STRATEGIC STONE STUDY

A Building Stone Atlas of Lancashire

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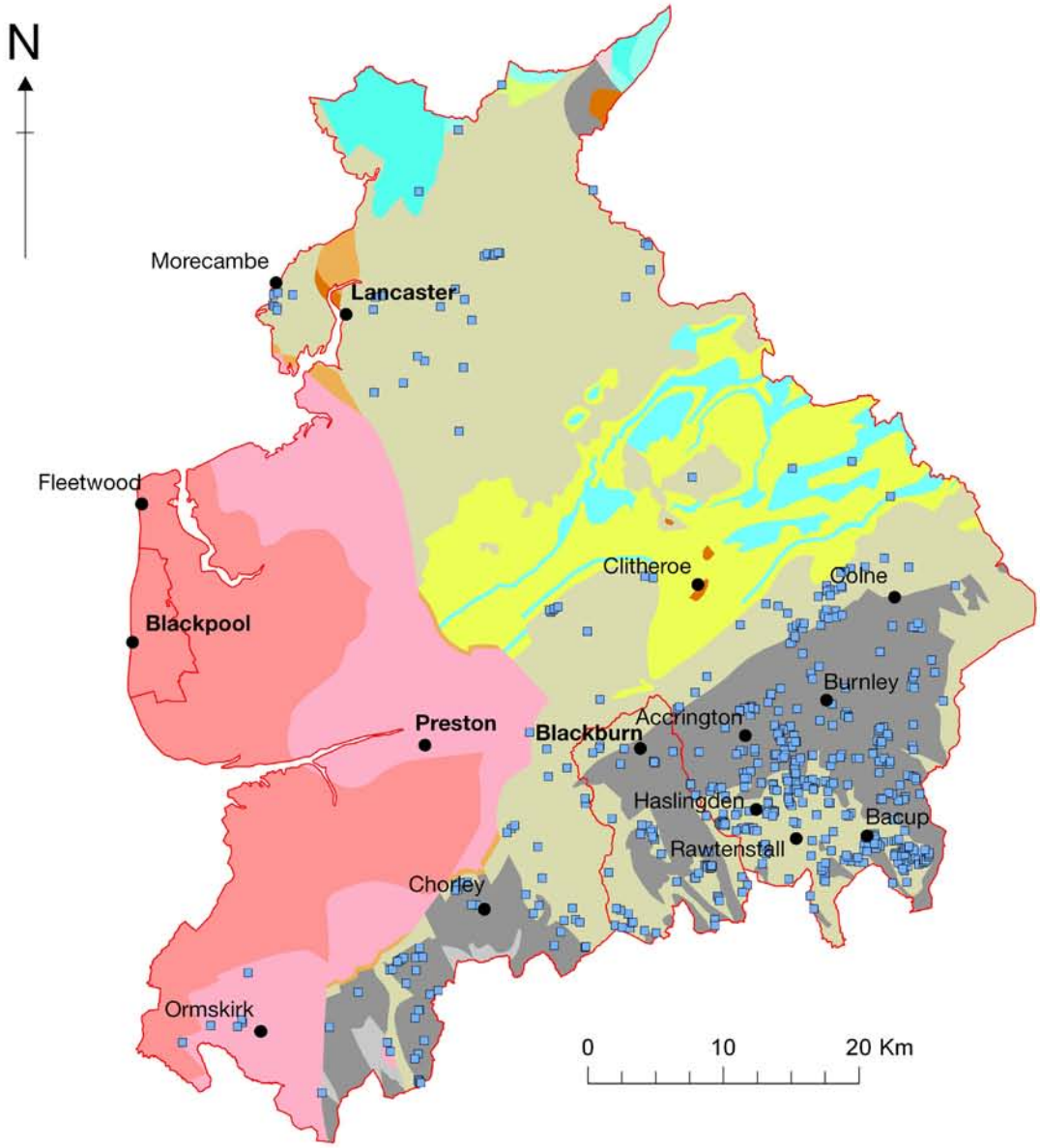
Lancashire Bedrock Geology



Lancashire Bedrock Geology

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Click on this link to visit Lancashire's geology and its contribution to known building stones, stone structures and building stone quarries (Opens in new window http://maps.bgs.ac.uk/buildingstone?County=Lancashire)

Introduction

The bedrock geology of Lancashire is dominated by fine to very coarse-grained **SANDSTONES** of Carboniferous and, to a lesser extent, Permo-Triassic age. There are, in addition, locally important outcrops of **LIMESTONE**. The Carboniferous rocks occupy a broad swathe of the east of the county, wrapping around a Triassic 'core' in the lowlands of the west, which is largely buried under thick accumulations of glacial till (Quaternary).

