginous sandstone which varies in colour from very dark purplish-brown to yellowish-brown; this colour variation appears to be continuous and may be exhibited in a single wall or building. Small Carr is invariably employed in the form of small, tabular blocks; the blocks are usually of uniform thickness, varying from 2 to 3 cm, although blocks up to 8 or 10 cm thick are also encountered. The blocks are traditionally laid in a coursed manner that resembles dry-stone walling; each overlapping ‘plate’ (or ‘slip’) of Small Carr is pitched slightly downward and outward to minimise rain water penetration. The stone is durable and weathers well, in many instances better than Big Carr.

Small Carr is used quite extensively in buildings between Dersingham and Downham Market in northwestern Norfolk, but can occasionally be encountered as far east as Sheringham and East Dereham (in Norfolk) and as far west as March (in Cambridgeshire). In Norfolk, particularly fine examples of its use can be seen in the Sandringham area and in the town of Downham Market.

Big Carr (Snettisham Carr, Puddingstone)

Big Carr is a rich orange-brown or dull orange to yellowish-brown ferruginous sandstone which typically exists as larger blocks than Small Carr. Big Carr also commonly exhibits irregular veins and joint coatings of brownish-black ‘ironstone’. The grain size varies from medium to coarse, and the stone often weathers well. However, the coarsest, dull-coloured...
variety (called Puddingstone), which contains well-rounded small pebbles of vein quartz, has relatively poor weathering properties.

Big Carr has been much used in a wide variety of forms in Norfolk. The actual form of use shows a geographical distribution. Coursed Big Carr is much employed in north-west Norfolk. Big Carr dressings are seen north of Kings Lynn towards Old Hunstanton and Holme, and further east towards Anmer. Snecked Big Carr has a more restricted occurrence than this, and is largely confined to villages and towns north and north-east of Dersingham, such as Brancaster, Snettisham, Heacham and Hunstanton. Randomized Big Carr was used in two different sizes – ‘giant’ (such as in C19th cottages in Dersingham) or ‘normal’ (such as in the Post Office at Wells-next-the-Sea). The ‘normal’ size occurs quite widely across the more general area of use, but the ‘giant’ variant is mostly restricted to larger settlements such as Hunstanton, Heacham and Snettisham. Chronologically, use of Randomized Big Carr began after the Snecked form and it became increasingly popular in the late C19th and Edwardian period, particularly for housing. The use of Big Carr declined in the early C20th; however, from the late C20th, it has frequently been used in new housing developments, notably between Downham Market and Holme-next-the-Sea.
The ‘Red Chalk’ is a very distinctive geological unit that extends for approximately 15 km from Hunstanton cliffs south to near West Newton and the Babingley River. As its name implies, the stone is a uniform, brick red coloured form of chalk, which in places can be nodular and shelly. The use of Red Chalk as a building stone is only common in Old Hunstanton and neighbouring villages such as Holme-next-the-Sea; otherwise, it is rarely encountered. It is not particularly durable and weathers relatively easily. Where seen, it tends to have been employed as a roughly dressed rubblestone in walls, or has been used decoratively along with other materials (often white Chalk) on account of its attractive appearance.

Upper Cretaceous

Chalk Group - Grey Chalk Subgroup

‘Lower Chalk’

‘Lower Chalk’ hardgrounds
(Paradoxica Bed Stone, Inoceramus Bed Stone)

Several prominent beds of relatively hard, ‘gritty’, chalky limestone occur in the ‘Lower Chalk’ sequence of northwestern Norfolk, especially in the Kings Lynn district. These beds typically comprise pale grey to pale buff coloured, bioturbated, shell debris-rich chalk. Glaucitisied and phosphatised chalk pebbles occur at some levels, and erosion surfaces (hardgrounds) are commonplace.

These ‘Lower Chalk’ hardgrounds are used only very occasionally and locally as building stones – where they do occur, they are usually employed as scattered rubblestone blocks in church walls as, for example, at Runcton Holme.

Cromer Knoll Group

Hunstanton Formation

Red Chalk (Hunstanton Chalk, Red Clunch)

The ‘Red Chalk’ is a very distinctive geological unit that extends for approximately 15 km from Hunstanton cliffs south to near West Newton and the Babingley River. As its name implies, the stone is a uniform, brick red coloured form of chalk, which in places can be nodular and shelly. The use of Red Chalk as a building stone is only common in Old Hunstanton and neighbouring villages such as Holme-next-the-Sea; otherwise, it is rarely encountered. It is not particularly durable and weathers relatively easily. Where seen, it tends to have been employed as a roughly dressed rubblestone in walls, or has been used decoratively along with other materials (often white Chalk) on account of its attractive appearance.

