Historic England

Isle of Wight

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.

This guide was prepared by Andy King (Geckoella Ltd) for Historic England.

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Front cover: The Royal Hotel and other buildings, Ventnor. Green Ventnor Stone and other stones. © Ric Holland / Alamy Stock Photo.

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HistoricEngland.org.uk/advice/technical-advice/

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 the Isle of Wight Council mineral planning and unitary authority area.

Contents

1 Introduction

The Isle of Wight has a diverse and rich stone-built heritage. This encompasses well-known picturesque villages, coastal towns and prestigious manor houses, in addition to hamlets and farms, which, although less conspicuous, contain an equally important range of locally sourced and worked building stones.

Historically, the relative isolation of the Isle of Wight has meant that almost all the building stone used there has been sourced locally, from at least Roman times. As early as the 11th century, and continuing throughout the rest of the medieval period, the Isle of Wight was an important exporter of building stone. It supplied significant amounts of building stone for major building projects on the mainland, including the cathedrals at Winchester, Chichester and Canterbury. Early exports of Quarr Stone extended as far as London, where small amounts were incorporated into the White Tower at the Tower of London. The quality of stone quarried from the Isle of Wight combined with the relative ease of transport by ship from the isle's ports meant that exporting it became a feasible and commercially viable business. It successfully competed with other stones also being imported into South East England at this time, such as Caen Stone from Normandy.

Geologically, the Isle of Wight can be divided into two regions. They lie to the north and south of the prominent Upper Cretaceous chalk upland area that forms the isle's central ridge (the Sandown and Brighstone anticlinal axis). To the north of the ridge, the geology is dominated by the youngest bedrock on the Isle of Wight, comprising limestones and mudstones of Tertiary (Palaeogene) age. To the south, the geological succession comprises a varied sequence of sandstones, limestones and ironstones of Lower Cretaceous age.

Sandstones from the Lower Cretaceous Selborne Group (Upper Greensand Formation) have furnished some of the most durable and widely used building stones on the Isle of Wight. The freestone and attractive glauconitic sandstones have been quarried in many places, principally from areas around Ventnor, Bonchurch, St Boniface Down and Shanklin in the south-east, and from the Whitcombe to Gatcombe area further north.

Chalk from the Upper Cretaceous White Chalk Subgroup was quarried as a local source of building stone across much of its outcrop. Here, as elsewhere in South East England, flint (originally derived from the chalk succession) has been used extensively as a local building material. As well as quarried flints, this includes Quaternary deposits of field flint and beach pebble flint.

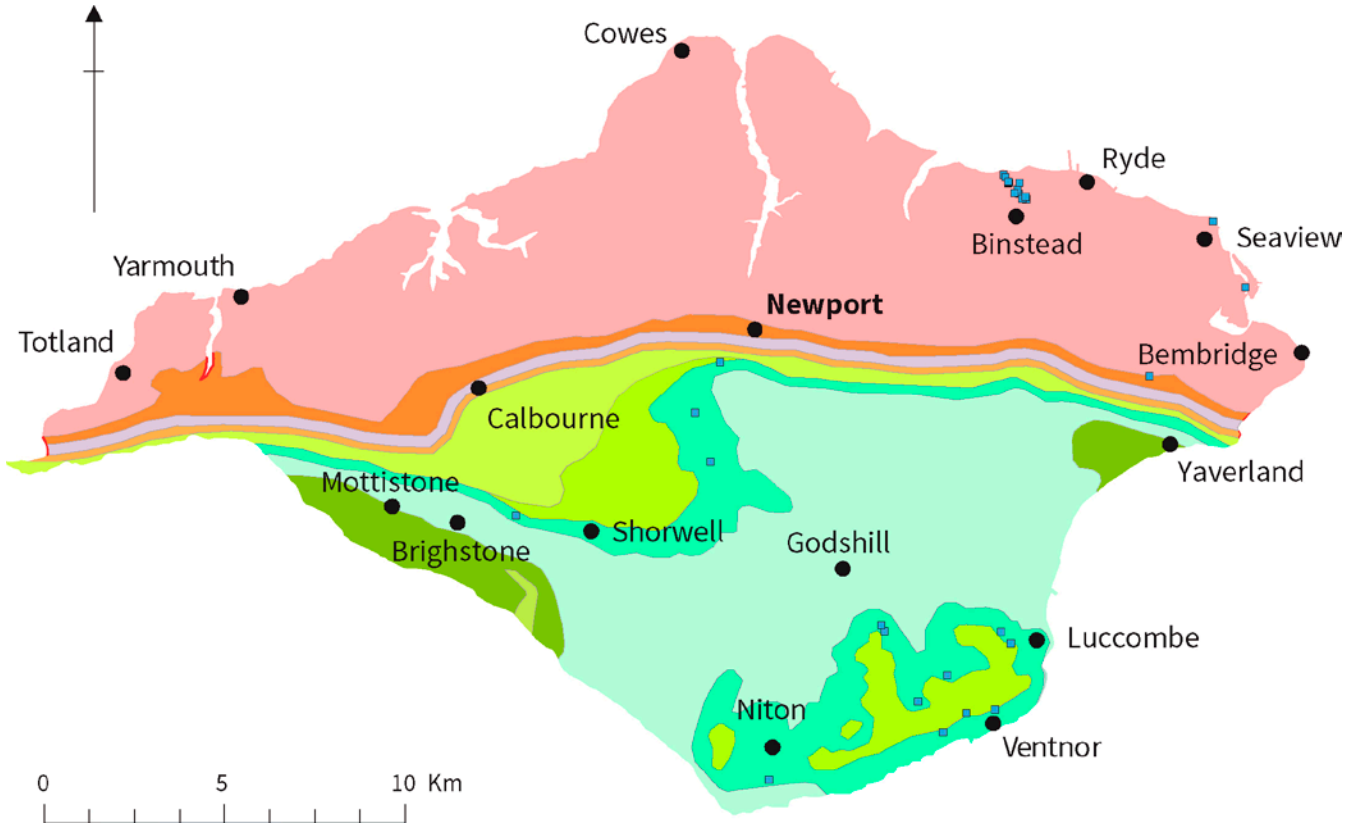
Early Tertiary limestones assigned to the Headon Hill Formation and the Bembridge Limestone Formation (Solent Group) are some of the major building stones employed on the Isle of Wight. They include well-known building stones such as Quarr Stone, Binstead Stone and Bembridge Limestone. The principal quarries were in the north-east around Quarr and Binstead, and most of the rock extracted was exported to the mainland.

