Historic England

Berkshire

Building Stones of England

The Building Stones of England

England's rich architectural heritage owes much to the great variety of stones used in buildings and other structures. The building stones commonly reflect the local geology, imparting local distinctiveness to historic towns, villages and rural landscapes.

Historic England and the British Geological Survey (BGS), working with local geologists and historic buildings experts, have compiled the Building Stones Database for England to identify important building stones, where they came from and potential alternative sources for repairs and new construction.

Drawing on this research, plus BGS publications and fieldwork, guides like this one have been produced for each English county. The guides are aimed at mineral planners, building conservation advisers, architects and surveyors, and those assessing townscapes and countryside character. The guides will also be of interest if you want to find out more about local buildings, natural history, and landscapes.

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Front cover: Monks' Barn, Hurley. Quarry flint and chalk block. © Richard Sowersby / Alamy Stock Photo.

How to Use this Guide

Each guide describes the local building stones in their geological timescale order, starting with the oldest layers through to the youngest. The guide ends with examples of other notable building stones from other parts of England and further afield.

Geological time periods, groups, formations and building stones

Each building stone is listed under the relevant geological timescale, group and formation. A formation may be divided into members and where relevant these are referenced in individual building stone sections.

Middle Jurassic
↑— geological time period

Inferior Oolite Group, Lincolnshire Limestone Formation
↑— geological group ↑— geological formation

Lincolnshire Limestone
↑— building stone (alternative or local name)

Bedrock geology map and stratigraphic table

To help you with the geology of the area, there is a bedrock geology map and a stratigraphic table which shows the layers of rocks and the associated building stones in this geological timescale, group, formation order.

Page numbers for each building stone are included in the stratigraphic table for ease of reference. The page numbers are inverted to correspond with the geological age order.

Contents list

If you click on the page number for a building stone in the Contents list, you will go straight to the relevant section in the guide.

Building stone sources and building examples

A companion spreadsheet to this guide provides:

- More examples of buildings. Information is included on building type, date, architectural style, building stone source, and listed/ scheduled status
- A list of known (active and ceased) building stone sources such as quarries, mines, pits and delphs
- Additional information on building stones including lithology, grain size, sedimentary structures, key identification features, and notes on failure/weathering, and use.

The Building Stone GIS map allows you to search the Building Stones Database for England for:

- A building stone type in an area
- Details on individual mapped buildings or stone sources
- Potential sources of building stone sources within a given proximity of a stone building or area
- Buildings or stone sources in individual mineral planning authority area.

Further Reading, Online Resources and Contacts

The guide includes geological and building stone references for the area. A separate guide is provided on general Further Reading, Online Resources and Contacts.

Glossary

The guides include many geological terms. A separate Glossary explaining these terms is provided to be used alongside the guides.

The guides use the BGS lexicon of named rock units.

Mineral and local planning authorities

This guide covers mineral planning areas of the Central and Eastern Berkshire Authorities (Bracknell Forest Council, Reading Borough Council, the Royal Borough of Windsor and Maidenhead, and Wokingham Borough Council), West Berkshire, and Slough; and the corresponding unitary planning authorities.

Contents

1 Introduction 1

2 The Use of Stone in Berkshire's Buildings 5

3 Local Building Stones 18

Quarry Flint (Fresh Flint) 18
Chalk 20
Sarsen Stone (Sarsen Sandstone, Berkshire Sarsens, Greywethers, Silcrete) 21
Ferricrete (Conglomerate, Iron-cemented Conglomerate, Puddingstone, Pebble Beds) 25
Quaternary Flint (Field Flint, Downland Field Flint, Clay-with-Flints) 27
Tufa 29

4 Examples of Imported Building Stones 30

York Stone, West/South Yorkshire 30
Pennant Sandstone, Bristol-Mendip area and Forest of Dean 31
Mansfield Stone (Red Mansfield Stone), Nottinghamshire 32
Permo-Triassic Sandstone (New Red Sandstone), Midlands 33
Hollington Stone (Uttoxeter Sandstone), East Staffordshire and West Derbyshire 34
Hornton Stone, North Oxfordshire 34
Bisley Common Stone, near Stroud, Gloucestershire 35
Bath Stone, Bath, NE Somerset and possibly Corsham area, Wiltshire 35
Taynton Stone, Oxfordshire 36
Caen Stone, Normandy, France 37
Corallian Sandstone and Limestone (Wheatley Limestone), Oxfordshire 37
Swindon Stone, Swindon, Wiltshire 38
Portland Stone, Isle of Portland, Dorset 39
Bargate Stone, Surrey 39
Kentish Ragstone, Weald of Kent 40

5 Further Reading 41

6 Contact Historic England 43

7 Acknowledgements 44

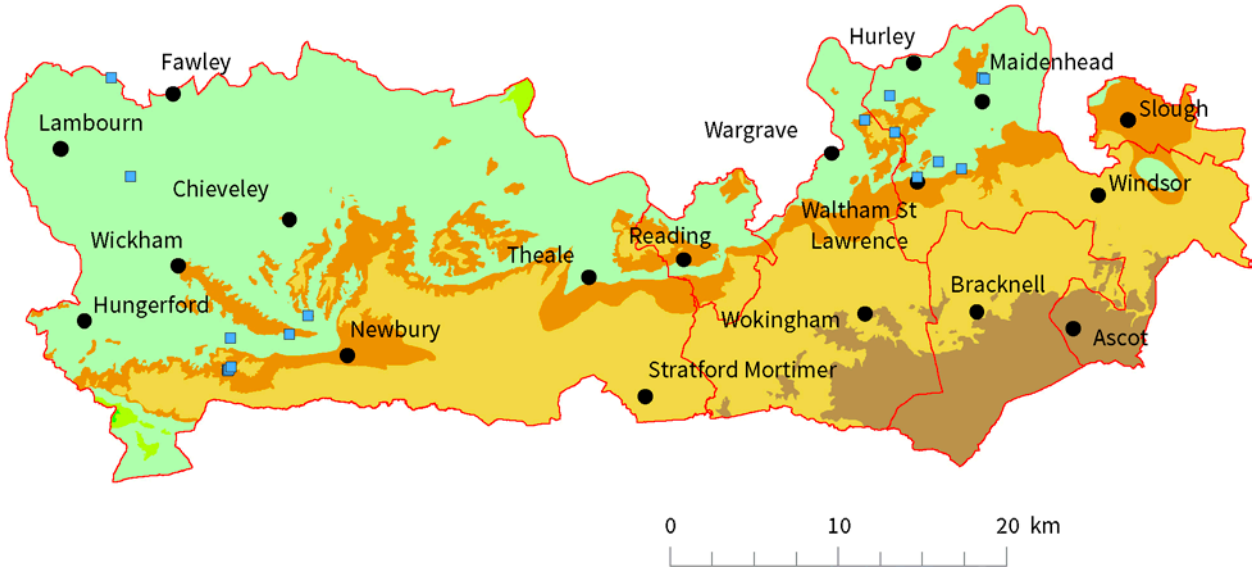
1 Introduction

Berkshire lies to the west of London. Its landscape and scenery vary from chalk downs in the north and west to lower-lying, gently undulating Palaeogene and younger strata in the south and east. The oldest rocks exposed at the surface belong, in large part, to the Upper Cretaceous Chalk Group, the upper parts of which (White Chalk Subgroup) contain much flint. This chalk outcrop slopes gently away to the south. It is mainly overlain by sands and clays of Tertiary age, which occur south of a line from Hungerford via Reading to Windsor, and younger superficial deposits of Quaternary age, which are widespread throughout the county.

Overall, Berkshire has few locally sourced building stones. Although there are many gravel workings, there are currently no building stone quarries operating in the county. Historically, flints from the Upper Cretaceous White Chalk Subgroup, or those reworked into younger Quaternary deposits (such as clay-with-flints), have been used extensively for building. Other Palaeogene or Quaternary age building stones are represented mainly by quartz-cemented sandstones (Sarsen stone) and iron-rich conglomerates (ferricretes). Tufa was employed very locally as a building stone in West Berkshire.

The limited availability of indigenous building stone in Berkshire has resulted in the extensive use of imported stones. This commenced from at least the Saxon period. Such imported stones were sourced from various parts of England and further afield. For example, extensive quantities of Caen Stone were imported from France for use in Reading Abbey. Kentish Ragstone from Kent was much used in the 14th to 16th-century construction phases of Windsor Castle. From the 17th century, importation of stone increased dramatically with improved transportation, and a wide range of stones were used as ornamental dressings to mansions, civic buildings, churches and chapels. The rapid growth in population in the 19th century led to the construction of a comparatively large number of new Anglican and Roman Catholic churches and non-conformist chapels. Imported stone, including Bath Stone, was used extensively for dressings and decorative effects in churches of the Victorian High Gothic, often in conjunction with flint and brick.