The competence of the Carboniferous sandstones is reflected in the rugged moorland of east Lancashire, which in turn is reflected in the 'sturdy' character of the built landscape. The limestones present in northern Lancashire and around Clitheroe bring a lighter 'openness' to the villages of these areas. Lowland Lancashire, meanwhile, is primarily brick country, with the exception of some Triassic sandstone pockets around Ormskirk and Heysham.

The widespread availability of durable building stone led to the development of quarrying throughout central and eastern Lancashire, with Rossendale (during the 1870s) exporting vast amounts of building stone to other areas of Britain and also abroad. Only a small number of quarries produce building stone today, with most of the industry now focussing on the supply of crushed stone products.

Over forty different geological horizons occurring within the county have been exploited for building stone. Most of these beds have been used only locally, however. The development of major building stone quarries was made possible, by the growth of the railway network. On the back of this, a much more restricted set of beds – mainly from the (Namurian) Millstone Grit Group – was targeted. The detailed descriptions that follow are reserved for these major stone resources, while a more generalised approach is adopted for the many other 'local stones' (which are often of similar character). The oldest rocks are described first.

SILURIAN

Coniston Group

A limited outcrop of Silurian strata (in the order of 2 square km) is found within Lancashire, occurring to the east of Kirby Lonsdale in the valley of the Leck Beck, northeast of Leck Village. The outcrop is triangular in shape with the apex adjacent to Leck Fell Road and the base along the county boundary on the northwestern flank of the valley. It is part of a much larger outcrop underlying the fell country to the north within Cumbria. Geologically, the beds are assigned to the Coniston Group, which mostly comprises **Greywackes**, **Mudstones**, **Siltstones** and sandstones.

The outcrop appears to be tectonically bounded by the North Craven and Dent faults. The strata are exposed in the bed of the Leck Beck for a distance of about 1 km, and also on the western flank of the valley around Fell End Crag. The area is remote, and it appears that there is only one building lying within the outcrop area. There are no obvious signs of extraction, but the stone may have had limited local use for field boundary walls and such like. The Silurian strata are not an important source of building stone in Lancashire.

LOWER CARBONIFEROUS

'Dinantian'

Carboniferous Limestone Supergroup

The Dinantian limestones present are the oldest of the Carboniferous rocks in Lancashire, though they have a limited **Outcrop**. The Supergroup as a whole consists of beds of limestone, **Shale** and occasionally sandstone. These beds have never been a major commercial source of building stone, only being used for local building on and near the outcrop. However, the limestones have been commercially important for the production of lime and, more recently, for cement and aggregate, resulting in numerous quarries across the outcrop area. There are two geologically and **Lithologically** distinct limestone areas in Lancashire: the Craven Basin and North Lancashire.

Bowland High Group

In the Craven Basin, around Clitheroe and the Hodder Valley, the Lower Carboniferous sequence is of basin type and comprises alternating beds of limestone, shale, mudstone, siltstone and occasionally sandstone. The limestones are assigned to the Chatburn Limestone and the Clitheroe Limestone formations (the latter including the Thornton Limestone Member), which together make up the Bowland High Group. These limestones are generally well bedded, dark grey in colour, fine to medium-grained and with occasional macrofossils. They occur only in the cores of the Clitheroe and Slaidburn anticlines, and within the Sykes and Brennand inliers. The limestone is used in buildings either roughly dressed into blocks or used as random **rubble**, often rendered over. Examples of villages using this stone are Chatburn and Downham. The bottom image shows the use of Chatburn limestone in a cottage in Bolton-by-Bowland.

Numerous limestone reef knolls occur within this Group, in a belt from Clitheroe north-eastwards to Rimington, and between Dunsop Bridge and Slaidburn. The limestone from the knolls is paler in colour than the bedded limestones, and is often **fossiliferous**, weathering to a pale grey to white colour. This is extensively used in the settlements around the knolls, for example Clitheroe, Worston and Newton. The below image shows the Calf's Head, Worston, constructed of 'reef Knoll limestone'.

Great Scar Limestone Group

The North Lancashire limestones are of shelf type and the major limestone unit in this area is the Urswick Limestone Formation, quarried near Nether Kellett and around Yealand, Redmayne and Warton. The other limestones of the group have seen little use as building stones, having been used only in villages near to the quarries. The reef knoll limestones are absent in the north.

Craven Group

Bowland Shale Formation

Pendleside Sandstone Member

Overlying the Bowland High Group is a considerable thickness of shale-dominated strata – the Craven Group (formerly referred to as the Worston and Bowland Shales). Within the Craven Group are a number of named limestone and sandstone units. Craven Group limestone is used for building and walling only very locally with respect to its quarry source. The most important building stone obtained from the Craven Group, however, is actually sandstone.