This distinctive building stone set, comprising Cretaceous sandstones (often employed as ashlar or coursed squared stone blocks), ironstones, chalk and flint (including flint galleting), plus Tertiary limestones, has given rise to a stone-built heritage and assemblage of stone types that, collectively, is unique to the Isle of Wight.

Quarrying of building stone on the Isle of Wight has declined during the past 50 years due to a combination of reduced demand for new buildings and an increased use of brick. Currently, the isle has no commercially significant building stone reserves that are actively worked. Historically, however, there has been extensive use of a number of local stones for building, and there are few parts of the Isle of Wight's diverse geological succession that have not supplied local stone for construction purposes where a suitable stone occurs.

Figure 1: Cottages, Godshill. Chert and Upper Greensand Sandstone.

Bedrock Geology Map



Key

Building stone sources

Bedrock geology

Solent Group — sand, clay, silt and sand

Bracklesham Group and Barton Group (Undifferentiated) — sand, silt and clay

Thames Group — clay, silt, sand and gravel

Lambeth Group — clay, silt, sand and gravel

White Chalk Subgroup: Chalk Group — chalk

Grey Chalk Subgroup: Chalk Group — chalk

Gault Formation and Upper Greensand Formation (Undifferentiated) — mudstone, sandstone and limestone

Lower Greensand Group — sandstone and mudstone

Wealden Group — mudstone, siltstone and sandstone

Wealden Group — sandstone and siltstone, interbedded

Stratigraphic Table

Geological timescale	Group		Formation	Building stone	Page
Quaternary	various		various	Tufa (Travertine)	27
				Ferricrete (Heathstone)	27
				Quaternary Flint, Field Flint, Beach Pebble Flint	25
Tertiary	Solent Group		Bouldnor Formation		
			Bembridge Limestone Formation	Bembridge Limestone (Bembridge Stone, Wight Stone)	23
			Headon Hill Formation	Binstead Stone (Binstead Limestone)	22
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	Barton Group		Becton Sand Formation	How Ledge Limestone	19
			Chama Sand Formation		
			Barton Clay Formation		
	Bracklesham Group		Boscombe Sand Formation		
			Branksome and Selsey Sand Formations		
			Marsh Farm Formation		
			Wittering and Poole Formations		
	Thames Group		London Clay Formation		
	Lambeth Group		Reading Formation		
Upper Cretaceous	Chalk Group	White Chalk Subgroup	Portsdown Chalk Formation	Chalk (Chalk Block)	17
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			Newhaven Chalk Formation		
			Seaford Chalk Formation		
			Lewes Nodular Chalk Formation		
			New Pit Chalk Formation		
			Holywell Nodular Chalk Formation		
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			West Melbury Marly Chalk Formation		
Lower Cretaceous	Selborne Group		Upper Greensand Formation	Chert	15
				Upper Greensand Sandstone	14
				Ventnor Stone (Freestone, Firestone, Hearthstone)	11
				Green Ventnor Stone	11
				Ventnor Foxstone (Ventnor Foxmould)	11
				Bonchurch Stone	10
			Gault Formation		
	Lower Greensand Group		Monk's Bay Sandstone Formation	Monk's Bay Sandstone (Carstone, Ironstone)	8
			Sandrock Formation	Sandrock	7
			Ferruginous Sand Formation	Ferruginous Sandstone	6
			Atherfield Clay Formation		
	Wealden Group		Vectis Formation	Wealden (Paludina type) Limestone	6
			Wessex Formation	Wealden Mudstone	6
				Wealden Conglomerate	5

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

2 Local Building Stones

Lower Cretaceous

Wealden Group, Wessex Formation

Wealden Conglomerate

The Wessex Formation only crops out in two separate coastal areas on the Isle of Wight: in the west, extending from Shippards Chine and Hanover Point to Shepherds Chine, and in the east around Sandown and Red Cliff. The sequence as a whole comprises a range of mainly soft, varicoloured mudstones and unconsolidated sands, with occasional harder bands of indurated sandstone, sandy conglomerate and pebbly conglomerates (at the base). The pebbly conglomerates have been employed locally as a building stone. They are generally pale red or dark reddish in colour and contain calcareous clasts.

The conglomeratic bands are moderately hard and resistant and they have provided a local source of rubblestone for buildings and walls in the villages of Brook, Mottistone, Brighstone and Yafford in the west. They are occasionally evident in Sandown and the village of Yaverland to the north-east. Many of the blocks of these conglomeratic beds, which are seen in old buildings, were probably obtained from the local beaches and coastal landslips.

Figure 2: Wall, Mottistone Manor. Wealden Conglomerate, Ferruginous Sandstone and Monk's Bay Sandstone.

Wealden Mudstone

Wealden Mudstone is seen only in the area immediately surrounding its outcrop on the foreshore at Yaverland. It is a homogenous, brown, dense, iron-rich mudstone, which occurs as one or more thin layers varying from 100 to 150mm thick. Commonly, the mudstone is intensely bioturbated and it contains moulds of fossil gastropods. It breaks into distinctly brick-shaped pieces along planes of weakness created by thin layers containing these fossil moulds. The Wealden Mudstone is used very locally at Yaverland in the Second World War concrete defensive structures. The concrete was mixed on site using the available beach material as aggregate.

Wealden Group, Vectis Formation

Wealden (Paludina type) Limestone

The Wealden Limestone has a similar outcrop pattern to the Wealden Conglomerate. The main beds of the Wealden Limestone used for building stone purposes are thin, grey or brown-coloured, coarsely fossiliferous, freshwater or lagoonal limestones. They occur mostly in light grey beds commonly 100 to 200mm thick. The uppermost layer comprises densely packed disarticulated valves of oysters, whereas lower beds contain silty calcareous horizons of disarticulated valves of the bivalve Filosina gregaria and, less commonly, small gastropods such as *Viviparus infracretacicus*. These strata resemble the fossiliferous Paludina limestones that occur in the Wealden Group of the Weald area of South East England, most notably in West Sussex.

The limestones are moderately hard, resistant and durable, and they have provided a local source of rubblestone for building and decorative purposes in the villages of Brook, Mottistone, Brighstone and Yafford. Some of the limestone slabs have also been used as paving stones in the Sandown area.