Bedrock Geology Map



Key

Building stone sources

Bedrock geology

London Clay Formation — clay, silt and sand

Bracklesham Group — sand, gravel, clay, silt

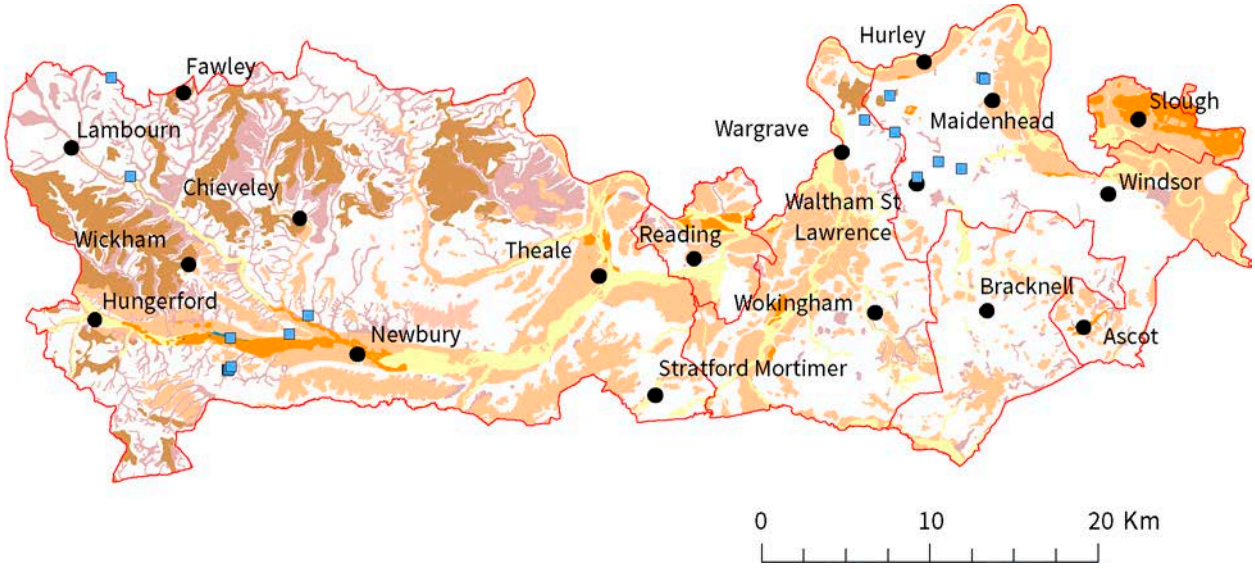
Lambeth Group — clay, silt and sand

White Chalk Subgroup: Chalk Group — chalk

Grey Chalk Subgroup: Chalk Group — chalk

Upper Greensand Formation — sandstone

Superficial Geology Map



Key

- Building stone sources

Superficial geology

- Alluvium — clay, silt, sands and gravels
- Brickearth — peat, clays, silt and sand
- Head — sands, gravels, silt and clay
- River Terraces — sands, gravels, silt and clay
- Tufa
- Clay-With-Flints — sands, gravels, clay, silt

Stratigraphic Table

Geological timescale	Group		Formation	Building stone	Page
Quaternary	various		various	Tufa Quaternary Flint (Field Flint, Downland Field Flint, Clay-with-Flints) Ferricrete (Conglomerate, Iron-cemented conglomerate, Puddingstone, Pebble Beds) Sarsen stone (Sarsen Sandstone, Berkshire Sarsens, Greywethers, Silcrete)	29 27 25 21
Tertiary	Bracklesham Group		Camberley Sand Formation		
			Windlesham Formation		
			Bagshot Formation		
	Thames Group		London Clay Formation		
			Harwich Formation		
	Lambeth Group		Woolwich Formation		
			Reading Formation		
			Upnor Formation		
Cretaceous	Chalk Group	White Chalk Subgroup	Newhaven Chalk Formation	Chalk Quarry Flint (Fresh Flint)	20 18
			Seaford Chalk Formation		
			Lewes Nodular Chalk Formation		
			New Pit Chalk Formation		
			Holywell Nodular Chalk Formation		
		Grey Chalk Subgroup	Zig Zag Chalk Formation		
			West Melbury Marly Chalk Formation		
	Selborne Group		Upper Greensand Formation		

Building stones in geological order from the oldest through to the youngest layers.

2 The Use of Stone in Berkshire's Buildings

Background and historical context

There are nearly 4,400 listed buildings and 121 conservation areas in Berkshire. They range from graveyard monuments to the extensive complex of buildings that make up Windsor Castle. However, geologically speaking, Berkshire has relatively few rocks that are suitable sources for building stone. The Berkshire Downs, to the west of the county, provided Quarry Flint, Quaternary Flint, chalk and Sarsen stone, whereas ferricrete was occasionally used in the Thames Valley, to the east. Tufa is known to have been employed in at least one church in the Thames Basin Heaths area. Due to the sparsity of indigenous building stone, timber framing was the dominant vernacular building technique in Berkshire from the medieval period. It was much used for housing until the early 17th century and for farm buildings until the early 19th century.

The River Thames and its tributaries, particularly the Kennet, provided easy access to London and to the west of England, through the Goring Gap. Such good transportation links influenced Berkshire's economy and enabled the importation of a wide range of building materials. From an early date, similar stone to that available within Berkshire was imported from adjacent counties. For example, some of the Sarsen stone used in the 12th-century Round Tower at Windsor Castle originated from near Bagshot in Surrey. In Reading and the east Thames Valley, much of the flint used came from the Chiltern Hills in Buckinghamshire. Building stone, particularly flint, was also frequently transported within Berkshire: for example, from the Berkshire Downs southwards to the Newbury area.

From the 18th century onwards, the development of long-distance transport routes, first canals, then railways, enabled the importation of a wide variety of stone from further afield. Rapid economic and population growth and changing social, cultural and religious practices increased demand for stone, particularly for 'polite' housing, civic buildings, new churches and chapels.

The largest and most significant building of Norman origin in Berkshire is Windsor Castle. A wide variety of different stones were used, including locally sourced Sarsen stone and chalk and imported stones such as Kentish Ragstone and Caen Stone. Local Quarry Flint and chalk were utilised at Donnington Castle near Newbury, where the only standing remains of the quadrangular castle is the late 14th-century gatehouse.

Figure 1: Donnington Castle gatehouse, near Newbury. Quarry flint and chalk with red brick repairs.

Throughout the medieval period, Berkshire was strongly influenced by monastic estates, particularly those of Abingdon Abbey (now in Oxfordshire) and the Cluniac Abbey at Reading. Reading Abbey was one of the richest in England and the abbey church was the fourth largest church in Britain. There were other religious houses, too, from a variety of orders at Hurley, Steventon, Wallingford, Broomhall, Bisham, Poughley and Sandleford. Generally, the monastic estates were managed directly. Agriculture was dominated by a sheep and corn system throughout much of the county, with downland manors supporting large flocks of sheep. Newbury established itself as a major cloth town in the 15th century.

From the late 15th and 16th centuries, farms and manors started to be let on long-term leases, which led to the construction of new or enlarged manor farmhouses. Timber framing remained the preferred construction method for some large houses, such as Ockwells Manor, Cox Green, Maidenhead, and for most vernacular buildings. The Dissolution of the Monasteries resulted in the break-up of monastic lands and a growth in privately owned farming estates. Often, farmhouses and major farm buildings were rebuilt. Large new houses, particularly those in the east of the county, such as Shaw House at Shaw-cum-Donnington, were built in brick, reflecting the abundance of locally available clays. Others houses continued to be of timber-framed construction, such as Ufton Court at Ufton Nervet, south-west of Reading.

Churches are the most common examples of surviving medieval buildings in which indigenous stone was used extensively. They are predominantly constructed of flint, with chalk and Sarsen stone also being employed in the western downland area. A few ferricrete and flint churches occur in the east, and here the stone may have come from sources outside the county. The long history of alteration, extension, rebuilding and repair of such churches means they frequently exhibit a range of stones from different origins and periods.

Flint is one of the most characteristic building materials throughout a large part of Berkshire. It is used in churches, houses of various social statuses, garden structures, farm buildings and boundary walls. From the start of the 14th century, knapping and squaring of flints to produce flat surfaces became common. Flushwork was highly fashionable in the late 15th century, and a particularly fine example of chequerwork can be seen in the tower of the Minster Church of St Mary the Virgin at Reading.

Figure 2: West tower of Minster Church of St Mary the Virgin, Reading. Chequerwork of Taynton Stone and flint.

Figure 3: South wall of Minster Church of St Mary the Virgin, Reading. Chequerwork of Taynton Stone and flint.