C19th cottages built of alternating roughly coursed blocks of Red Chalk and white Chalk with red brick dressings, Kirkgate, Holme-next-the-Sea

The walls of the C12th Church of St. James at Runcton Holme contain scattered, small, undressed blocks of ‘Inoceramus Bed Stone’
Totternhoe Stone

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’ due to the presence of coarse fossil fragments.

It has been used occasionally in Norfolk – a particularly fine example is provided by the Norman doorway at Wimbotsham church.

Chalk Group - White Chalk Subgroup

‘Middle Chalk’ and ‘Upper Chalk’

Chalk (Clunch, White Clunch)

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

In Norfolk, Chalk is typically used as a rough walling stone, often accompanying other stone types (especially Big Carr, Quarry Flint and Quaternary Flint, and occasionally Red Chalk and Chert pebbles and cobbles). Further details regarding the form and geographical extent of its use are provided in ‘The use of stone’ section of this Atlas.

Particularly fine examples of the use of Chalk (as coursed blockwork and rubblestone) can be seen in several of the villages located along the north-western Norfolk coast, notably Old Hunstanton, Holme-next-the-Sea and Thornham. Where the Chalk is employed in a coursed blockwork fashion, it is often accompanied by dressings of red brick.
Quarry Flint (Fresh Flint, Nodule 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 Norfolk; 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 chequerwork and flushwork. Further details regarding the form and geographical extent of its use are provided 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 below.
Quaternary

Ironpan (Ferricrete, Ironbound Conglomerate, Ironbound Sandstone, Cinderstone)

The name ‘Ironpan’ is herein applied to an important group of closely related building stones that formed in geologically recent times as the result of iron-rich groundwaters cementing various sands, gravels and conglomerates.

The three commonest varieties of Ironpan are ‘Ironbound Conglomerate’, ‘Ironbound Sandstone’ and ‘Cinderstone’; these are intergradational in character. Ironbound Conglomerate and Ironbound Sandstone are yellowish, reddish or purplish-black coloured stones (due to the presence of dark iron cement). Flint pebbles predominate in the conglomerate, but other lithologies are also present. With the decline in the proportion of pebbles, Ironbound Conglomerate grades sequentially into pebbly Ironbound Sandstone and Ironbound Sandstone. The ferruginous quartz sand matrix ranges from fine- to coarse-grained. Cinderstone is also dark coloured, typically appearing blackish-purple, and is massive in form. It is generally a finer-grained stone than Ironbound Conglomerate and Ironbound Sandstone (although small, scattered flint clasts may be present). Cinderstone typically exhibits closely spaced, irregular cavities of 5-15 mm in size that have near-black linings of iron oxide cemented coarse silt or sand.

All three varieties of Ironpan are typically hard, durable and tough stones that possess excellent weathering properties. Consequently, Ironpan has been quite widely employed for building purposes, although nowhere is it common and its use decreased significantly post-C19th. Ironpan is mainly encountered in buildings in northern and western Norfolk in an area defined by Hunstanton, Sheringham and Downham Market; sporadic use is also made of the stone between Norwich and Great Yarmouth. Typically, Ironpan occurs in wall fabrics as large-sized masses (commonly larger than Big Carr), but it can also be found as small, irregular lumps. Slabby forms are very rare as Ironpan tends to lack bedding structures.

The ruined chapel at North Elham dates from the C12th. The wall fabric includes blocks of Ironbound Conglomerate and Cinderstone.

The non-rendered wall fabric (and churchyard wall) of the C18th Church of All Saints at North Runcton exhibits blocks of Ironbound Conglomerate, Ironbound Sandstone and Cinderstone along with Carrstone and some Quaternary Flint.
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 within deposits of ‘Clay-with-Flints’, or as pebbles within fluvioglacial sands and gravels. The size of the nodules typically ranges from 10-30 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. Mottled flint is not uncommon in Norfolk. 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 wherever deposits are present in Norfolk. Many walls and buildings across the county include Quaternary Flint in one form or another, and the stone has been used extensively in many towns and villages.

As a walling stone in Norfolk, 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 Quaternary Flint, used in a random fashion or as part of decorative arrangements, are also encountered with some regularity, however. The stone can be seen in many churches and walls in towns and villages throughout the county. Further details are given in ‘The use of stone’ section of this Atlas.

Particularly fine examples of a range of uses of Quaternary Flint are provided by the Guildhall in Norwich, the Church of St Mary in Roughton and various sections of walls in Blakeney village.
Chert 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.