Lower Greensand Group, Ferruginous Sands Formation

Ferruginous Sandstone

The Ferruginous Sands Formation forms much of the inland outcrop of the Lower Greensand Group across the southern part of the Isle of Wight. It occurs in a broad tract of land stretching from Compton Bay and Chale Bay in the west, via Godshill and Arreton, to Shanklin and Sandown in the east. It varies in thickness from approximately 75 to 160m.

Unweathered, the ferruginous sandstone is a fine or medium-grained sandstone, which is pale grey to greenish coloured when fresh. Upon weathering, the sandstone turns a very attractive and distinctive ochreous orange-yellow colour.

The sandstones are typically heavily bioturbated and sometimes contain fossil plant debris. Some sandstones are weakly cemented and make

relatively poor building stones. At outcrop, such sandstones may be associated with layers of calcareous, phosphatic or pyritic concretions that contain fossils.

Ferruginous sandstone is of variable quality from a building stone perspective. The poorly cemented, fine-grained sandstones weather easily, whereas the harder, better cemented sandstones produce a good quality building stone that is used locally, but extensively, in villages (mainly) and small towns across the outcrop area. Here, ferruginous sandstone is employed as uncoursed rubblestone blocks and, occasionally, as dressed ashlar. One of the wings of Wolverton Manor, near Shorwell, is built of ferruginous sandstone. Other particularly fine examples can be seen in the village of Shorwell itself. Tuberous ironstone concretions from the Ferruginous Sands Formation are frequently employed in the rococo ornamentation of gate pillars and garden walls near Sandown Bay.

Figure 3: Oak Cottage, Shorwell. Ferruginous Sandstone, Sandrock, Carstone and Upper Greensand Sandstone.

Lower Greensand Group, Sandrock Formation

Sandrock

Sandrock occurs in two areas in the south of the Isle of Wight: in a generally narrow, sigmoidal outcrop, extending from Compton Bay in the west to Culver Cliff in the east, and in a wider outcrop around the northern margin of the southern downs, from Chale Bay in the west to Shanklin Chine in the east.

Sandrock comprises pale brown or buff-coloured sandstones of variable grain size, which form part of coarsening upwards cycles along with mudstones and pebble beds. Characteristically, blocks of sandrock display small to large-scale cross-bedding features. The finer grained varieties also exhibit lamination and bioturbation structures. The formation reaches a maximum thickness of 70m.

In common with other sandstones from the Lower Greensand Group, sandrock is of variable quality from a building stone perspective. Locally, across the outcrop, the more durable beds are used extensively, both as uncoursed rubblestone blocks and, occasionally, as dressed ashlar.

Lower Greensand Group, Monk's Bay Sandstone Formation

Monk's Bay Sandstone (Carstone, Ironstone)

The distinctive dark brown, purple-brown or red-brown variegated Monk's Bay Sandstone (formerly called carstone or ironstone) is readily identified wherever it occurs in the southern part of the Isle of Wight. Apart from always being highly ferruginous, the sandstone varies lithologically, from a coarse-grained, weakly consolidated, quartz-rich sandstone (grit) to a more fine-grained, often pebbly sandstone and ironstone towards the top of the formation. The thickness varies north-eastwards across the Isle of Wight, from 2m up to nearly 22m.

Sandstones from this formation are of variable quality. Some are poorly cemented, fine-grained sands that weather easily and do not make good building stone. However, more durable, harder, better cemented sandstone beds also occur in the formation, and these produce good quality building stones. They are used locally, but extensively, in a number of small towns and villages throughout the outcrop area.

Figure 4: Lodge, Farringford, Freshwater. Monk's Bay Sandstone.

Examples of the use of Monk's Bay Sandstone can be seen at Yarbridge, Knighton, Arreton, Whitecroft, Rookley, Chillerton, Shorwell, Wolverton, Brighstone, Mottistone, Hulverstone, Freshwater, Locksley, Wroxall, Luccombe, Whitwell, Blackgang and Yaverland. Where used, the Monk's Bay Sandstone is most commonly employed as large, irregularly coursed, rubblestone blocks. The intractable nature of these ironstones has meant that quoin stones, buttresses and window mouldings are commonly constructed in local brick or the finer local sandstones from the Upper Greensand Formation, which are more suitable for dressing as ashlar.

Figure 5: St Peter and St Paul's Church, Mottistone. Monk's Bay Sandstone and Upper Greensand Sandstone.

Selborne Group, Upper Greensand Formation

Bonchurch Stone

This is a massive, pale grey to pale buff-coloured variety of Ventnor Stone that is only slightly glauconitic. It was quarried only at Bonchurch and was mainly used as ashlar or roughly squared blocks in buildings and boundary walls in the Bonchurch and Ventnor area. It features in some churches elsewhere on the Isle of Wight, including the Church of All Saints at Freshwater.

Figure 6: The Grotto entrance, Bonchurch Village Road, Bonchurch. Bonchurch Stone.

Ventnor Foxstone (Ventnor Foxmould)

A distinctive variety of Ventnor Stone with a characteristic brown/red-brown surface colouration was quarried only in the Ventnor area. It was widely employed in Ventnor and nearby towns, typically being seen in prominent 19th and 20th-century buildings, where it is used as roughly squared blocks, often alternating in a decorative chequerboard pattern with Ventnor Stone and Green Ventnor Stone.

Green Ventnor Stone

A green-coloured variety of Ventnor Stone, so-called because of the higher concentration of green glauconitic grains present in the sandstone. Quarried only between Bonchurch and Ventnor, the principal quarry sources for Green Ventnor Stone were developed along the area known as the Undercliff. Some of these continued to operate until the early 1920s. Large blocks of Green Ventnor Stone ashlar and roughly squared stone are commonly seen in houses in Ventnor and the surrounding villages.

Ventnor Stone (Freestone, Firestone, Hearthstone)

Ventnor Stone, commonly known as freestone, is only 1.2 to 1.8m thick, but it can be traced in cliff and quarry sections along much of its outcrop. It has been worked extensively in the Bonchurch and Ventnor areas.

Figure 7: Royal Hotel annex, Ventnor. Ventnor Stone and Ventnor Foxstone.

Lithologically, Ventnor Stone is very similar to Upper Greensand Sandstone, although there are a number of distinct named varieties (described below). Where the sandstone is cemented by silica, the resulting building stone is commonly known as Firestone or Hearthstone because of its resistance to high temperatures.