Enclosure of open agricultural fields by agreement during the 17th to mid-18th centuries, in response to increases in food prices and population, required greater capacity for the processing and storage of corn crops. Many new farm barns were built and existing barns modified. Much of the Berkshire countryside was transformed between 1700 and 1900, with open fields, common lands and manorial wastes being replaced by hedged fields. Between 1738 and 1883, one-third of the total land area of historic Berkshire was enclosed by parliamentary means. Enclosure pre-1800 was concentrated in the Berkshire downland area, particularly around Lambourn and East Garston. The gradual conversion of downland to arable accelerated, and farming tended to become more specialised, requiring different and additional farm buildings. Enclosure spread to the Kennet Valley and the downs of east Berkshire. The enclosure of Windsor Forest took place between 1813 and 1817.

Timber-frame construction of farm buildings predominated well into the 19th century. The form of barns changed little between the medieval period and the age of steam threshing in the 19th century. Aisled construction was used for many of the earliest barns, particularly in south Berkshire. Such barns frequently used indigenous stone in the footings and plinths, including flint, Sarsen stone, chalk and ferricrete. Large, unaisled, timber-frame barns or brick and flint combination barns became dominant in the downland areas enclosed from the later 18th century. Many timber-framed agricultural buildings were clad in weatherboarding, although brick and flint became far more common in the 19th century. In eastern and southern Berkshire, brick was increasingly used in farm buildings from the 17th century, but it was not until the later 19th century that it became common in the Berkshire downland areas, where it was employed extensively in combination with Quaternary Flint.

South Berkshire has an abundance of clays suitable for brick making. Brick was used extensively in the Roman period and many Roman bricks have been reused in buildings, in association with flint and other stonework. The making of bricks restarted in the 15th century. They were used in church towers from the 16th century, such as at Wargrave and Bradfield, and larger houses also started to be built in brick at this time. However, brick was not used extensively in agricultural buildings in the western downland areas until the 19th century. The brick-making industry became very important in Berkshire in the late 19th and 20th centuries, with brick becoming the most

common building material used throughout the county. The swift expansion of Reading, following the opening of the Great Western Railway in 1841, made extensive use of locally manufactured bricks in the construction of houses and civic buildings.

The 17th and 18th centuries saw rapidly increasing population and improvements in agriculture, as well as continued growth of large estates and farms. In eastern Berkshire, park estates and modest country houses within easy distance of London were established from the 18th century. The majority of these were constructed of brick or imported stone. The latter became more easily available with the openings of the Kennet Navigation in 1723, the Thames and Severn Canal in 1789 and the Kennet and Avon Canal in 1810.

In the 18th and 19th centuries, a comparatively large number of new Anglican and Roman Catholic churches and non-conformist chapels were built to serve the spiritual and social needs of the rapidly growing population. The

Figure 4: St Ethelbert's Catholic Church, Slough. Flint nodules with Bath Stone dressings.

Classical and Gothic Revivals of the 18th and 19th centuries, combined with improved transportation, led to the importation of a wide range of stone from outside the county. In particular, from the 1850s onwards, architects of the High Victorian Gothic Revival favoured flint (as seen at St Peter's Church at Chalvley, designed by G E Street) and the use of elaborate ornamentation, colour and textual contrasts employing a wide variety of imported building stones. The use of flint as a favoured building stone continued into the early 20th century, as seen at St Ethelbert's Catholic Church at Slough, for example.

National Character Areas (NCAs)

Local landscape character and the combination of history, cultural and economic activity, geodiversity and biodiversity have been mapped for the whole of England and National Character Areas (NCA) defined (see Further Reading, Online Resources and Contacts). For each NCA there is a profile document which describes the natural and cultural features that shape the landscapes, how the landscapes have changed over time, the current key drivers for ongoing change, and a broad analysis of each area's characteristics and ecosystem services. The profiles include notes on local vernacular and building materials which are expanded in the following section on the four NCAs covered in this guide:

110 Chilterns
115 Thames Valley
116 Berkshire and Marlborough Downs
129 Thames Basin Heaths

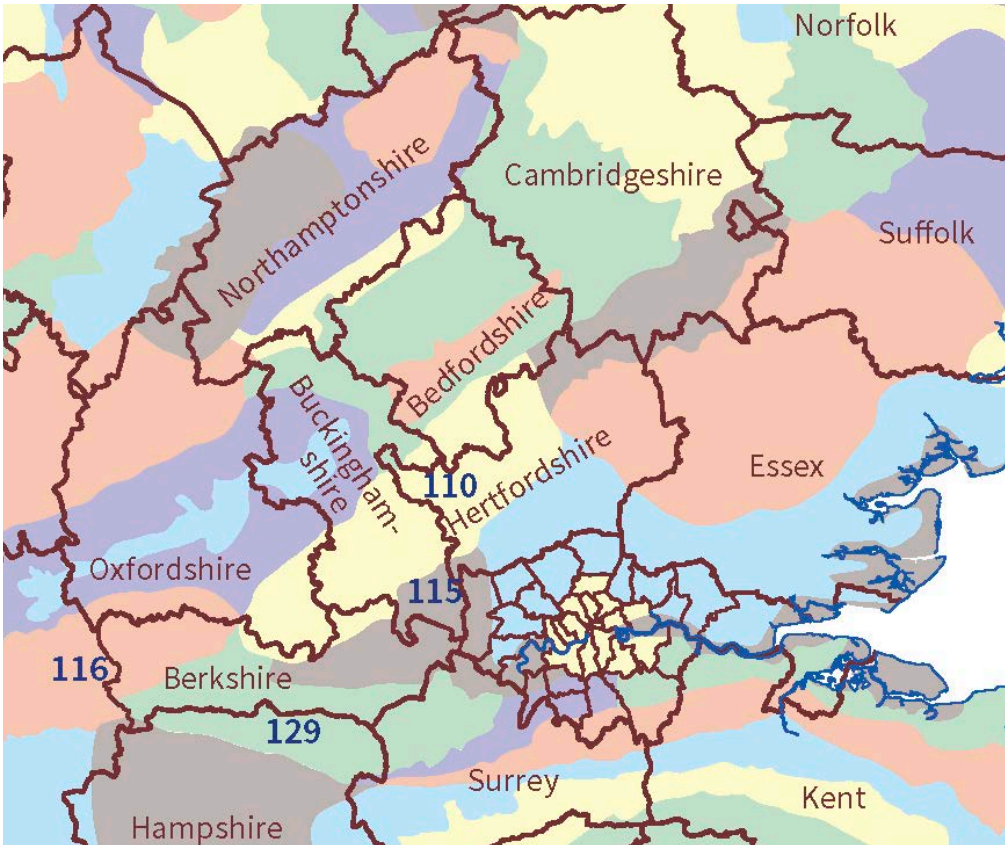


Figure 5: Map showing the National Character Areas (and the NCA numbers).

Chilterns

The south-western boundary of the Chilterns area is mainly formed by the River Thames as it flows past Wallingford, Reading, Henley and Marlow. A small area lies south of the River Thames by Goring, bounded to the west by the North Wessex Downs Area of Outstanding Natural Beauty. Although part of the Chilterns, this belt of countryside is dominated by the river and its floodplain rather than by the hills.

Timber frame was the traditional material for most buildings here until the 18th century, when brick began to be widely used. Brick was often made locally, giving rise to variations of colour and quality. Locally, flint was used extensively in combination with brick. Clay tiles were generally used for roofing from the 16th century onwards, until Welsh slate became available in the 18th century.

Thames Valley

The Thames Valley includes major settlements, such as Reading, Slough, Windsor and Bracknell, and riverside towns, such as Maidenhead, as well as the principal western approaches to London. Suburban and recent development within this area is extensive.

Historically, timber frame was dominant, with brick and/or flint infill used in numerous smaller houses and farm buildings post-17th century. Pre-1750 farmstead buildings were typically of loose courtyard plan with timber-framed barns, including aisled barns and cattle housing. Many of the 19th-century farmsteads were built in brick, with the occasional use of flint in their plinth walls. They are often arranged in regular courtyard complexes.

Flint was used in the Roman villa at Cox Green, Maidenhead, and as the rubble core of the walls of buildings in Reading Abbey. The much-restored abbey gate and the hospitium (monks' dormitory) survive, together with extensive ruins that also contain Caen Stone, although often only the flint rubble cores of the walls remain. At least some of the flint used at Reading Abbey is likely to have been sourced from the nearby Chiltern hills in Buckinghamshire or south Oxfordshire.