The Pendleside Sandstone Member includes some of the more important of the workable sandstone beds, and attained a local significance because the limestones present within the succession are much harder to dress and use for building. The rock is a grey to brown, fine to medium grained, **MICACEOUS** sandstone that weathers to a darker grey-brown colour. In the Ribble Valley, the Pendleside Sandstone crops out on the western side of Pendle Hill between Whalley and Rimington, and also along the southern edge of the Bowland Fells between Chipping and Bolton-by-Bowland. Examples of buildings constructed of Pendleside Sandstone are the Parish Church, Chipping (top right image) and Lower Coar Farm near Chipping (bottom image).


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UPPER CARBONIFEROUS

'Silesian'

Millstone Grit Group

Pendleton Formation

Pendle Grit Member

Sandstones from this unit are probably the second most widely used building stone in Lancashire, surpassed only by the sandstones of the Haslingden Flags. Pendle Grit is typically an even-coloured, pale buff, medium to coarse-grained, feldspathic sandstone, with **INTERBEDDED** siltstone and mudstone. It is commonly developed as massive beds of up to 4.5m in thickness, with little, if any, visible internal structure (no cross-bedding, for example). There is little lithological variation across the outcrop area.

Pendle Grit sandstone is extensively developed in the Craven Basin, being found in the Lancaster, Settle, Garstang and Clitheroe areas. There were major quarries at Longridge and Lancaster – where it was known as 'Longridge Stone' and 'Lancaster Freestone' respectively. The sandstone was very widely used in all manner of civic, ecclesiastical, commercial, industrial, domestic and agricultural buildings over a wide area of Lancashire, especially in towns and villages close to the outcrop, and exported to the larger towns in mid-C19.

It seems to have been the stone of choice for many of the considerable number of churches which were constructed during the Victorian building boom. Lancaster has many important 'Lancaster Stone' buildings: the Castle, the Priory Church (St Mary), the City Museum, top right image (old Town Hall), the Customs House - below image. St George's Quay, the Judges' Lodgings, the Lune aqueduct and Skerton Bridge being the most outstanding examples.

Preston, in contrast, is primarily a town of brick buildings. 'Longridge Stone' is used in many of its prestigious buildings, however, including the Church of St. John the Devine and the Harris Museum. Most of the C19 stone buildings in the town centre and the Victorian Churches in the fringes and suburbs were constructed of the sandstone, while the better quality Victorian and Edwardian terraces and houses used 'Longridge Stone' decoratively. The stone was also utilised in similarly prestigious buildings in many other Lancashire towns, including Bolton Town Hall and in construction of the Liverpool Docks. It is also thought that the 'Longridge Stone' was extensively used in Lancashire's railway architecture and structures.

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The quarry at Waddington Fell (NW of Clitheroe) – lying within a Pendle Grit outcrop formerly mapped as 'Warley Wise Grit' – was reopened in about 1960 primarily for aggregate production. More recently, though, it has begun producing blockstone for sawing into building stone on site, and this is now widely distributed across Lancashire and beyond for both new-build and conservation purposes.

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Copster Green Sandstone

The Copster Green Sandstone occurs within the Pendle Grit Member, lying roughly in the middle of the unit. It crops out in an area extending from Copster Green (NW of Blackburn), northwards towards Dinckley on the River Ribble. In this area, it forms a distinctive ridge in the landscape. The rock is a medium to coarse-grained sandstone composed of **QUARTZ** and feldspar grains, with occasional larger pebbles of quartz. Amongst other characteristics, it differs from the usual Pendle Grit sandstones by virtue of its pale red colour. A handful of quarries worked Copster Green Sandstone around Copster Green itself, providing building stone for the surrounding area.

Copster Green Sandstone was frequently used for dressed stone work, but was also employed as a rubblestone. Examples of buildings using Copster Green Sandstone are St Leonard's Chapel in Old Langho and many houses in Copster Green and Ribchester. In Ribchester, which is downstream from the rock outcrops at Dinckley, boulders of Copster Green Sandstone were collected and used for building.

Birkett Stone

Birkett Stone – sometimes referred to as 'Red Fell Stone' – is another Pendle Grit variant. Lithologically, it is a medium to coarse-grained, feldspathic sandstone, with a distinctive purple to red colour (and is not dissimilar to the sandstone currently produced at Waddington Fell Quarry).