Ventnor Stone is an important building stone in Ventnor and it is very widely used in many of the older and prestigious buildings, as well as other structures in the town. It is a very homogeneous stone and readily cuts into quality ashlar or more roughly dressed squared blocks. Poorer quality rounded or irregular blocks of Ventnor Stone are often used in boundary walls, in association with flint or chert nodules or other locally derived stones.

Figure 8: Royal Hotel annex, Ventnor. Ventnor Stone and Ventnor Foxstone.

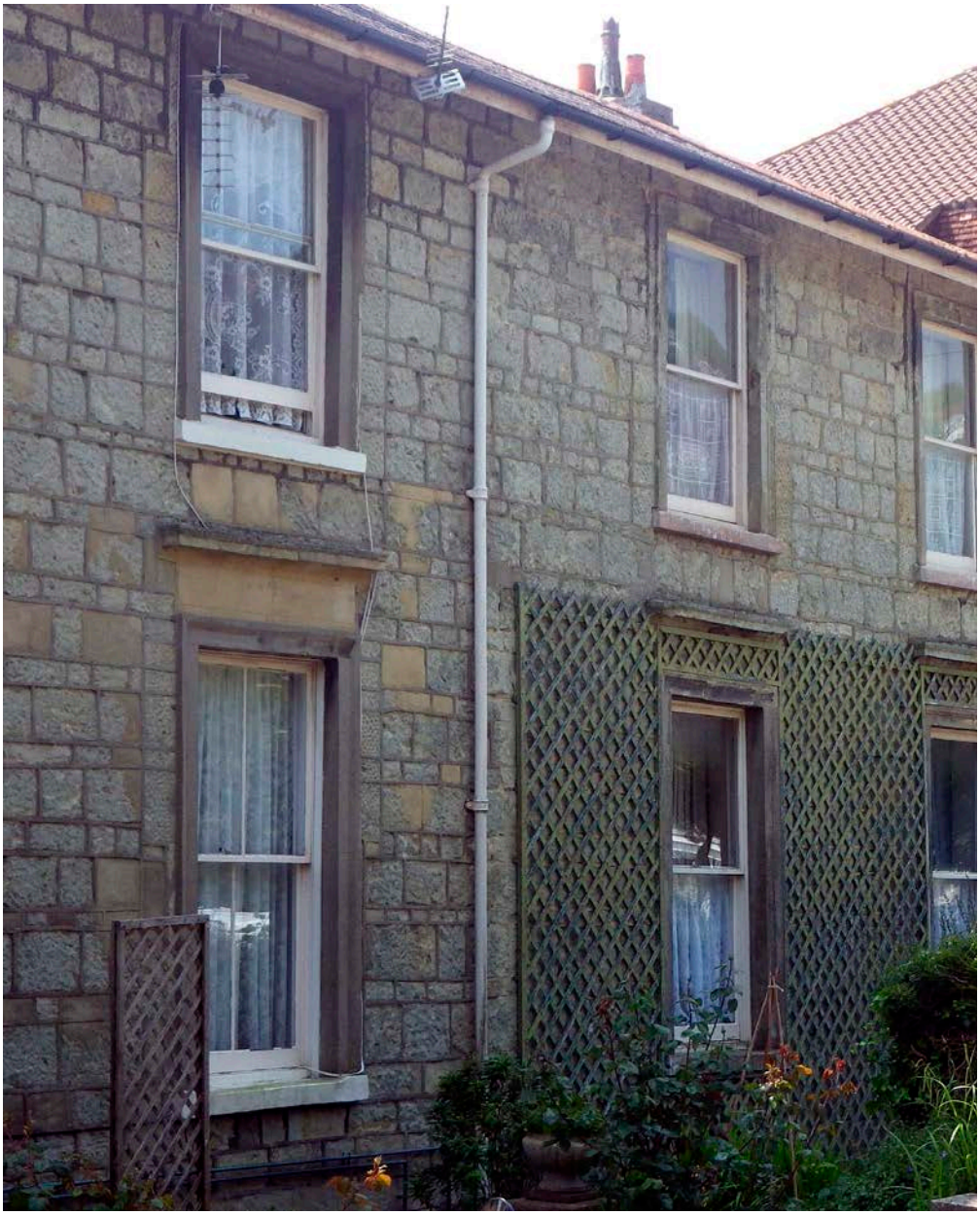

Figure 9: Cottages, Belgrave Road, Ventnor. Green Ventnor Stone.

Figure 10: Royal Hotel, Ventnor. Ventnor Stone.

Figure 11: St Catherine's Church, Ventnor. Ventnor Stone.

Upper Greensand Sandstone

The Upper Greensand Sandstone occurs adjacent to the Chalk Group outcrop on the Isle of Wight in two principal areas: a central outcrop that extends from Compton Bay in the west to Whitecliff Ledge in the east, and a southern outcrop that occurs south of a line extending from Chale Bay and Blackgang in the west to Luccombe Bay in the east.

The Upper Greensand Sandstone is a pale greenish-grey, fine-grained, glauconitic, calcareous or siliceous sandstone, with spicular chert and small brownish phosphatic pebbles. It is often highly bioturbated and contains a limited fossil fauna, including serpulid worms, bivalves (scallops, oysters), ammonites and brachiopods. When weathered, the sandstones can become highly porous, as the siliceous sponge spicules are gradually leached out and the stone surface flakes and spalls.

The Upper Greensand Sandstone was the most important source of building sandstones on the Isle of Wight, and it has been used since Roman times. It has seen extensive use at Shanklin (especially as ashlar, walling stone and window dressings), Newchurch, Rew Street, Niton, Whitwell, Newport, Gatcombe, Wroxhall and Godshill. It is also the source of large ashlar and squared stone blocks for many houses in Ventnor, Bonchurch, St Lawrence and Niton. Several historic and important buildings on the Isle of Wight, including Appuldurcombe House, Arreton Manor, Yaverland Manor and Carisbrooke Castle, feature Upper Greensand Sandstone.

Figure 12: Gatehouse, Carisbrook Castle. Upper Greensand Sandstone.

Chert

Chert occurs in the uppermost part of the Upper Greensand Formation (below the Grey Chalk Subgroup), where the main chert-bearing beds occur as part of cyclic units of alternating layers of hard nodules or concretions interbedded with softer, grey-green, glauconitic sandstone. Chert is more common in the Upper Greensand of the southern downs of the Isle of Wight than in the equivalent strata of the central downs. The chert beds are particularly well exposed at Gore Cliff, Niton, where they can reach a thickness of 7.3m.