Flint was also widely used in medieval church buildings. Reading's Minster Church of St Mary the Virgin originates from the 11th century and predates Reading Abbey. It was extensively rebuilt in the 16th century using materials from the abbey. For example, the west tower is chequered with squared flint with stone. The 12th-century St Mary's Church at Slough is built in flint, with rubble and stone dressings, and it has a 17th-century tower base constructed of flint. Flint was also sometimes employed in association with ferricrete, as seen in All Saints' Church at Binfield. Here, squared knapped flint is used in dressings to some windows, but the stone also occurs as nodular rubblestone with irregular ferricrete blocks as the main walling material in the aisle.

Hurley Priory was founded in 1087. The 12th-century nave remains as the parish church, with walls of flint and chalk as well as some minor Caen Stone and possibly Taynton Stone. Hurley village has many boundary walls constructed of flint with brick and some chalk blockwork. Other examples of flint-built churches with stone dressings (usually Bath Stone) include the Church of St Mary the Virgin at Shinfield and the Church of St Andrew at Windsor. The distribution of flint in medieval churches in the east of the area suggests that some flint may have been imported from adjacent counties.

During the 19th century, the use of flint in new churches was extensive. Examples include St Mary's Church at Twyford (designed by Benjamin Ferrey) and St Michael's Church at Tilehurst (designed by G E Street), built of knapped and squared, coursed flint.

Chalk was usually dug from small pits, although it was mined during the 18th century in the Reading area, at Coley and Emmer Green. However, not all of this chalk was extracted for building purposes, as it was also largely used as an additive in brick making. Mill House and associated barns at Frogmill, near Hurley, are examples of 19th-century buildings that display chalk and flint in attractive chequerwork along with red brick dressings.

Figure 6: Mill House, Frogmill, near Hurley. Chequerwork of chalk and flint.

Hurley village also has a considerable number of buildings, dating from the medieval period to the late 19th century, that employ chalk block. For example, extensive use of chalk was made in the buildings of the 12th-century priory. Surviving structures include the cloisters, a much-altered part of the refectory of the priory (which also employs flint and other stones), the medieval dovecote by the Tithe Barn and the large medieval Monks' Barn on the High Street. This last is largely constructed of flint, but much chalk is also present as dressings, quoins, chequerwork and blockwork in the north gable end wall.

Chalk was occasionally used in other medieval churches, such as St Lawrence's Church at Waltham St Lawrence and St Mary's Church at White Waltham. The latter is mostly built of flint, but it exhibits chalk dressings and fine chequerwork of chalk with squared flint. The Church of St Mary at Wargrave burnt down and was rebuilt in 1916. It is one of the last churches in Berkshire built in flint with chalk dressings. Chalk was occasionally employed in cottages, smaller houses and agricultural buildings. The 18th-century Dew Drop Inn near Hurley is constructed of flint rubble and squared chalk block with red brick dressings, and at Shottesbrooke Farm, White Waltham, a 17th-century timber-frame weatherboarded and brick barn has an attached cowshed and stable built mainly in chalk block.

Figure 7: A public house, near Hurley. Quaternary Flint with chalk block and red brick.

Ferricrete was used in a small number of churches in the Bracknell area such as All Saints Church at Binfield. The 14th-century nave at the latter, is galleted with smaller ferricrete stones in combination with flint. At St Michael's Church at Warfield, ferricrete is used in the 15th-century tower and nave, along with chalk window tracery. The 15th-century tower and clerestory of All Saints' Church at Wokingham exhibits squared ferricrete blockwork.

The Thames Valley area also contains a select range of buildings that are constructed exclusively from imported stones. A particularly good example is the Sacred Heart Church, Watlington Street, Reading, which was constructed in the 1870s mainly of grey Kentish Ragstone. This vividly contrasts with the alternating blocks of decorative Red Mansfield Stone and cream-coloured Bath Stone, which are well displayed at various window levels on the clock tower and around the triple-arched lancet windows and adjoining turrets.

Berkshire and Marlborough Downs

The Downs have been settled since Palaeolithic times. The first 'monuments' were constructed in the landscape during Neolithic times, with settlements developing during the Bronze Age. Many of today's villages date to the Saxon period.

Settlements are generally sparse, and villages cluster in valley bottoms and near springs. There are historic market towns, such as Newbury and Hungerford, and villages such as Lambourn, Great Shefford, East Ilsley and West Ilsley. From the 18th century, the Lambourn Valley and the surrounding downs became a centre for racehorse breeding, which led to the construction of stables and other new buildings. Traditional buildings are predominantly timber framed, generally with brick infill. However, the Downs were also a local source for Quaternary Flint, chalk and Sarsen stone. Roofing materials include thatch, tiles and Welsh slate.

Flint was usually a by-product of the quarrying of chalk for lime or marling or was picked from the fields after ploughing. It was widely and extensively employed across the area, in a range of buildings from town houses to barns. It was also much used in churches mostly dating from the 12th century onwards. One of the earliest surviving uses of flint is in the 11th-century Saxon west tower of St Swithin's Church at Wickham. This is mainly constructed of squared and knapped flint, with some reused Roman brickwork and tiles. In other locations, flint stonework was rendered. For example, the walls of the 12th-century Church of SS Luke and Mark at Avington, east of Hungerford, are mainly built of rendered flint rubble, with some blocks of ferricrete and Bath Stone dressings. The 11th-century St Thomas' Church at Great Shefford also employed ferricrete in addition to flint in its construction.

Villages such as Lambourn include large houses mainly constructed of flint (for example, Rook's Nest, a 16th-century country house with 20th-century additions in flint with stone dressings) and cottages built of combinations of flint and brick. However, flint was not widely used in farm and domestic buildings until the 19th century, when it was frequently employed in farm structures and walls. A good example of the use of flint and brick in a mid-19th-century barn is Hook End Farm, Basildon, which exhibits fine banding and quoins in brick.

Sarsen stone has been used for construction in the Berkshire and Marlborough Downs area since Neolithic times. It is frequently found in the plinth walls of timber-framed barns, as seen at Pigeon House, Eastbury. It was also used in boundary walls, cottages, town houses and churches. Settlements such as Lambourn and Upper Lambourn have a considerable number of buildings constructed mainly of Sarsen stone. These include the 18th-century College House, High Street, Lambourn; the 16th-century Sarcens, and the Old Manor House in Upper Lambourn. Sarsen stone is also used extensively in boundary walls of the village and, to a lesser extent, in Lambourn itself.

Figure 8: College House, High Street, Lambourn. Sarsen stone with red brick dressings.

Soft limestone, known as clunch was used as rubblestone, including as the inner skin to brick walling. Harder chalk block was also used occasionally as quoins (for example, at the largely Sarsen stone built Old Manor House, Upper Lambourn), as squared stones with brick bands (for example, at the south gable end of East Ilsley Farmhouse) and in some churches as window tracery and quoins. Chalk continued to be used as an occasional building stone into the 19th century, as typified by the picturesque cottages of 26–27 High Street, West Ilsley, which were built in 1840.

Staddle barns are an unusual type of timber-framed barn that developed in the downland areas of Hampshire, Berkshire and Wiltshire. Many of these barns date from the mid to late 18th century and have an unaisled timber frame raised on as many as 64 staddle stones. This helped to protect the unthreshed crop from damp and vermin, particularly after the introduction of the brown rat in the early 18th century.

Thames Basin Heaths

The Thames Basin Lowlands cover the south of Berkshire and extend from Newbury eastwards to Weybridge in Surrey. Until the 19th century, the area was dominated by a wood pasture economy, with commons, small fields, wood pasture and small woodlands created by the clearance of woodland.

Timber-framed building was the dominant tradition for houses and farm buildings in this area until the emergence of brick during the 16th century. Local farms were small scale, which meant there was little capital available to replace buildings. Consequently, medieval and 16th and 17th-century farm buildings and moated farmsteads often survive, although some timber-framed buildings were refaced or filled in brick. Staddle barns and granaries also occur in the area, such as the granary at Banisters, Finchampstead.

Brick is the dominant building material encountered in buildings and walls from the 18th century onwards, reflecting the lack of readily available indigenous stone.

Large park estates and modest country houses were established during the 18th and 19th centuries due to the area's proximity and easy access to London. These tended to be mainly constructed in brick, with imported stone dressings. For example, Bearwood near Wokingham was built from brick with Mansfield Stone dressings. The Royal Military Academy Sandhurst, Wellington College and Broadmoor Hospital in Crowthorne were all established in the 19th century and are constructed in brick with imported Bath Stone dressings.

Figure 9: Wellington College, Crowthorne. Red brick and Bath Stone.

Flint is much used in and around Newbury, and most was probably brought from the downland area to the north and west. Examples of medieval uses include Quarry Flint with chalk at the 14th-century Donnington Castle gatehouse and flint rubble in the walls of the 13th-century Litten Chapel, Newbury. Flint was also employed with brick in substantial houses and cottages, including at the 17th to 19th-century priory at Shaw-cum-Donnington and the 17th-century Hambridge Farm House, near Newbury. In the east of the area, flint was used in the Victorian Churches of St Bartholomew at Arborfield and St James at Barkham, although this may have been imported from sources outside of Berkshire.