The outcrop of the Birkett Stone is restricted to a small area between Dunsop Bridge and Newton in the Hodder Valley, and it was worked in several quarries on Birkett Fell, to the SW of Newton. Birkett Stone appears to have been utilised only in the local area, and is characteristic of older buildings in the villages of Newton, Dunsop Bridge and Slaidburn. It was used both dressed and as a rubblestone. Examples of buildings using Birkett Stone are Slaidburn Church (bottom image), Browsholme Hall (below image) and many village houses in Newton.

"Warley Wise Grit"

The Warley Wise Grit – a brownish grey, moderately or thickly bedded, medium- to coarse-grained, pebbly sandstone, with siltstone interbeds throughout and coal seams locally – sits immediately above the Pendle Grit Member (from which it differs in several respects). It crops out in the Lancashire Pennines south of the Craven Fault System and north of a line from Rochdale to Leeds, but is frequently drift covered and thus not readily accessible. Historically, the sandstone was only quarried at a comparatively small number of sites, and then only for local use e.g. in the vicinity of Barley, and around Foulridge. Stoneyhurst College, seen top right, shows the use of Warley Wise Grit in its construction. The stone was likely quarried from the nearby Sandy Bridge Quarry at Hurst Green.

In the Bowland area, a sandstone known as the Brennand Grit occupies the stratigraphic position of the Warley Wise Grit. This has the same general characteristics and use as the stone occurring further south.

Silsden Formation

In southern Lancashire, the Silsden Formation comprises a substantial thickness of shale, referred to as the Sabden Shales. Some sandstone interbeds are present, and these have been worked on a small scale for building and walling.

In the Bowland area, the sandstones are much more widely developed and several have been quarried in an organised fashion in the Forest of Bowland, and used in the buildings of greater significance.

Ward's Stone Sandstone

This sandstone is quarried around Clougha Pike and Ward's Stone Hill (immediately east of Lancaster) for building, walling, paving, roofing and millstones. At Heysham Head, it seems to be the source rock for the ancient (ruinous) priory (image below) and the Parish Church.

Dure Clough, Cocklett Scar & Moorcock sandstones

Other snadstones worked for building include the Dure Clough sandstones and the Cocklett Scar sandstones (Roeburndale Member). At Claughton Moor, a locally developed sandstone – the Moorcock Sandstone (Claughton Member) – has been worked to some extent for roofing and paving flags.

Samlesbury Formation

The Samelsbury Formation albeit mudstone-dominated includes some relatively thin sandstone beds but there is currently no evidence of them being worked for building stone.

Hebden Formation

The Hebden Formation includes a large number of sandstones which are generally massive, coarse-grained and often conglomeratic. They are greyish brown in colour when fresh, but undergo darkening upon weathering.

Ellel Crag Sandstone

The Samlesbury Formation, albeit mudstone-dominated, includes some sandstone beds. The most important of these is the Ellel Crag Sandstone, a fine to medium-grained sandstone, which shows large-scale cross-bedding. This was still being worked for aggregate and occasionally building and monumental stone, up to the end of the C20.

Todmorden Grit

The stratigraphically lowest sandstone of some significance is the Todmorden Grit, which crops out around Blackburn (where it is called the 'Parsonage Sandstone'). This sandstone tends to be finer-grained than the others in the formation.

Kinderscout Grit

These are the most important sandstones of the formation. They have been worked on a large scale in the eastern parts of the county, mainly to produce foundation material for industrial plant. Around Great Harwood the beds were suitable for production of flags and some building stone while at Sabden the sandstones have been quarried in several places on the side of Black Hill and the stone used for building and gate posts. Vernacular cottages in Great Harwood and Great Harwood church (top right image), are constructed from Kinderscout Grit.

Eldroth Grit

This sandstone was used extensively in harbour works at Glasson Dock and in Lancaster.


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Knott Copy Grit & Heysham Harbour Sandstone

Other sandstones worked include the Knott Copy Grit and the Heysham Harbour Sandstone. The latter is the local equivalent of the Upper Kinderscout Grit and the highest bed in the Millstone Grit Group exposed in north Lancashire.

The Marsden Formation

Marsdenian rocks are distributed from Askrigg and Stainmore in the north, through the Central Pennines, and thence southwards into north Staffordshire. In Lancashire, they crop out over a broad arc from Heysham Head, through Bowland, the Pennine flanks, and in the Rossendale Anticline.

The main building stones are typically medium to very coarse-grained (sometimes pebbly) feldspathic sandstones, which were laid down in an extensive river delta system. Colour-wise, they are characteristically grey to buff, but locally have yellow or red overtones and banding. Though often massive and uniform, they may show cross-bedding.

