

# **Stone Roofs of Northwest Clare**

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## 1. INTRODUCTION

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This article is based on a thesis completed by the author in 2003 entitled “The Stone Roofs of North West Clare”. The thesis was submitted to the School of Architecture University College Dublin as part of a Masters in Urban and Building Conservation

The landscape of North West Clare is harsh and windswept. Wind-bent trees, dry-stone walls and low solidly-built cottages characterise this part of Clare. These characteristics have evolved and been influenced by the local materials and conditions. One of most enduring features of this landscape is the use of the local flagstone, locally called Liscannor stone, used in farm walls, houses, paving, flooring and even on roofs.

Childhood summers were spent in NW Clare from the 1970's. Even then the traditional landscape characteristics were already beginning to erode as a result of modern farming techniques and the growth in the economy and holidays houses. Readily available cheaper roof tiles have slowly replaced the once prevalent stone roofed houses.

**Note on Terminology:** In describing this roof covering the term stone slate has been used. Strictly speaking this stone is not a slate but rather a sedimentary stone meaning that unlike metamorphic slate they split along bedding planes. The term “stone slate” is also used by English Heritage (*Stone Slate Roofing, Technical advice note*, English Heritage 1998, 2), providing a generic term to describe a roof covering which is known under various names.

In NW Clare, the stone slates used on houses are known as slates while the thicker ones used on out-buildings are known as flags. The stone used is generally known as Liscannor stone. Liscannor stone does not specifically relate to an individual quarry, it is the name given to a number of fissile sandstones that have been worked in the area around the Cliffs of Moher and Liscannor village, Co. Clare. More specifically the stone is described variously as Moher, Luogh and Doonagore slate, flag and flagstone after the quarries from which they are taken.

## 2. GEOLOGICAL BACKGROUND

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Until recently the most prevalent material for roof covering in Ireland and Britain was natural (metamorphic) slate rather than stone slate. In spite of the development of artificial slates, natural slate is still one of the most well-known roof coverings in Ireland. As a roof covering it is light, hardwearing and resistant to the elements. True slate is a metamorphic rock which derives:

*from fine muddy sediments that have been altered by extreme pressure. During compression, the clay and other minerals have recrystallised and reorientated to lie at right angles to the maximum compression. This allows the slate to be split, or cleaved, into thin sheets parallel to the reorientated crystals. The cleavage is not necessarily parallel to the bedding (Pavia & Bolton, 2000, 70).*

According to Pfeiffer & Shaffrey, metamorphic slates have been used as a roofing material from the 18<sup>th</sup> century and earlier. However it was not until the 19<sup>th</sup> century that the use of slate became more prevalent, reflecting growing availability (Pfeiffer & Shaffrey 1990, 64). One of the best known Irish slates was the Killaloo slate, which was quarried at Portroe, near Nenagh in County Tipperary and Valentia Slate which is still quarried on Valentia Island, County Kerry.

Stone can also be used as roofing material when it *naturally cleaves or can be riven into suitable thin layers* (Oliver 1997, 310). In West Clare roofs of stone slates can be seen as far north as Doolin to as far south as Kilrush. The use of stone as a roofing material in west Clare is partly explained by the underlying geology, which is largely shaped by sandstone formations.

### **The Geological Background of County Clare**

The rocks of County Clare are of Carboniferous age and are part of the Dinantian and Namurian succession. The dominant rock types are limestone, mudstone and sandstone (Finch, Culleton & Diamond 1975, 74-75). In north and mid Clare the landscape is dominated by Dinantian limestone which forms the Karst region known as the Burren. Elsewhere in west and northwest Clare the geology is dominated by shales and sandstones of Namurian age. This describes the group of rocks which were previously known as the Upper Avonian Shale and Sandstones, Millstone Grit and Flagstone Series with Coal in places, and the Coal Measures (ibid., 75).

Sandstone is a sedimentary rock with a specific grain size of between 2mm and 1/16mm, usually formed when sand is deposited in layers and subsequently lithified. Distinguishable layers are called beds and were originally horizontal. The Namurian sandstone of Clare is composed of a thin-bedded sandstone which was formerly known as

grits. *The thinner beds produce flagstones for flooring, cladding and even roofing (A. Flegg, pers. comm.)* (Pavia & Bolton 2000, 55). This type of rock is also found in parts of counties Carlow, Laois, Kilkenny, Tipperary, Kerry, Limerick and Leitrim (Fig. 8).

Liscannor stone is a general term given to a number of quarry works located in the area around the Cliffs of Moher and Liscannor Village. This is probably due to the fact that it was from Liscannor pier that the rock was once shipped. It includes the current quarries at Luogh and Moher, and in the past also included the now closed quarry works at Doonagore. Today Liscannor stone has come to describe any fissile sandstone that displays the fossilised trails of marine activity such as that quarried at Moher and Miltown Malbay.

The stone is a hard siliceous sandstone consisting of between 70% and 90% silica making it hard and durable. *The environment in which the stone was deposited was similar to the modern day Mississippi Delta. Here millions of tons of sand and silt pour out in periodic layers from the great river into the sea* (Maher 2003, *Minerals*, G.S.I. website). In this region of Clare, Liscannor stone was formed interbedded with shales and it is only in particular areas where it occurs in regular flat beds that it can be quarried and split to produce flags for paving, cladding and building material.

Moher stone is named after the area along the Cliffs of Moher from which it is quarried. Some of the quarries are right on the cliff edge. This rock is currently quarried at Derreen and Kineilty. It is the most well known of all Liscannor stone types and has come to represent the public perception of Liscannor Stone. The rock is distinguished by the fossilised tracks of molluscs, arthropods and worms which burrowed through the soft sand and mud looking for food *circa* 320 million years ago.