Tufa has a very localised and occasional use as a rubblestone in medieval church walls. It occurs in the 14th-century Church of St Mary at Hamstead Marshall, south-west of Newbury. Here, tufa is used as roughly shaped and faced blocks with flint nodules and red brick, along with minor amounts of Sarsen stone, chalk, Caen Stone and Bath Stone.

Figure 10: Church of St Mary, Hamstead Marshall. Flint and red brick, with tufa and small amounts of Sarsen stone, chalk, Caen Stone and Bath Stone.

3 Local Building Stones

Cretaceous

Chalk Group, White Chalk Subgroup, Seaford Chalk Formation Newhaven Chalk Formation

Quarry Flint (Fresh Flint)

Quarry Flint is one of the most common and widely used building stones in Berkshire. It originates from bands and more isolated nodules of flint that occur within the chalky limestone beds of the White Chalk Subgroup. Quarry Flint was dug from chalk pits and has been used extensively close to and within the outcrop area of this bedrock unit, within and adjoining the Berkshire Downs and south of the River Thames.

The stone is an extremely fine-grained and hard form of silica, containing microscopic quartz-crystal aggregates. It usually occurs as irregularly shaped nodules that are 100 to 200mm across, or as (sub-)rounded pebbles and cobbles. Occasionally, it is found as weakly banded tabular sheets or layers up to 200mm thick. The colour is very distinctive: fresh flint 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 flints contain well-preserved fossils, with echinoids, sponges, bivalves and burrow structures being the most commonly encountered types.

Quarry Flint is used extensively in walls throughout Berkshire in a wide variety of ways: laid to course as rough tabular ‘sheets’ of nodules; in squared chequerwork; or as knapped, faced, trimmed or cleaved-faced stone in random and decorative arrangements. Many churches in Berkshire employ flint in one form or another, and the stone was used extensively in a number of villages near Maidenhead. Around Newbury, roughly trimmed flints, usually accompanied by blocks of Sarsen stone and ferricrete, may be seen in the walls of many old buildings. Locally mined flints were used with chalk in the construction of Donnington Castle near Newbury, with Caen Stone and Taynton Stone in the medieval walls of Reading Abbey, and with chalk block in Monks’ Barn, Hurley.

The extremely hard and resistant nature of Quarry Flint nodules has resulted in them being recycled by natural processes into younger deposits. These reworked types of flint, which show specific characteristics, are described below in the Quaternary section of this guide.

Figure 11: Holy Trinity Church, Cookham. Flint and chalk.

Figure 12: The Vicarage House, Hurley. Chalk block.

Chalk Group, White Chalk Subgroup, Newhaven Chalk Formation

Chalk

The white chalky limestones of the Upper Cretaceous White Chalk Subgroup are among the most distinctive and easily recognised building stones employed in Berkshire. They are white to very pale grey, typically structureless limestones, sometimes containing inoceramids, echinoids and occasionally crinoids, brachiopods and belemnites. Pale-coloured malmstone from the Upper Greensand Formation of the Selborne Group can resemble chalk, but it does not powder in the same way.

Generally, chalk is unsuitable for exterior stonework because repeated wetting and drying, coupled with frost action, causes the relatively soft rock to powder and disintegrate into small angular brash. Softer forms of the stone, when used externally, may show concave weathering away from mortar joints. Where used as a building stone in Berkshire, chalk tends to be protected from rain by wide eaves, or it is employed above the foundation course of a more resistant stone.

Chalk has been quarried as a local source of building stone across much of its outcrop in Berkshire, although its use is relatively limited and mainly confined to an area within and close to the Downs and south of the Chiltern hills and River Thames.

It is typically used as a rough walling stone, often accompanying other stones, especially flint and Sarsen stone, or for decorative purposes, such as window dressings, banding and so forth. Chalk may be roughly cut, which has enabled the creation of areas of squared blockwork, but walls constructed entirely of chalk block are rare. One example is the barn wall at Shottesbrooke Farm, White Waltham. The church walls at Bisham, Chieveley, Hurley, Speen, Warfield, Wargrave and Waltham St Lawrence show a more typical use of chalk.

Chalk was also used with flint in the construction of Donnington Castle, near Newbury. Many small villages around Lambourn, including Upper Lambourn, East Garston and Eastbury, feature chalk block in their buildings. Examples include the chalk quoins of the Old Manor House, Upper Lambourn, and the chalk cob perimeter wall of All Saints' Church at East Garston.

The village of Hurley, near Maidenhead, serves as a particularly impressive example of the use of chalk, especially around the church, its gatehouse and cloisters, and along the northern end of the High Street (for example, Monks' Barn). Fine examples of chalk and flint chequerwork can be seen in the Church of St Mary the Virgin at White Waltham and at Frogmill Court, west of Hurley.

Figure 13: Converted cloisters, Hurley Priory. Chalk block.

Figure 14: Church House, Hurley. Squared and randomised chalk block.

Quaternary

Sarsen Stone (Sarsen Sandstone, Berkshire Sarsens, Greywethers, Silcrete)

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

Sarsen stone has seen widespread use in Berkshire. It is found as rounded field boulders and cobbles, and was often used as such. Sometimes, however, it was split and dressed into roughly square-shaped blocks. Sarsen was mainly utilised as a walling stone and it is encountered in many old village, church and boundary walls, in Lambourn and Upper Lambourn, for example, often accompanying other materials such as flint or chalk. Large Sarsen stones were also used as corner stones, doorsteps, stepping stones, mounting blocks or gate posts.

Sarsen stone was used in churches around Windsor such as St John the Baptist, and stone, sourced from beyond Berkshire, was used very extensively in the construction of Windsor Castle.

Figure 15: Old Manor House, Upper Lambourn. Sarsen stone with flint nodules and chalk.

Figure 16: Old Manor House, Upper Lambourn. Sarsen stone with flint nodules.

Figure 17: High Street, Upper Lambourn. Sarsen stone, some blocks dressed and roughly shaped.

Figure 18: College House, High Street, Lambourn. Grey Sarsen stone.

Figure 19: Place Farmhouse, Lambourn. Sarsen stone and brick.

Figure 20: Limes Farmhouse, Upper Lambourn. Sarsen stone with chalk block.

Figure 21: Norman Gate, leading to the upper ward of Windsor Castle. Sarsen stone (Bagshot Heath Stone) with Kentish Ragstone, Caen Stone and Bath Stone.

Ferricrete (Conglomerate, Iron-cemented Conglomerate, Puddingstone, Pebble Beds)

This is a distinctive, dark reddish-brown or dark orange-red to purplish-brown, iron-cemented conglomerate containing sub-rounded to sub-angular pebbles of flint or chert, or occasionally sandstone. The pebbles may reach 50mm in diameter, but the usual size range is between 20 and 30mm. They may appear whitish or be stained to various hues of pale brown, ochreous brown, grey or green. The matrix cement is often coarsely sandy or gritty, dark coloured and iron stained. The conglomeratic texture and colour of ferricrete readily distinguishes this building stone from all others in Berkshire. It is relatively soft when first excavated but hardens upon exposure to air.

Ferricrete is widely, but sporadically, used across several areas of Berkshire, including Newbury, Reading, Windsor, Bracknell Forest and Slough. It is typically employed as irregular, crudely dressed blocks in walls and is often accompanied by roughly trimmed flints and Sarsen stone. It is seen in a variety of walls, including those of churches and other old buildings, farmyards and gardens. Particularly good examples are the churches at Binfield, Bucklebury, Waltham St Lawrence, Warfield and Winkfield, and the round towers of St Gregory's Church at Welford and St Mary's Church at Great Shefford. The tower of All Saints' Church at Wokingham formerly exposed a superb example of ferricrete stonework, but it has since been extensively rendered.

Figure 22: All Saints' Church, Binfield. Ferricrete.

Figure 23: Church of St Michael the Archangel, Warfield. Ferricrete with Bath Stone and chalk dressings.

Figure 24: Northern wall at Church of St Michael the Archangel, Warfield. Ferricrete stonework with chalk window dressings.

Figure 25: Church of St Michael the Archangel, Warfield. Ferricrete and rounded flint pebbles.

Quaternary Flint (Field Flint, Downland Field Flint, Clay-with-Flints)

Quaternary Flint occurs in large quantities in Berkshire and it is distributed across wide areas of the Downs, where it typically occurs as irregularly shaped nodules on the field surface, in clay-with-flints or as pebbles in river terrace gravels and other superficial deposits. The size of the nodules ranges from 100 to 300mm, although larger nodules occasionally occur. The colour is variable: less weathered flint nodules or pebbles have a cream outer cortex with a darker coloured (greyish) interior; weathered flints, or those that have lain in soil or superficial deposits for a long period, may be variously discoloured or bleached, and often have brown-stained interiors due to the precipitation of iron hydroxides from percolating ferruginous water. This weathered appearance helps distinguish field flint from the much fresher looking Quarry Flint.