Fletcher Bank Grit (aka the Gorpley Grit, the Midgley Grit or Revidge Grit)

The most important building stone source, the Fletcher Bank Grit, was intensively quarried in Edenfield and around Chorley, The image to the right shows St. James' Church in Brindle, constructed of Fletcher Bank Grit. The image below is of Holcombe Road Viaduct, Haslingden, which includes Fletcher Bank Grit and Rough Rock in its construction.

Helmshore Grit

Worked locally along its outcrop for building stone. Frequently used in combination with Haslingden Flags – their softer, more uniform texture making them suitable for **DRESSINGS** and mouldings – Marsden Formation gritstones are well-seen in individual buildings such as Hoghton Tower, the adjacent railway viaduct, and in Rivington, Chorley and Brindle.

Hazel Greave Grit

This locally quarried sandstone is notably finer-grained and more flaggy in its lower part.

Brooksbottom Grit

This coarsening upwards sandstone unit has been quarried for building stone around Heskin and Belmont.

Holcombe Brook Grit

Also coarsening upwards, this sandstone has been quarried for local building stone use along much of its outcrop.

The Rossendale Formation

Haslingden Flags

The Upper and Lower Haslingden Flags, including the 'Lonkey' sandstones, form the lowest beds of the Yeadonian stage. They are yellowish brown, fine-grained, SILICA-rich siltstones and very fine grained sandstones, which weather to darker shades of brown. They frequently have ripple marks associated with fine cross-bedding, and characteristically split into thin, uniform beds that are often separated by mica 'partings'. Distributed amongst the flaggy sandstones are the 'Lonkey' beds (in particular, a 3.5 m thick bed at the base of the sequence), which are much harder, pale, massive, quartzitic sandstones.

The Haslingden Flags were most extensively worked in the Rossendale Valley, but also between Great Harwood and Blackburn, and in an arc from Darwen round to Chorley. Cragg Quarry at Rawtenstall is reputed to have been one of Britain's most sizeable quarries in the late 1800's.

Initially, the main Haslingden Flag beds were used primarily for roofing, but as quarrying methods improved, paving and building stone became more important products. These were used throughout much of urban East Lancashire. A wider demand for stone products developed, and they were exported throughout northern England, and also taken south to Birmingham and London. Hard sandstone from the 'Lonkey' beds has been widely used for **QUOINS** and decorative features on buildings, as well as for **SETTS** – the major road surfacing material of C19 Lancashire.

Haslingden Flag use is widespread throughout eastern Lancashire (both in main elevations and as a roofing material), especially in Haslingden itself, but also in, for example, Wheelton, Chorley and Edgworth (top right image shows Dingle Farmhouse, Edgworth). The middle image shows the use of Haslingden Flags in weavers' cottages in Fallbarn Road, Rawtenstall, and the bottom right is of Higher Mill, Haslingden.

Rough Rock

The Rough Rock is the youngest and most extensively developed unit of the Rossendale Formation. It is a coarse-grained, pebbly, feldspathic sandstone, which was deposited rapidly in massive, relatively uniform beds. The Rough Rock tends to cap the higher moors of Rossendale and the West Pennines, though locally it has been down-faulted to much lower levels, such as at Euxton (near Chorley) where, in buildings such as Gillibrand Barn, it can be seen stained red due to the overlying presence (at outcrop) of Sherwood Sandstone. Rough Rock sandstone has often been used where large, load-bearing blocks were required, the best example being the 24 eight tonne blocks used in the foundations of the Eiffel Tower. Locally, it was often used in the construction of moorland farm buildings, and associated drystone walls, together with many structures on the Lever Park Estate and the tower on Rivington Pike (top right image).

Pennine Coal Measures Group

Pennine Lower Coal Measures Formation (PLCM)

The general pattern of sedimentation established during the Namurian continued into Westphalian times, but the depositional cycles increasingly involved protracted periods during which the ground surface was colonized by swamp vegetation (which subsequently formed the thin coals now prominent in the succession). A typical depositional cycle consists of interbedded mudstone, siltstone and sandstone, with subordinate **SEATEARTH** and developments of coal. The sandstones can be thin and laterally impersistent, but some are more extensive and extend basin-wide. In contrast to the sandstones of the Millstone Grit Group, the PLCM sandstones are predominantly medium-grained. Normally grey when fresh, they usually weather to a yellowish brown colour. Sedimentary structures including cross-bedding, lamination and bioturbation, together with plant remains, are commonly observed. In Lancashire, the PLCM strata are found around the Burnley Coalfield and along the northern edge of the Wigan Coalfield.

The Burnley Coalfield occupies much of the relatively low-lying ground to the north of the Rossendale Anticline, and stretches from Blackburn through Burnley to Colne, with southwards-directed extensions around Darwen and Bacup. The youngest of several sandstone beds occurring within this coalfield sequence is known as the Doghole Rock.