Norfolk’s fluvioglacial deposits were formerly exploited for construction materials on mainly a local scale and the harder Chert 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 walls in Norfolk (especially churchyard walls) is not especially common but quite widespread nonetheless; where seen, such pebbles have often been used in association with Quaternary Flint. A particularly fine example is provided by the churchyard wall at Shipdham.

Chalky Hardpan

‘Chalky Hardpan’ is the name adopted here for blocks of pale grey or off-white coloured hardened clay containing numerous rounded chalk pebbles and subangular Quaternary Flint clasts; occasional rounded pebbles of whitish quartzite and brownish chert flakes are also present. The individual pebbles and clasts typically range from 1 to 5 cm in diameter. The geological origin and geographical source of Chalky Hardpan is uncertain, but this material may represent the ‘cemented interface’ between the top of a chalk deposit lying on a weathered Crag surface. At

Iron Slag

The only example of the use of Iron Slag as a building material in Norfolk is reputedly provided by the ruined medieval Church of St. Michael at Bawsey (Mintlyn Church), directly east of King’s Lynn. The church dates from the early C12th and fell into ruin in the second half of the C18th. It was apparently constructed from local Carrstone and Ironbound Conglomerate, with some Quaternary Flint and limestone dressings. The wall fabric is said to also contain brick and pieces of (Roman) metalworking debris. Unfortunately, these observations cannot be confirmed at the present time owing to the overgrown state of site, but they are included in this account for the sake of completeness.
Although the Cretaceous bedrock succession and younger sedimentary deposits of Norfolk 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 Norfolk 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 Limestone

*Derbyshire*

**Lower Carboniferous**

Peak Limestone Group

A dark grey coloured, bioclastic limestone that is distinctively packed with fossil corals (up to 3 cm across in section) and smaller crinoid ossicles and stem fragments. The fossil debris is typically white or pale cream in colour and contrast strongly with the grey limestone matrix, especially on polished surfaces.

*Polished Carboniferous Limestone pillars (containing abundant fossil coral sections) in the west entrance porch of the Roman Catholic Cathedral of St. John the Baptist, Norwich*
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 Norfolk, York Stone is employed mainly as flagstones, paving stones or as plinths.

Grey-buff York Stone paving stones alongside Purfleet Quay, Kings Lynn

Mansfield Red Stone
Mansfield, Nottinghamshire

Permian
Cadeby Formation, Zechstein Group

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

Mansfield Red Stone used as decorative dressings around an entrance doorway to a hotel in St. Giles Street, Norwich
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 – Norfolk. The name encompasses several named varieties of Lincolnshire Limestone (including Weldon Stone, Kings Cliffe Stone, Stanion Stone and Casterton Stone) which cannot reliably be distinguished for a number of reasons. Ketton Stone and Ancaster 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 Norfolk, especially for the dressings and quoins of churches.

The impressive South Gate to the town of Kings Lynn, was originally built of Barnack Stone and dates from the late C13th, but has been much restored (using other types of Lincolnshire limestone) since 1520

Whitby Sandstone
(Saltwick Sandstone, Aislaby Sandstone)
North Yorkshire

Middle Jurassic
Ravenscar Group

Pale yellow-grey to yellowish sandstones which commonly display shallow-angle cross-bedding, laminations and other channel-fill structures. Fossil plant remains and rootlets are common in blocks. This stone is only very rarely encountered in Norfolk, with the best example of its use being provided by the Church of St. John the Evangelist in Kings Lynn.

The Church of St. John the Evangelist, Kings Lynn was constructed in 1844-46 using blocks of tooled Whitby Sandstone. The dressings are mainly of Bath Stone

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

Ketton Stone is a porous, cream to pale yellow coloured (occasionally pale pink-stained) ooid-rich limestone with a well sorted texture. It lends itself to being quarried in large blocks and is regarded as a high-quality freestone. It has been described as the ‘perfect oolite’ because of its uniform texture. It is seldom encountered in Norfolk, but a good example of its use is provided by the former Customs House in Kings Lynn.

The Grade I listed, former Customs House (now a Tourist Information Bureau) at Purfleet Quay, Kings Lynn, was constructed in 1683 of Ketton Stone ashlar.

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 Norfolk, Ancaster Stone, along with other types Lincolnshire Limestone, tends to have been used in the construction of prestigious buildings, especially in the construction of cathedrals, churches or chapels.