Its widespread availability, combined with its hardness and resistance to weathering, means that Quaternary Flint is one of the most dominant types of building stone in Berkshire. Many walls and buildings (especially churches) throughout the county employ Quaternary Flint in one form or another, and the stone has been used extensively in many towns and villages.

As a walling stone, Quaternary Flint was employed in a wide variety of ways: as nodules or pebbles laid roughly to course, as squared blocks as part of chequerwork, and as knapped, faced, trimmed or cleaved-faced stone in random or decorative arrangements. Nodules were often selected for their shape and size, and laid in either a random or coursed manner.

Figure 26: St Ethelbert's Presbytery, Slough. Quaternary Flint nodules with Bath Stone window dressings.

Figure 27: Weathered Downland Field Flint nodules.

Figure 28: All Saints' Church, Binfield. Flint nodules.

Figure 29: St Mary's Church, Hamstead Marshall. Roughly squared knapped flint blocks and nodules.

Figure 30: All Saints' Church, Binfield. Flint nodules, some knapped.

Tufa

Tufa is a whitish or pale grey-coloured limestone formed by the precipitation of calcium carbonate (lime) in or adjacent to springs issuing from calcareous rocks, such as chalk or limestone. It is often highly porous and open textured, with up to 50 per cent void space. Blocks may be ‘fibrous’ and contain the impressions of vegetation. They sometimes exhibit faint traces of banding.

Tufa is soft and crumbly when freshly quarried, and it is easily cut into blocks suitable for use as ashlar. However, upon exposure to air, it hardens to become a useful, more general building stone. It has a very localised and sporadic use as a rubblestone in medieval church walls in Berkshire. An example can be seen at St Mary’s Church at Hamstead Marshall, near Marsh Benham.

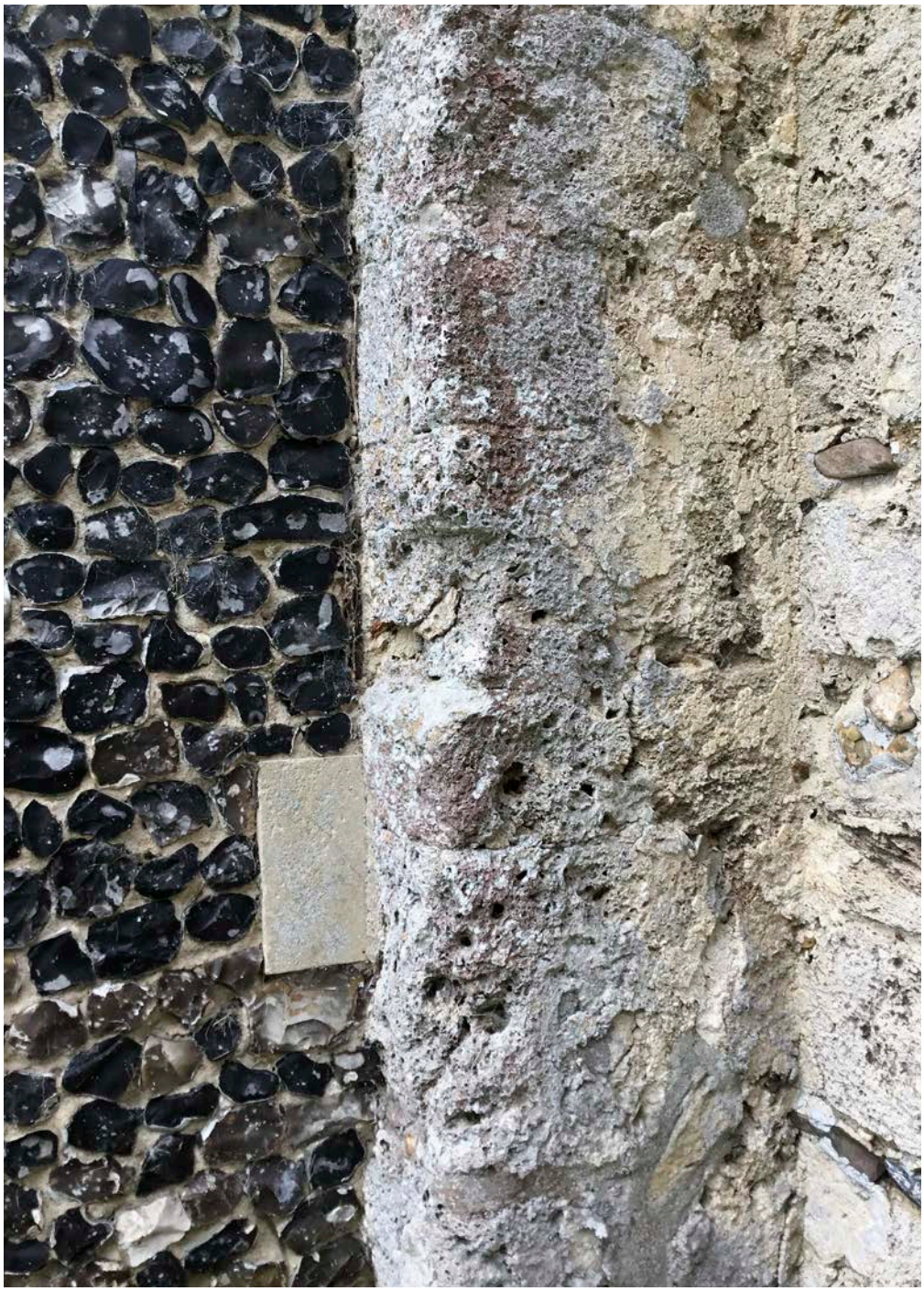


Figure 31: St Mary's Church, Hamstead Marshall. Tufa, and knapped and roughly squared flint.

4 Examples of Imported Building Stones

A discussed in the Introduction, the limited availability of local building stone within Berkshire has resulted in the extensive use of imported stones. These have been sourced from various parts of England and, indeed, further afield.

Stone has been imported into Berkshire since at least the Saxon period. For example, extensive quantities of Caen Stone were imported for use in Windsor Castle and Reading Abbey. Such importation increased dramatically from the 17th century with improved transportation. A wide range of stones was used as ornamental dressings to mansions, civic buildings, churches and chapels. The rapid growth in population in the 19th century led to the construction of a comparatively large number of new Anglican and Roman Catholic churches. Imported stone, including Bath Stone, was used extensively for decorative effect in churches of the Victorian High Gothic, often in conjunction with brick and flint.

Upper Carboniferous

Pennine Coal Measures Group, Elland Flags Formation

York Stone, West/South Yorkshire

Buff to pale grey or greenish-grey, fine to coarse-grained sandstones, often micaceous and laminated, occasionally with small-scale cross-bedded structures. York Stone usually weathers evenly, but may separate along mica-rich horizons. It is little used as a building stone in Berkshire, but employed occasionally as flagstones, paving stones or plinths.

Figure 32: Queen Victoria Jubilee Fountain, St Mary's Butts, Reading. York Stone, granite, Permo-Triassic Sandstone and Portland Stone.

Warwickshire Group, Pennant Sandstone Formation

Pennant Sandstone, Bristol-Mendip area and Forest of Dean

Grey or rusty-brown lithic sandstones, often with coaly flecks or streaks. Iron-staining develops upon weathering and is often concentrated along joints. Pennant Sandstone is found mainly in the southern parts of Berkshire, notably in association with the Great Western Railway and Kennet and Avon Canal. It is used as randomised or coursed, snecked, rock-faced blocks in a cluster of churches and chapels in the Maidenhead and Reading areas, for entrance gateways and lodges (at Englefield Park, for example) and as decorative squares or hexagonal blocks in flintwork in church walls. Pennant Sandstone is also widely used for church steps and door sills, as well as for kerbing, guttering and flagstones.

Figure 33: East lodges and gateway, Englefield Park, Theale. Pennant Sandstone and Bath Stone.

Permian

Zechstein Group, Cadeby Formation

Mansfield Stone (Red Mansfield Stone), Nottinghamshire

A distinctive uniform, red-brown sandy dolostone used very occasionally in Berkshire as a decorative stone. One of the best examples is The Sacred Heart Church (formerly the Church of St John the Evangelist), Watlington Street, Reading.