Many individual sandstones across the whole coalfield area were worked for building stone and used in towns such as Colne, Nelson and Padiham. Here, quarrying for building stone was an important local industry, if somewhat overshadowed by the more extensive operations in the Rossendale Valley. The local quarrying industry declined in the first half of the C20 however, and very few sites produced building stone after 1945.

To the south and west of the West Pennine Moors, the area takes in the northern fringes of the Wigan Coalfield. The PLCM strata are affected by extensive faulting, which has produced four tectonic blocks: Chorley, Coppull and Adlington; Turton; the Ashurst–Billinge Ridge and; the Skelmersdale Basin. Most of the Coalfield is covered by till, which considerably restricts access to the sandstones. The succession is almost entirely of PLCM age, although there are inaccessible Pennine Middle Coal Measures rocks in the extreme south.

There are over twenty named sandstones in the PCLM succession. Virtually all of these sandstones have been worked for building stone, dry stone walls or road aggregate to some extent, while a small number, in both of the named coalfields, were worked on a commercial scale.

Ousel Nest Grit

The oldest of the PLCM building stone sources is the Ousel Nest Grit – a medium-grained yellowish sandstone often showing cross-bedding. It is found around Turton, Eccleston and Horwich where there are still quarries working this stone. The main working sites, such as Montcliffe - were in the Bolton area and the sandstone was widely utilised in Lancashire. The image below is of St Peter's, Belmont, constructed of Ousel Nest Grit.


© J McNeal

Woodhead Hill Rock & Darwen Flags

The Woodhead Hill Rock is a mainly medium-grained, ochreous-weathering sandstone found in the east of the county. It is either parallel- or (thickly) cross-bedded. The younger Darwen Flags were quarried and mined south of Darwen for their eponymous flags, which are fine-grained, micaceous and ripple-laminated sandstones. The image top right shows its use in a vernacular building in Simonstone (Hackings Farm).


© S J Rhodes

Crutchman & Warmden sandstones

The Crutchman Sandstone – also known as the Milnrow Sandstone or, locally, the Flag and Stone Rock – is similar to the Woodhead Hill Rock. It was worked at Crutchman Quarry near Accrington on a significant scale, and also around the Ashurst Ridge near Parbold. The Warmden Sandstone, also called Helpet Edge Rock, is similar to the Woodhead Hill Rock, but weathers to a yellow-brown colour. It was worked around Oswaldtwistle and Accrington.

Dyneley Knoll Flags

The Dyneley Knoll Flags are variably developed, and are sometimes absent altogether. A sandstone bed occurring at the same stratigraphic level (i.e. between the Crutchman Sandstone and the Old Lawrence Rock) was worked on a considerable scale at Catlow Quarries, and is thought to be the source of most of the building stone used in the Nelson area. Small-scale extraction still takes place in part of the old quarry area. It is also reputed to have been the source of the stone used to build the City Art Gallery, Mosley Street, Manchester (1832). Supplies were apparently insufficient to complete the job, however, and alternatives from Salterforth and Leeds were used. The same sandstone was also quarried at Ashurst near Skelmersdale, and on a small scale north of Hawkshaw.

Old Lawrence Rock

The most important of the PLCM building stones is the Old Lawrence Rock. This was worked extensively around Appley Bridge and Parbold in the south, and Hapton (near Accrington) in east Lancashire. It is a fine to medium-grained, slightly micaceous sandstone with a distinctly greenish-grey colour. It is parallel-bedded with ripple laminae interbedded with mudstones. Use of the stone was principally for flags and general building. Sawn stone was produced for a short period at Appley Bridge.

Flags were also produced from the nearby Upholland Flags beds, which are reported to have been widely used in Liverpool. A dwelling constructed of Old Lawrence Rock is seen in the top image, while the image immediately below shows its use as 'walling' for a pig pen at Rufford Old Hall. This use of large upstanding flagstones as boundary and pen walling is common in areas where the Upholland Flags (and the Haslingden Flags) occur.


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Dandy & Tim Bobbin rocks

The Dandy Rock and the Tim Bobbin Rock are both found in the Burnley and Brierfield areas. These modest sandstones were worked in local quarries, often within the towns themselves, and are now mostly built over. At Padiham, a quarry near the gates to Gawthorpe Hall (image above), virtually in the grounds of the mansion, worked the Tim Bobbin Rock, and this would appear to have been the source of the stone from which the Hall was built. The quarry was backfilled with spoil from an adjacent colliery and is no longer visible.