Chert is an extremely finely grained variety of quartz, typically occurring as nodules or concretionary masses, and occasionally as layered deposits. It is often dark coloured: green, grey or brown. Like flint, which is dark grey or black, chert is very hard and resistant, and it breaks with a conchoidal fracture, typically producing very sharp edges. It may sometimes contain fossils of bivalves or sponge spicules, and thin veins of pale blue-grey, microcrystalline quartz and small crystal-lined cavities are common.

From the 17th century onwards, chert has been used commonly as a building stone on the Isle of Wight, in both agricultural and non-agricultural buildings, especially in the boundary walls of estates and farmland. A line of villages, including Godshill, Rookley and Alverstone, include older properties with

chert from the nearby central downs outcrop and exposures on the northern flanks of the south downs. To the south, chert can be seen in walls flanking roads around Shanklin Old Village, St Lawrence, Bonchurch, Ventnor, Niton and Chale, as well as in farm buildings inland, close to the southern downs outcrop.

Because of its hardness and the irregular manner in which it breaks, chert is a difficult stone to work. Larger blocks tend to be used close to outcrop, where they are often employed as irregular, angular capping stones on walls, which themselves are either constructed of smaller chert nodules or Upper Greensand Sandstone.

Figure 13: Wall, Kings Bay Road, Bonchurch. Flint and chert.

Upper Cretaceous

Chalk Group, White Chalk Subgroup, various formations

Quarry Flint

The White Chalk Subgroup succession on the Isle of Wight yields Quarry Flint. This is an extremely fine-grained (cryptocrystalline) and hard form of silica, containing microscopic quartz-crystal aggregates. Quarry Flint typically occurs as irregularly shaped nodules, usually 100 to 200mm across, or as (sub)rounded pebbles and cobbles. Occasionally, it is also found as weakly banded tabular sheets or layers up to 200mm thick. Fresh flint nodules have a white outer cortex with a darker coloured (black, dark grey) interior. They break with a distinct conchoidal fracture, producing razor-sharp fine edges. The nodules may contain cavities lined with small transparent quartz crystals (flint geodes). Banded structures, formed from alternating layers of slightly different composition, may also occur on cleaved surfaces. Well-preserved fossils (with fine shell details replaced by silica) may occur in or on the surface of some flint nodules. Echinoids, sponges, bivalves and burrow structures are the most commonly encountered types.

Quarry Flint is a very hard rock and it is highly resistant to weathering. Consequently, Quarry Flint nodules are commonly employed as a building stone along parts of the outcrop in central and southern parts of the Isle of Wight. Larger flint nodules were often utilised for walls or as capping stones for walls. Nodules of medium size, both rough and dressed, were employed as a more general building stone, often in conjunction with brick or other materials. Particularly good examples of the use of Quarry Flint can be seen in Calbourne and in the Bonchurch and Ventnor areas.

Figure 14: Houses, Southgrove Terrace, Ventnor. Quarry Flint and Quaternary Beach Pebble Flint.

Chalk (Chalk Block)

Although often regarded as a relatively soft building stone elsewhere in southern England, much of the chalk within the steeply dipping sections on the Isle of Wight has been secondarily hardened by re-cementation during tectonism. Consequently, it has been widely used as a durable, resistant building stone on and adjacent to the extensive chalk outcrops of central and southern areas.

Hard white chalk is one of the most distinctive and easily recognised building stones employed on the Isle of Wight. It is a white to very pale grey, typically massive limestone, sometimes containing fossil bivalves (inoceramid oysters) and echinoids, and occasionally crinoids, brachiopods and belemnites. The total thickness of the White Chalk Subgroup on the Isle of Wight is approximately 400m.

Many houses, farms, barns and churches on and adjacent to the chalk outcrops were commonly, at least in part, constructed using chalk. There is marked variability in the way chalk was used: random rubble and polygonal

chalk rubblestone patterns are common in some cottages, whereas coursed and squared chalk ashlar blocks (chalk block) are employed in others. Examples of the use of chalk building stone can be seen in Arreton, Downend, Havenstreet, Newchurch, Mottistone, Winford Cross and, particularly, Brighstone.

Figure 15: Cottages, North Street, Brighstone. Chalk.

Tertiary

Solent Group, Headon Hill Formation, Bembridge Limestone Formation

The Solent Group on the Isle of Wight contains a number of Tertiary limestones that have long been recognised as valued building stones. They include such well-known types as Quarr Stone, Bembridge Limestone and Binstead Stone. Some of these building stones have been employed since Roman times, and large quantities were exported from the Isle of Wight for extensive use on the mainland, especially during medieval times.

However, despite the relative fame of the good quality building stones, the outcrop characteristics and precise stratigraphical origins of some of these limestones remain uncertain. Some of the limestones unquestionably occur as isolated lenses and, historically, they have been quarried as such. Recent studies also indicate that some named limestone types merely represent facies variants of the same stone, and these visibly grade into each other over very short distances, or even within the same block of stone. Furthermore, particular names, such as Bembridge Limestone, have been applied in a broad and often varying sense to different stones. In this guide, therefore, the limestones have been grouped together under Headon Hill Formation and Bembridge Limestone Formation.

How Ledge Limestone

How Ledge Limestone crops out only at Headon Hill and the adjacent coastal sections between Hatherwood Point and How Ledge. It is a relatively hard, durable limestone, which forms a distinct, resistant and prominent unit that is up to 2m thick.

The How Ledge Limestone is a fine-grained, cream to pale brown (fawn), shelly limestone, containing well-preserved fossils of freshwater gastropods. It is distinguished from other similar Palaeogene-aged limestones by its more massive structure, with fewer fossil cavities. This limestone was evidently quarried historically, but only for occasional local use as a rubblestone.

Headon Limestone

Headon Limestone is a fine-grained, pale brown, massive to concretionary limestone that is typically up to 6m thick, but occasionally reaches 9m in thickness. The hard concretionary limestone forms a prominent landscape feature at outcrop on Headon Hill, and can be traced inland towards Middleton. This is impersistent, however, and the concretionary limestone facies is absent at Cliff End. Apart from containing fossils of freshwater gastropods (Limnaea, Planorbis, Viviparus) and occasional vertebrate (especially turtle) remains, the Headon Limestone is relatively structureless. A few beds may exhibit lamination, and, if present, the siliceous concretions tend to occur in the lower parts of the unit where they can attain relatively large sizes.