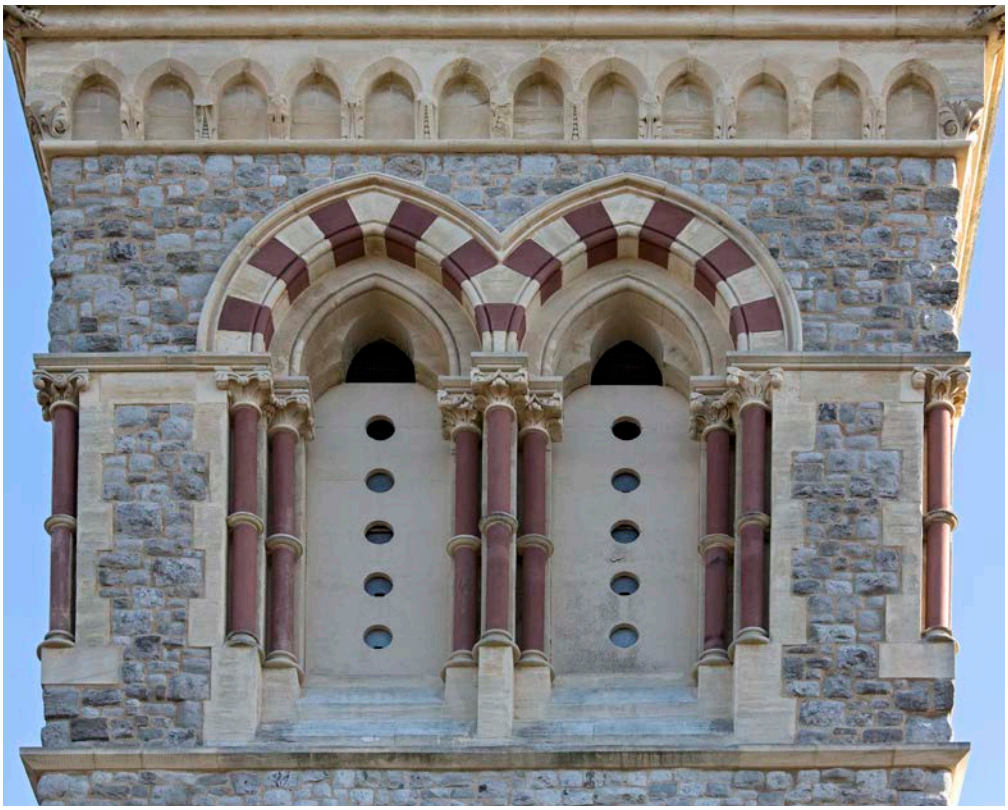


Figure 34: The Sacred Heart Church, Reading. Kentish Ragstone, Bath Stone and Red Mansfield Stone.

Permo-Triassic

Various groups, various formations

Permo-Triassic Sandstone (New Red Sandstone), Midlands

Pale red to red-brown fine-grained, dolomitic-quartz sandstones. The individual sandstone types and source of these New Red Sandstones is often impossible to determine without documentary or petrological evidence. These sandstones are employed only occasionally in Berkshire, but do feature in ashlar work and decorative bands of certain buildings. Some of the best examples are seen in Reading, notably at the front entrances of Reading Museum, and the town hall.

Figure 35: Reading Museum. Permo-Triassic Sandstone.

Triassic

Sherwood Sandstone Group, Helsby Sandstone Formation

Hollington Stone (Uttoxeter Sandstone), East Staffordshire and West Derbyshire

These sandstones are a pale red to red-brown, quartzitic, sometimes pebbly sandstone. Small-scale cross-bedding, ripple marks or laminations are typical of many blocks seen in buildings. Hollington Stone is employed only occasionally, and mainly for decorative purposes, in Berkshire. An example can be seen at Wycliffe Baptist Church, King's Road, Reading.

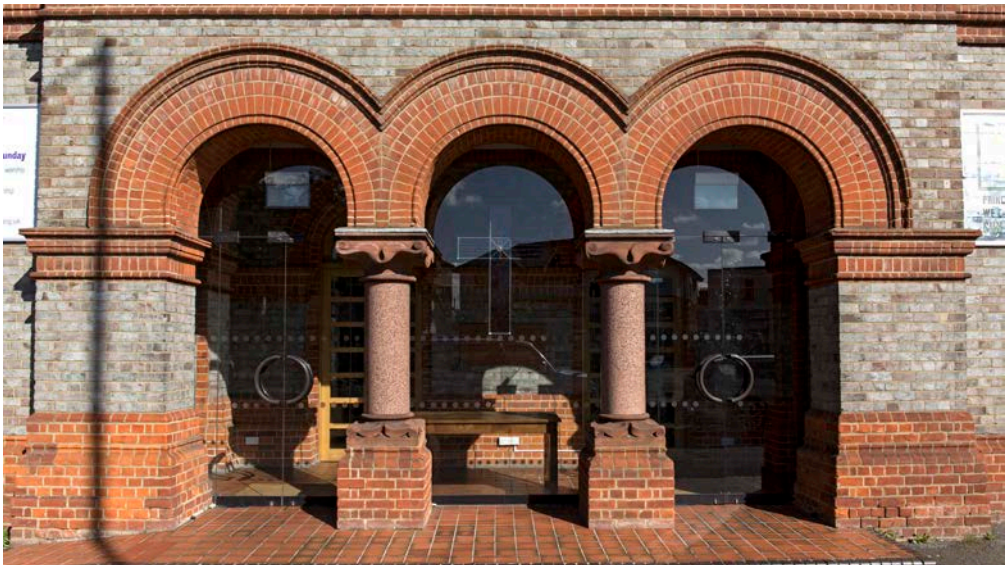


Figure 36: Wycliffe Baptist Church, Reading. Grey and red brick and Uttoxeter Sandstone.

Lower Jurassic

Lias Group, Marlstone Rock Formation

Hornton Stone, North Oxfordshire

Hornton Stone is a dark grey to rusty-brown, ferruginous, sandy limestone, which is often 'iron shot' and very fossiliferous. It is rarely used in Berkshire, but it was employed in St Laurence's Church wall in Reading town centre.

Figure 37: St Laurences's Church churchyard wall, Reading. Hornton Stone with flint, Taynton Stone and brick.

Middle Jurassic

Great Oolite Group, White Limestone Formation

Bisley Common Stone, near Stroud, Gloucestershire

A fine- to medium-grained, pale grey to pale buff limestone, sometimes similar to Bath Stone but with fine, darker grey laminations. The pale grey colour helps to distinguish Bisley Common Stone from the warmer cream to buff-yellow colour of Bath Stone. It is known at only two churches in West Berkshire, St Mary's Church at Fawley and All Saints' Church at Brightwalton, where it is employed as a coursed walling stone.

Figure 38: St Mary's Church, Fawley. Bisley Common Stone with Bath Stone dressings.

Great Oolite Group, Chalfield Oolite Formation

Bath Stone, Bath, NE Somerset and possibly Corsham area, Wiltshire

A cream to buff-yellow, oolitic limestone freestone. Bath Stone is used extensively throughout Berkshire, particularly in Victorian new builds and church refurbishment, and especially as ashlar and window and door mouldings. Noteworthy examples of its use as ashlar include the Church of the Most Holy Trinity at Theale and grand houses along Eldon Road, Eldon Square and London Road in Reading.

Figure 39: Church of the Most Holy Trinity, Theale. Bath Stone.

Great Oolite Group, Taynton Limestone Formation

Taynton Stone, Oxfordshire

A cream to pale brown, fine to medium-grained limestone with frequent shelly and ‘foliated’ layers that become more pronounced upon weathering. Taynton Stone is readily distinguished from Caen Stone, which tends to be paler in colour and lacks distinctive foliated layers. It is used as an occasional walling stone in Berkshire. Examples include the Church of St Nicolas at Newbury, Reading Abbey (with Caen Stone and locally mined Quarry Flint) and the Minster Church of St Mary at Reading.

Figure 40: Minster Church of St Mary, St Mary's Butts, Reading. Taynton Stone and flint.

Calcaire de Caen Formation

Caen Stone, Normandy, France

Pale creamy-yellow to light orange limestone with a fine-grained texture and few large fossils. It may exhibit spalling if laid 'out of bed' and softer blocks of Caen Stone may also show irregular dissolution. It is employed only occasionally as a walling stone in Berkshire, at the Chapter House of Reading Abbey, for example.