Other Local Sandstones

There are many localised developments of other sandstones, and these were worked over limited geographical areas. In the Parbold area, for example, the Harrock Hill Grit (sitting near the base of the formation), is a very coarse gritstone that was extensively quarried in five or six substantial workings and several more minor ones near the village. The stone is notable as it is often shows pink staining and liesegang ring markings – features attributed to the nearby presence of Triassic strata, which presumably once overlay the older rocks. The Parbold quarries assumed particular importance since they are the nearest potential source of durable Carboniferous sandstone to the extensive lowland areas of the west.

PERMO-TRIASSIC

In Lancashire, Permo-Triassic rocks underlie the western third of the county. They are extensively covered by superficial deposits, however, and are rarely exposed. Permian strata crop out over a relatively small area, and they are exposed at only a small number of locations – and then only to a very limited extent. There are no known instances of rock from these exposures being quarried as building stone. Triassic strata, by contrast, are considerably better developed, and there are sandstones from within the Sherwood Sandstone Group – including the Ormskirk Sandstone Formation – which have been employed as building stone.

TRIASSIC

Sherwood Sandstone Group

The Sherwood Sandstone Group (formerly known as the Bunter Sandstone), is a comparatively soft, fine-grained, sandstone-dominated, red-bed succession. Despite its fairly widespread distribution in Lancashire, the group is seen at the surface in a workable condition at only two locations around Mawdesley and Ormskirk. It has been used in relatively few (mostly early) buildings, for example Eccleston Parish Church (C14 in part, and Grade2*), lower right image. Mawdesley Hall, with its C18 wing of Sherwood Sandstone, provides another, somewhat later, example; top right image.

Mawdesley Hall is also noteworthy due to the fact that it stands directly on the bedrock. Although the Sherwood Sandstone was readily accessible at Mawdesley, most of the buildings are brick-built, and its three Victorian churches are constructed of Millstone Grit Group sandstone 'imported' from elsewhere. Only two or three buildings close to the Hall are of Sherwood Sandstone, its limited use being a consequence of the stone's poor durability and the availability of better building stone types nearby. At Ormskirk, for example, preference was given to the Ormskirk Sandstone (see p. 15). Any red Triassic sandstone used in the construction of Victorian churches was likely to have been 'imported' from outside the county (Cheshire, Merseyside and Cumbria), where more durable versions of the stone were worked.

Ormskirk Sandstone Formation

The top of the Sherwood Sandstone Group is marked by a comparatively thin sequence of better-cemented, harder, and therefore more durable sandstones. Known as the Ormskirk Sandstone Formation (formerly the Lower Keuper Sandstone). The unit is about 200m thick in Lancashire. It comprises thickly-bedded, generally pale yellow, but occasionally light red, medium to coarse-grained sandstones, which show pronounced cross-bedding. These sandstones are much more durable than the typical Sherwood Sandstone. The outcrop is limited in extent, and surface exposure is restricted to the higher ground around Ormskirk and Aughton, and also the low-lying land around Downholland and Halsall. The outcrop continues to the southwest into Merseyside, with workings reported in Maghull, Melling and Bootle. The main Lancashire source appears to have been a small quarry near Scarisbrick (Pinfold Delph), which is now disused and partly backfilled. Other minor workings appear to have existed around Clieves Hill, Aughton and Tower Hill, Ormskirk.

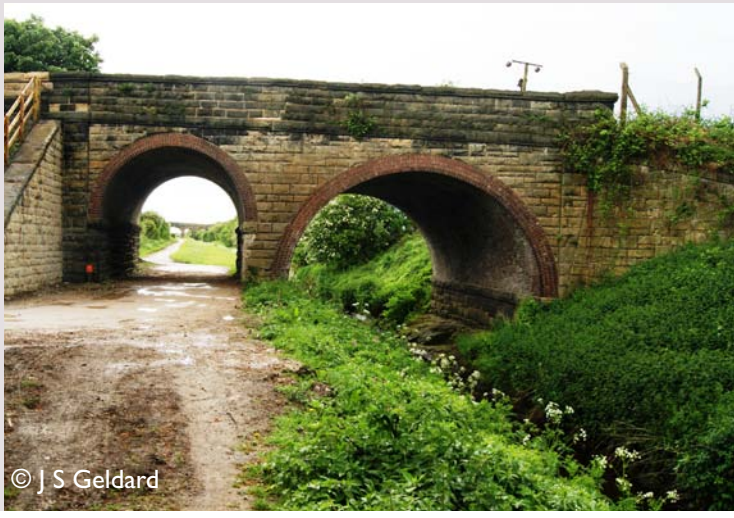
Several important churches are built of the distinctive Ormskirk Sandstone, including Ormskirk Parish Church (C12 with later alterations, additions and restorations and, virtually uniquely, both a tower and a spire) and Halsall Parish Church (medieval but also much altered, added to and restored). The sandstone was also used in some older town centre buildings in Ormskirk, and is reputed to have been used by the Stanley family (the Lords Derby) for the now demolished Latham Hall. At Tower Hill, southeast of Ormskirk, stands a splendid water tower (now converted to a house) built of the pale red and mottled form of this stone that was probably extracted from shallow workings in the nearby Ruff Wood. There are also examples of its use in buildings outside the area, including the distinctive St John's Parish Church (1883) and the Scarisbrick family mausoleum, both at Crossens, Southport.