The Roman Catholic Cathedral of St. John the Baptist, Norwich was built in 1882 mainly of Ancaster Stone ashlar with smaller amounts of Clipsham Stone (from Rutland) used in the tower and transepts, and Beer Stone (from Devon) employed in the nave.

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 Norfolk 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 St Giles House (formerly Telephone House, but now a hotel) in Norwich, which dates from 1906.

St. Giles House Hotel in St. Giles Street, Norwich is built mainly of Bath Stone ashlar with Portland Stone and marble dressings.
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 Norfolk, and even then in ecclesiastical buildings or fortifications dating to Norman times.

*Norwich Cathedral, dedicated to the Holy and Undivided Trinity, was begun in 1096 and completed in 1145; its construction includes Caen Stone and Barnack Stone*

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 Norfolk 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 a high quality walling, notably in civil, administrative and financial buildings.

*The impressive Lloyds Bank building in Threadneedle Street, Norwich was built in the late C19th of Portland Stone ashlar, giant order Corinthian pilasters and elaborately decorated consoles and pediments*

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 Norfolk, and usually for the walling of ecclesiastical buildings; may be found as dressed (typically rock-faced) tabular blocks or forming irregular random rubblestone patterns.

*Trinity Methodist Church, Deerham was constructed in 1880 using roughly squared blocks of Kentish Ragstone; the dressings are mainly of Bath Stone*
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 sizes (termed phenocrysts) which display good crystal shapes. Smaller amounts of darker iron- and magnesium-bearing minerals and glinting flakes of mica are also usually present. Granite is very durable and various types are employed in Norfolk. This stone type has been put to various uses in Norfolk, 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.

Granite paving and road setts alongside the statue of the naval explorer, Captain George Vancouver, Purfleet Quay, Kings Lynn

A further example of the use of imported granite is provided by the use of pale-grey coloured Aberdeen Granite (possibly from Rubislaw Quarry) in the former prison of Norwich Castle (dating to c. 1825).
The Church of St. Andrew, North Pickenham was largely rebuilt in 1863 of Flint with Lincolnshire Limestone dressings; the roof is mainly Welsh Slate.

The Victorian school at Happisburgh was built in 1861 largely of red and buff brick; the steeply-pitched roof comprises alternating rectangular and diamond-shaped patterns of Welsh (Penrhyn) Slate (and possibly Westmorland Slate).

Exotic pebbles, cobbles and ballast

Various ages, usually Neoproterozoic to early Permian

A wide variety of ‘exotic’ pebbles and cobbles are seen in the wall fabrics of many buildings, notably churches and inns (especially those in coastal areas). The range of different stones encountered typically includes igneous granites, syenites and dolerites, metamorphic gneisses and schists, along with sedimentary quartzites and well-indurated limestones. Some of these pebbles and cobbles (which sometimes approach small boulders-size) are likely derived from the extensive deposits of boulder clay and other superficial deposits that mantle Norfolk. Others, however, given the common use of these stones in coastal areas, likely represent pieces of off-loaded ballast. Particularly fine examples of exotic pebbles and boulders can be seen in walls at Holme-next-the-Sea (Church of St. Mary), Wells-next-the-Sea (Steadmans Yard) and Great Yarmouth (The Mariners Inn).

Walls of the Mariners Inn in Great Yarmouth display an impressive range of exotic pebbles and cobbles including various granites, dolerites and quartzites.

Roofing slates

Several different types of roofing slate have been imported into – and used all across – Norfolk, 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. Other types of roofing slate, such as green Westmorland Slate, are less commonly encountered.

The Church of St. Andrew, North Pickenham was largely rebuilt in 1863 of Flint with Lincolnshire Limestone dressings; the roof is mainly Welsh Slate.

The Victorian school at Happisburgh was built in 1861 largely of red and buff brick; the steeply-pitched roof comprises alternating rectangular and diamond-shaped patterns of Welsh (Penrhyn) Slate (and possibly Westmorland Slate).
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**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. Remembers 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 Norfolk’s contribution to the Strategic Stone Study, sponsored by Historic England.

This report incorporates data from several sources, including local geological 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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**BGS Memoirs, Sheet Explanations and Mineral Resource Reports**


**Further Reading**


**Norfolk Historic Buildings Group Newsletters**


**Websites**

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

Victoria County Histories (VCH)
Norfolk (webpage accessed 14 March 2019)
https://www.british-history.ac.uk/vch/norf/vol2

EARTHA
East Anglia Earth Buildings Group (webpage accessed 20 March 2019)
Founded in 1994 to encourage the conservation of historic earth buildings and the construction of new buildings using earth materials.
http://www.eartha.org.uk/index.html