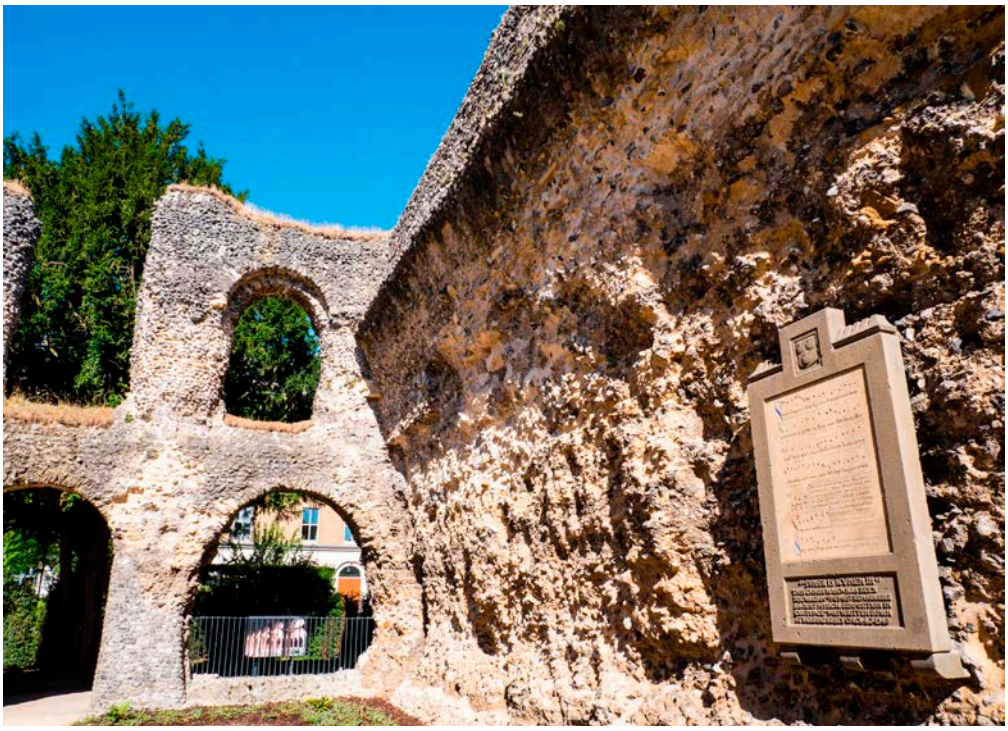


Figure 41: Chapter House, Reading Abbey. Caen Stone, Taynton Stone and Quarry Flint.

Upper Jurassic

Corallian Group, Kingston and Stanford Formations

Corallian Sandstone and Limestone (Wheatley Limestone), Oxfordshire

Shelly, medium to coarse-grained, light grey to buff-coloured, calcareous sandstones and sandy limestones, which are occasionally ooidal or contain fossil molluscs, echinoids and corals (Coral Rag). Corallian Sandstone and Limestone often weather to a dull yellow-brown or yellow-orange colour due to the presence of an iron-bearing calcite cement. Glauconite is always absent, which serves as a useful means of distinguishing the Corallian Sandstones from other macroscopically similar sandstones of Cretaceous age. The use of Corallian sandstones and limestones in present-day Berkshire is very limited, but they are employed extensively at Ascot Priory, north Ascot.

Figure 42: Ascot Priory, north Ascot. Corallian sandstones and limestones, with Bath Stone repairs.

Portland Group, Portland Stone Formation

Swindon Stone, Swindon, Wiltshire

Apale grey, very uniform, calcareous sandstone composed of quartz and calcareous mud ‘pellets’, with very fine bioclastic debris. A few rounded grains of glauconite are often also present. Faint, delicate laminations are characteristic of this stone, and some blocks show indistinct traces of bioturbation or simple burrow structures perpendicular to the bedding. Swindon Stone is relatively little used in Berkshire, but it has a widely scattered distribution. The best examples are the churches at Stratfield Mortimer (St Mary the Virgin) and Maidenhead (St Luke), where Swindon Stone is employed in regular, coursed and rock-faced, tabular blocks, often interspersed and alternating with larger square blocks that may extend in height to two or occasionally three courses.

Figure 43: Church of St Mary the Virgin, Stratfield Mortimer. Swindon Stone with Bath Stone dressings.

Portland Group, Portland Stone Formation

Portland Stone, Isle of Portland, Dorset

A very pale or white limestone that is typically fine and evenly grained (freestone). It has seen widespread use across Berkshire, especially in urban areas as a carved stone in architectural elements, milestones, obelisks, monuments (for example, Simeon Monument, Reading Market Place), war memorials, war graves, fountains, columns and Ionic porticos (for example, Prospect House, Reading). Portland Stone is also employed as a high-quality walling stone and ashlar. Particularly noteworthy examples include Maidenhead Bridge, Purley Park House, the north and south entrance gates to St Lawrence's Church at Newbury and Cambridge Lodge, Windsor.

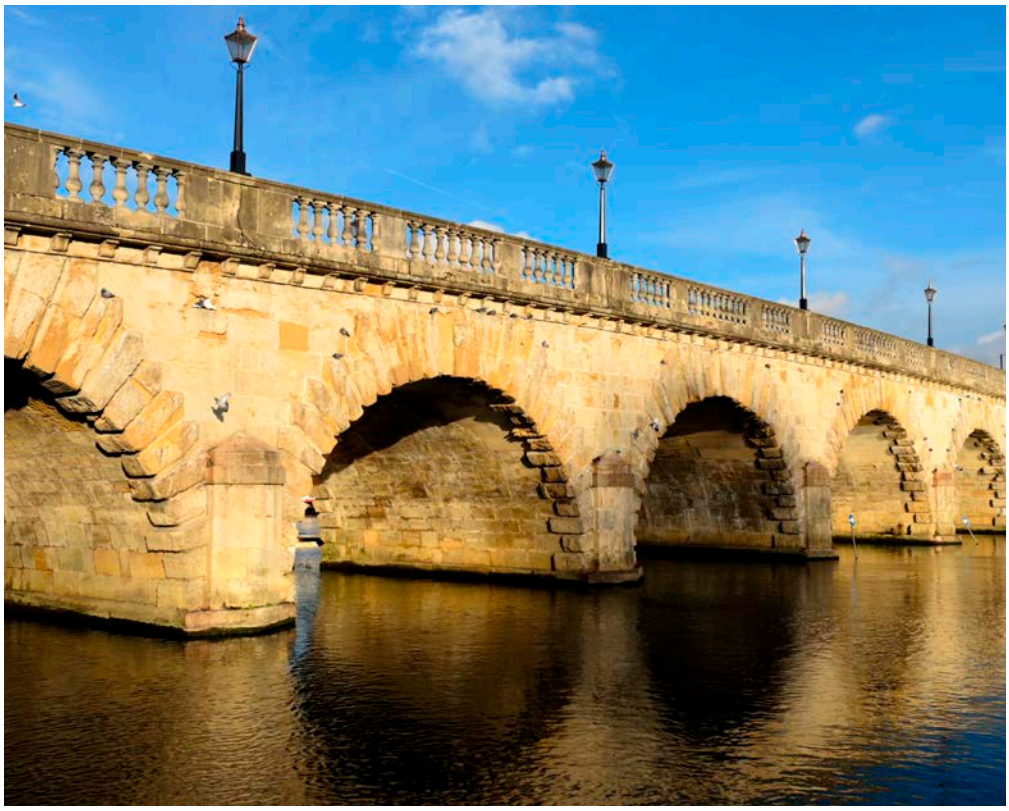


Figure 44: Maidenhead Bridge. Portland Stone.

Cretaceous

Lower Greensand Group, Sandgate Formation

Bargate Stone, Surrey

A hard, medium to coarse-grained, calcareous sandstone or gritstone, which is pale orange or honey-brown to greyish coloured. It is sometimes notably ferruginous and often weathers with a brown surface. Bargate Stone is mainly encountered in some of the larger towns in eastern Berkshire, including Wokingham and Greater Reading. Typically, the stone is employed as rock-faced or half-snecked tabular blocks in, often roughly coursed, walling. Examples include the Churches of St Andrew at Caversham, St Michael and All Angels at Sandhurst and All Saints at Wokingham.

Figure 45: Church of St Michael and All Angels, Sandhurst. Bargate Stone with Bath Stone dressings.

Lower Greensand Group, Hythe Formation

Kentish Ragstone, Weald of Kent

A range of medium to coarse-grained, pale grey or pale brown limestones, which are often rich in quartz and fossil sponge debris. Like Bargate Stone, the use of Kentish Ragstone in Berkshire is generally restricted to eastern parts of the county, and mainly to specific churches located close to the River Thames. Particularly good examples of Kentish Ragstone walling are the Polish Roman Catholic Church in Reading and the Roman Catholic churches St Edward's in Windsor and St Mark's in Dedworth.

Figure 46: Roman Catholic Church of SS Edward and Mark, Windsor. Kentish Ragstone with Bath Stone dressings.

5 Further Reading

The Further Reading, Online Resources and Contacts guide provides general references on:

- Geology, building stones and mineral planning
- Historic building conservation, architecture and landscape.

There is also a separate glossary of geological terms.

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Figures

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