Small quantities of the Headon Limestone have been quarried in the past from Headon Hill, and the stone has occasionally been employed locally as a rubblestone in the Headon Hill–Totland area.

Nettlestone Sandstone (Nettlestone, Nettlestone Grit)

Nettlestone Sandstone crops out on the foreshore at Nettlestone Point, Seaview, where it has been worked on a small scale. It is a finely bedded, pale grey to buff-coloured, flaggy, calcareous, fine-grained, silty sandstone, which characteristically displays well-defined, small-scale cross-bedding and ripple marks, with occasional slump structures. The fossil fauna comprises various freshwater shells and the gastropod Galba. Some blocks of Nettlestone Sandstone may grade into a void-rich limestone similar to Quarr Stone, from which it can be readily distinguished by the characteristic presence of fine cross-bedding.

Nettlestone Sandstone is moderately resistant and it has been used as a local building stone, mainly as tabular blocks or rubblestone in walls, especially in Seaview and Ryde. Some beds readily split into layers and the stone has been employed occasionally as a roofing slate.

Figure 16: Wall, Seaview Yacht Club, Seaview. Nettlestone Sandstone.

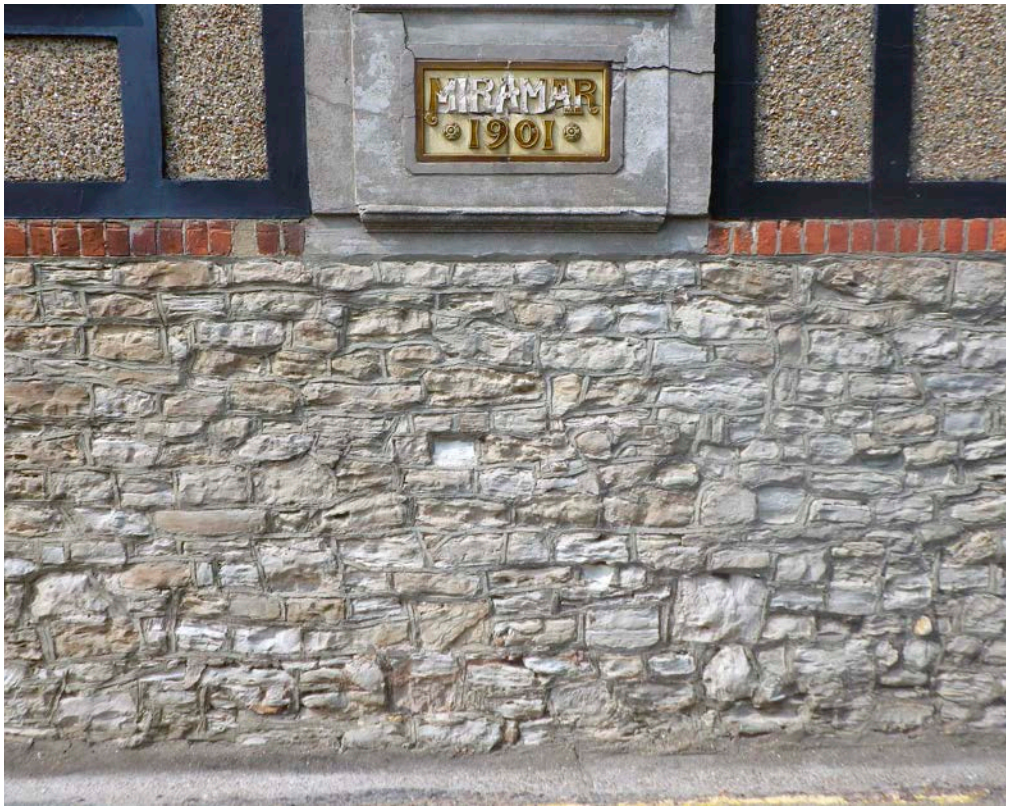

Figure 17: Appley Tower, Ryde. Nettlestone Sandstone, Featherstone, Bembridge Limestone, Upper Greensand Sandstone and Monk's Bay Sandstone.

Quarr Stone, Featherstone (Featherbed Limestone)

Quarr Stone is one of the most famous of the Tertiary limestones employed as a building stone. Its outcrop extent was very limited, and the principal source was restricted to area around Binstead, Quarr Wood and Holy Cross Church. This resource was largely worked out by the end of the 15th century. Current opinion is that Quarr Stone probably belongs to the Bembridge Limestone Formation.

Quarr Stone is a pale grey to buff-coloured, coarsely grained, bioclastic, freshwater limestone. It contains abundant and characteristic fossils, including bivalve shells (Polymesoda, Cyrena), gastropods and spherical egg cells (oogonia, which reach 1mm across) of the freshwater algae Chara. Small brown-coloured fossil turtle bone fragments also occur. The highly fossiliferous nature and texture of Quarr Stone immediately distinguish it from other building stones used on the Isle of Wight. It is also more dense, compact and durable than Featherstone.

Featherstone (or Featherbed Limestone) is a variant of Quarr Stone that is relatively light and highly porous. Like Quarr Stone, it is a pale grey to buff-coloured, coarsely bioclastic, freshwater limestone. However, it can be distinguished by its characteristic laminar texture, which results from the layers of closely packed, broken and abraded, fossil bivalve and gastropod shells. When cut across the bedding, this stone reveals a very distinctive feather-like appearance (hence its name). The framework of fossil shells and calcite cement gives this limestone its strength as a building stone, and the higher percentage of void space (greater than Quarr Stone) makes Featherstone relatively light and easy to cut as a freestone.

On the Isle of Wight, Quarr Stone has been used around Quarr, most notably within the walls of Quarr Abbey (along with Binstead Stone). Upon the dissolution of the abbey in 1536, the constituent Quarr Stone and Binstead Stone were sold for reuse, in the construction of Yarmouth Castle, for example. Elsewhere on the Isle of Wight, Quarr Stone was used in other prestigious buildings, especially churches dating from Norman times, and it can be seen in the surviving original Norman remnants of churches at Yaverland, Shalfleet and Calbourne. However, the younger stone fabrics of these churches comprise a range of other local stones, confirming that wider access to the Quarr Stone outcrop, even on the Isle of Wight, was restricted from relatively early times. In old sea walls close to the foreshore at Ryde, blocks of Quarr Stone can be seen grading vertically into shelly Featherstone.