Ormskirk Sandstone:

Top image shows Ormskirk Water Tower;

Middle right image is of Rufford Old Hall fireplace in the great hall: and

Bottom right image of the Great Altcar railway bridge.



QUATERNARY
Pleistocene

Most of lowland Lancashire, as already noted, is covered by superficial deposits, which are often of considerable thickness. They also extend over a significant part of the eastern, upland area. Glacial till (boulder clay) predominates, with subsidiary areas of sand and/or gravel of various types. Along and inland from the coast, there are areas of peat, silts, alluvium and blown sand, and most of the higher uplands are blanketed by peat. None of these deposits has any potential as building stone, though historically the tills have been an important source of clay for brick-making.

In a number of places, where suitable local sources are available, cobbles (large rounded stones) have been used for paving, walling and occasionally building construction – most notably in Lytham and St. Anne's. The usual sources of these are either river channels or the foreshore, with additional supplies coming from sand and brick pits (i.e. oversize fluvio-glacial material). Locally-derived sandstones, along with more 'exotic' igneous and metamorphic rocks from the Lake District and SW Scotland, are well represented amongst the cobbles, while the limestone examples present were likely derived from either Morecambe Bay or the Pennine area.

Commercial working of river deposits has taken place at various points along the rivers Calder and Ribble, for example at Ribchester and Preston. This continued into the second half of the twentieth century.

Historically, cobbles have had only limited use as street paving (e.g. in Preston) and as a walling material (e.g. in Ribchester). A fine example of the use of such materials is the group of former farm buildings at Brock Side, where large, roughly-dressed cobbles from the nearby River Brock have been used to construct all of the buildings.

At Lytham St Anne's, cobble-use is on a much more extensive scale, and cobble-built walls are a characteristic of the townscape in some parts of the town. A few buildings also incorporate them. Estate boundary walls made from cobbles, including those of the Grade I C18 Lytham Hall, provide the most notable example of the use of this material (image below).

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Glossary

Cemented: The materials which bind the grains and/or fossil components together to form a rock.

Dressings: To say a building is constructed of brick with stone dressings means that worked stone frames the corners and openings of the structure.

Fossiliferous: Bearing or containing fossils.

Greywacke: Old term for an immature sandstone with >15% clay minerals.

Interbedded: Occurs when beds (layers or rock) of a particular lithology lie between or alternate with beds of a different lithology. For example, sedimentary rocks may be interbedded if there were sea level variations in their sedimentary depositional environment.

Limestone: A sedimentary rock consisting mainly of calcium carbonate ($CaCO_3$) grains such as ooids, shell and coral fragments and lime mud. Often highly fossiliferous.

Lithology: The description of a rock based on its mineralogical composition and grain-size e.g. sandstone, limestone, mudstone etc.

Micaceous: A rock which contains a high proportion of the platey micaceous minerals muscovite and/ or biotite.

Mudstone: A fine-grained sedimentary rock composed of a mixture of clay and silt-sized particles.

Outcrop: Area where a rock unit is exposed at the ground surface.

Quartz: The crystalline form of silica (silicon dioxide, SiO_2).

Quoin: The external angle of a building. The dressed alternate header and stretcher stones at the corners of buildings.

Rubble: Rough, undressed or roughly dressed building stones typically laid uncoursed (random rubble) or brought to courses at intervals. In squared rubble, the stones are dressed roughly square, and typically laid in courses (coursed squared rubble).

Sandstone: A sedimentary rock composed of sand-sized grains (i.e. generally visible to the eye, but less than 2 mm in size).

Seatearth: The layer of sedimentary rock underlying a coal seam.

Sett: A squared or rectangular stone used for paving.

Shale: An argillaceous rock with closely spaced, well-defined laminae.

Silica: The resistant mineral quartz (silicon dioxide) SiO_2 an essential framework constituent of many sandstones and igneous rocks, but it also occurs as a natural cement in both sandstones and limestones.

Siltstone: A sedimentary rock composed of silt-sized grains (i.e. only just visible to the eye).

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