It should be noted, however, that the use of Quarr Stone on the Isle of Wight was relatively minor when compared with the large amounts of this stone that were exported to the mainland.

Bembridge Limestone Slate

Bembridge Limestone slate is a pale grey-coloured, fine-grained, finely bedded variety of Bembridge Limestone. It is a compact stone with few

structures other than traces of lamination, and it contains a similar, albeit less prolific, fossil assemblage to that of Bembridge Limestone. The thinly bedded, slabby, relatively hard and durable nature of Bembridge Limestone slate has enabled it to be used as a source of roofing slate on the Isle of Wight. Archaeological studies have confirmed that several Roman villas used this stone for roofing. Occasionally, more modern buildings, such as those at Endfield Farm near Ningwood, also employ this stone type for roofing.

Figure 18: Farm buildings, Endfield Farm, Ningwood. Bembridge Limestone slate roofs.

Binstead Stone (Binstead Limestone)

Binstead Stone derives its name from the area where the stone was quarried, and it is one of the harder Tertiary stones used for building on the Isle of Wight. Its physical appearance and features are very similar to Bembridge Limestone and it may simply be a localised variety of this stone.

The use of Binstead Stone for building purposes dates back to Roman times. Binstead Stone is a homogeneous freestone, which has typically been employed as large ashlar blocks laid to course. It has also seen use as roughly dressed or squared stone laid in irregular courses. Binstead Stone was widely employed in various buildings in Binstead itself, including Holy Cross Church, and it was the principal stone used in the original fabric of Quarr Abbey. The abbey limestone was reused in the construction of Henry VIII's Solent defensive forts at East and West Cowes, and also, in part, for Yarmouth Castle.

Figure 19: Yarmouth Castle. Binstead Stone and Quarr Stone.

Figure 20: Holy Cross Church, Binstead. Binstead Stone.

Bembridge Limestone (Bembridge Stone, Wight Stone)

Bembridge Limestone is one of the harder Tertiary stones used for building, and it has been regarded as one of the chief natural products of the Isle of Wight. It was certainly the most extensively quarried of the limestones from the Bembridge Limestone Formation for building purposes. It crops out along much of the north coast between Totland and Bembridge. The principal quarries were in the Binstead and Quarr areas, although Bembridge Limestone was also worked from foreshore ledges at Foreland (and St Helens. Here, the stone was extracted in large thick blocks, taking advantage of well-defined bedding planes and jointing. Such blocks, where seen in buildings, may contain surface boring marks made by burrowing marine animals. From the late 1930s and 1940s to near the present day, Bembridge Limestone was worked between Chessell and Wellow at Prospect and Tapnell quarries.

Bembridge Limestone is a fine-grained, pale grey to buff or pale brown, compact, relatively massive limestone, which occurs in units up to a maximum thickness of approximately 8m. Fossils are common but restricted in terms of species. They notably include the freshwater gastropod Galba and the spherical oogonia of the freshwater algae Chara. Fossil land snails and occasional mammal bones also occur. The centimetre-size rounded voids common in much of the rock used for building stone are moldic pore spaces arising from the dissolution of Galba shells.

Bembridge Limestone typically provides a good freestone building stone that could be used as large ashlar blocks laid to course and for quoins. Its use dates back to Roman times and it has been employed across much of the Isle of Wight, particularly in older 19th-century stone buildings in Ryde and East Cowes. Bembridge Limestone can also be seen in town buildings in Bembridge, Binstead, Quarr and St Helens, as well as in villages such as Shalfleet, Newtown and Totland. The Church of St George at Arreton and Yarmouth Castle are two of the many buildings on the Isle of Wight that are constructed primarily of Bembridge Limestone, as are the sea walls on the north coast. Norris Castle in East Cowes is built largely of Bembridge Limestone, with mortar joints of flint shard galleting. Large and small, irregular galleted blocks of coursed Bembridge Limestone are seen in cottages at Newbridge. Bembridge Limestone was also used as dressings in association with coursed flint nodules in Calbourne and as quoins in association with sandstone blocks from the Ferruginous Sands Formation at Shorwell.

Large quantities of Bembridge Limestone were exported to the mainland and it was much used in West Sussex.

Figure 21: Cottages, Newbridge. Bembridge Limestone.

Figure 22: Gatehouse lodge, Westover Park, Calbourne. Flint with Bembridge Limestone dressings.

Quaternary

Various groups, various formations including clay-with-flints

Quaternary Flint, Field Flint, Beach Pebble Flint

Quaternary Flint is a widely used building stone on the Isle of Wight and it has been employed in a variety of ways in a range of built structures across the outcrop area of the Chalk Group and in coastal towns and villages. As it is readily available in large quantities, it is one of the dominant building stone types used on the Isle of Wight.

Fresh flint originates from the White Chalk Subgroup. However, the stone also occurs in derived form, often in a more weathered, or worn-looking, state, within field brash (in areas underlain by White Chalk Subgroup strata) and other surficial deposits, including beach pebbles.

Like Quarry Flint, Quaternary Flint is an extremely fine-grained, hard, resistant form of silica and it makes a fine building stone. Flint walling is a common feature in many villages and towns on the Isle of Wight, and the flint is used either as cobbles, as fractured cobbles (displaying a grey-brown, lustrous interior), or as dressed or knapped and squared stones. Notable examples of the use of reworked, rounded or dressed flint nodules occur in Ventnor, Bonchurch and Calbourne. Coursed flint nodules are often employed in association with dressings of Bembridge Limestone (in Calbourne, for example) or Upper Greensand Sandstone ashlar (in Ventnor, for example). Occasionally, distinctive fine flint shards were used for galleting, as seen at Norris Castle, East Cowes.

Two main types of Quaternary Flint were used on the Isle of Wight, Field Flint and Beach Pebble Flint.

Field Flint occurs as irregularly shaped nodules, which form part of the field brash in areas underlain by chalk (White Chalk Subgroup). The size of the nodules varies from 100 to 300mm, although larger nodules occasionally occur. The outer skin (cortex) of the nodule is usually cream coloured with a darker brownish or greyish interior, which becomes white with exposure (as a result of fracturing). This lightly weathered appearance helps distinguish field flint from the much fresher looking Quarry Flint, which has a white outer cortex and a very dark grey or black interior. Weathered flints, or those that have lain in soil or superficial deposits for a long period, may be variously discoloured or bleached, often with brown-stained interiors due to the precipitation of iron hydroxides from percolating ferruginous water and the in situ oxidation of pyrite. Field flint nodules may also exhibit freeze/thaw weathering features, such as cryofractures (hairline cracks) or pot-lid fractures (sub-spherical hollows).

Field flint is the main flint type represented within the flintwork of village cottages and farm buildings that sit on the chalk outcrop in the inland parts of the Isle of Wight. Historically, the stone was collected directly from the field surfaces or from field brash. Field flint is used in a variety of ways for walling: typically, pieces were selected for shape and size and were laid in either random or coursed patterns. The early 19th-century gatehouse at Westover Park, Calbourne is a notable example of its use.

Beach pebble flint typically occurs as rounded pebbles and cobbles of flint. They usually reach 100mm in size, but are occasionally larger. The pebbles often exhibit a ‘frosted’ surface appearance or ‘chatter marks’ (small surface cracks) caused by collisions with other beach pebbles.

Beach pebble flint is a widely used stone on the Isle of Wight. It is employed mainly in coastal towns and villages, notably Ventnor, Bonchurch and Shanklin, where flint is often used in association with other stones such as Ventnor Stone or Bembridge Limestone. Beach pebble flint was typically used for walling: pebbles and cobbles were handpicked and sorted for size. They were then laid to course, with the long axis oriented horizontally, vertically or at an inclined angle, thereby creating an imbricate pattern.

Figure 23: Wall, Broadway, Sandown. Beach Pebble Flint.

Ferricrete (Heathstone)

Ferricrete is a dark reddish-brown-coloured stone, which exhibits a distinctive conglomeratic or brecciated texture created by clasts or pebbles of sandstone, chert or flint set within a ferruginous sandy matrix. It is formed within soil and superficial deposits by the precipitation of iron oxides and hydroxides from ferruginous groundwaters, and it usually occurs in intermittent, irregular layers up to 500mm thick. The ferruginous matrix is rather soft when freshly excavated, but this hardens when exposed to air. However, ferricrete is often loosely cemented and typically breaks up on exposure to the agents of weathering. This leads to the release of its constituent pebbles, which makes it a relatively poor rubble building stone.

The distribution of ferricrete on the Isle of Wight is not well known. Its sporadic development is typically associated with Quaternary gravel and alluvial deposits in northern and western areas (extending between Cowes, Ryde, Foreland and Newport, in association with the Solent terrace deposits) and in the vicinity of the River Medina (in association with the Medina terrace deposits). Ferruginous gravels with extensive iron oxide cementation are also recorded near Headon Hill. In these areas, ferricrete finds occasional and local use mainly as isolated blocks in wall fabrics.

Tufa (Travertine)

Tufa is a magnolia or pale grey-coloured, highly porous limestone. It is thought to have formed from by rainwater percolating through the Headon Hill Limestone (in the north) and chalk (in the south) and the dissolved carbonate reprecipitating in springs and caves. The resulting tufa deposits were subsequently exposed by coastal erosion. Tufa is soft and crumbly when freshly quarried, and it is easily cut into blocks. However, upon exposure to air, it quickly hardens to become a useful building stone.

Tufa is highly localised in terms of its development and it has only occasionally been employed as a building stone on the Isle of Wight. Local sources of the stone were rapidly exhausted in the wake of the Roman conquest, and its later use was mainly by virtue of ‘scavenging’ from older buildings. It occurs at Totland Bay, in the cliff top between Headon Hill and Widdick Chine, as blocks on the beach extending from Rocken End to Ventnor and in excavations at Ventnor.

Tufa was used as a building stone at Marvel Lane and Robin Hill, to the south and south-west, respectively, of Newport. It has also been found during excavations at several Roman villa sites, such as Combley, Newport and Brading. At Newport Roman villa, tufa may have been employed as lightweight roofing for a bath house. At the recently excavated Roman villa at Brading, the use of tufa in the foundations may suggest another tufa source nearby. Elsewhere, tufa may be seen sporadically in sea walls near to chalk and other limestone outcrops.

3 Examples of Imported Stones

The import of building stones from the mainland for use on the Isle of Wight has been very limited until comparatively recent times.

The decorative limestones (marbles) sourced from the Lower Cretaceous Purbeck Group in Dorset can be observed across the Isle of Wight in several churches dating from Norman times. Purbeck Stone slate has also been imported for roofing purposes at scattered locations, mainly for use in higher status buildings. In contrast, relatively small amounts of Portland Stone have been employed, despite the proximity of the famous Portland quarries in Dorset. Its typical use was for carved decorative stonework, war memorials and sculptures.

Lower Cretaceous

Purbeck Group, Durleston Formation

Purbeck Stone Slate, Isle of Purbeck

Grey or buff, heavy, fossiliferous, slabby limestones, typically employed in the form of a narrow strip or broad edging along the eaves of the roof adjoining clay tiles or pantiles. Examples can be seen in Mottistone, Wolverstone and West Court manors, King James Grammar School in Newport, cottages in Brook, Carisbrook Castle and Brighstone Church.

Figure 24: Mottistone Manor. Purbeck Stone slate roof.

Figure 25: Hanover House, Coastguard Lane, Brook. Purbeck Stone slate roof.

Purbeck Marble, Isle of Purbeck

Dark grey to buff, shelly limestone, containing fossil Viviparus shells and other finely-broken shell material. Used mainly for internal church memorials, ledgers, columns, bases and capitals, especially in Godshill, Arreton and Shalfleet churches.

Upper Jurassic

Portland Group, Portland Stone Formation

Portland Stone, Isle of Portland

Very pale, white fine-grained limestone. Used occasionally as a freestone in classical façades and pillar work in the early 18th century Appuldurcombe House and in various 19th century or 20th century buildings such as the former banks in Ryde and Ventnor.

Figure 26: Appuldurcombe House, near Wroxall. Portland Stone facades and pillarwork.

Carboniferous–Permian

Carnmenellis Intrusion

Carnmenellis Granite, Cornwall

Pale grey, leucocratic to mesocratic biotite-granite, often rich in feldspar megacrysts. A notable example of its use is as large blocks in the seaward-facing bastion walls of Sandown Fort.

4 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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