In Clare the surface of the Namurian sandstone reflects the conditions of deposition with rippled surfaces indicating shallow water deposition (as seen on sandy beaches) where wave effects penetrate, with smoother surfaces indicating deeper water (Hughes, T. 28/02/03, pers. comm.). In NW Clare the inland quarries of Doonagore produced flags with dimpled or ripple marks, while the nearby quarries of Luogh produced smooth flags. Colours vary from blue/black and grey/brown to more russet tones.

In the past a similar type of sandstone was quarried in and around Ennistymon. The Ducks quarry south of Ennistymon also had the fossilised traces of worm activity in some examples but is generally semi-smooth. Its colour varies from brown to dark grey (The Rock Shop, Liscannor, 2002).

Further south the stone was also quarried at Moneypoint and near Kilrush. The sandstone was also quarried at Aylevarro near Cappagh. This stone was also characterised by fossilised tracks of sea snails and worms. The quarries at Moneypoint closed in the early 20<sup>th</sup> century.

### 3. STONE SLATE ROOFS IN IRELAND & NW CLARE

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Although natural slate was up to recently the most prevalent roofing material in Ireland the use of stone as a roofing material has a long history in Ireland. The method in which it was employed developed over time to suit new architectural developments and requirements.

Stone was used to roof the Neolithic passage tombs such as the passage tomb complexes found at Knowth and Loughcrew, Co. Meath, dating to the third millennium BC. Here the walls and the roof were built at the same time using a technique known as corbelling. At its simplest this method involves placing successive layers of stone on top of one another, each one projecting slightly inwards until both sides meet at the top where they are capped. This construction method was used to build the beehive huts found on the small rock of Sceilig Mhicil, located off the coast of Kerry (Fig. 2). The same method was used to construct the boat shaped roof of Gallarus Oratory on the Dingle Peninsula, Co. Kerry, which is believed to date to the 9<sup>th</sup> century or as late as the 12<sup>th</sup> century (Edwards 1990, 118) (Fig. 1).



**Figure 1: Gallarus Oratory, Dingle Pinninsula, Co. Kerry (Photo by D. King).**



**Figure 2: Beehive huts, Sceilig Mhicil, Co. Kerry.**

The early churches are believed to have been constructed of wood. *Dairthech* is the most usual word for a church in the early medieval Irish documentary sources. Literally it means oak house and therefore indicates that churches were commonly made of wood (Edwards 1990, 122). It is not until the first half of the 8<sup>th</sup> century that stone churches (*damhliag*) are mentioned (724AD - Annals of Ulster). The development of stone churches was facilitated by a new development in building: the development of mortared stone technology in the 8<sup>th</sup> century allowed transfer of this tradition into permanent construction (McCullough & Mulvin 1989, 15). The system of roofing in stone continued into the Romanesque period when the roof was formed by the insertion of secondary arches in place of the struts, then by enlarging the space over the arch and making a separate room, as in Kells. Co. Meath, St. Mochta's House, Co. Louth and culminating in Cormac's Chapel on the Rock of Cashel. (McCullough & Mulvin 1989, 15).

The Franciscan Abbey of Ardfert, County Kerry was founded in the mid 13<sup>th</sup> century. During the 15<sup>th</sup> century a south transept, western residential tower and cloister were added. The cloister was roofed with stone tiles (Fig. 3).





**Figure 3: View of stone tiles at Franciscan Friary, Ardfert, Co. Kerry.**

The continuing use of stone slate when metamorphic slate became more readily available would have been regional. Where thin-bedded stone/flags were locally available it would have made more economic sense to use them to roof a building rather than transport slates in.

## **Historical Production of Stone Slate in North West Clare**

### *Pre 18<sup>th</sup> century*

There were no written references found to pre 18<sup>th</sup> century working of the stone around NW Clare. There are however many pre 18<sup>th</sup> century structures which were constructed and roofed with fissile sandstone. Examples include the early 12<sup>th</sup> Kilmacreehy Church and the early 16<sup>th</sup> century Doonagore Castle (Fig. 4 & 5). The use of thin flags in these early structures demonstrates the availability of a range of building materials. The quarries that helped build these structures would have produced a mix of stone types suitable for building: thick dimension stone for walling, flagging for flooring and stone slates for roofing.



**Figure 4: Kilmacreehy church, Liscannor, view of 16<sup>th</sup> century porch. Note stone slates capping sidewall.**



**Figure 5: View of the now restored Doonagore Castle.**

The use of thin flags in these early structures demonstrates the early availability of stone slates. It also establishes that as early as the 12<sup>th</sup> century the skill and knowledge to extract and work the thin beds was already highly developed, thus demonstrating that in spite of a general lack of written information on this subject prior to the 19<sup>th</sup> century that stone slates would have been available for roofing.

The material was also used in more difficult to date field boundaries and gateposts. Many of the walls consist of dry stonewalls which include thin bedded stone and others are constructed purely of upright flags. The exposed rubble walls of outbuildings also reveal their construction with the local thin-bedded stone.

#### *18th century*

Prior to the 19<sup>th</sup> century there is still very little information available on the use of stone slate as roofing material in Clare. Additionally there is little information on the use of the local stone for building material. The only reference to the period dates to 1789 by Donald Stewart, a Scotsman. In 1786, Stewart was appointed by the Committee of Agriculture to carry out a mineral survey of Ireland. In 1788 he was directed to make a tour through county *Clare for the purposes of searching for and examining Fossils, Ores and minerals* (Dillon 1953, 189). He describes only finding poorly worked coal seams at Liscannor bay. He also describes flagstones being worked near Kilrush (ibid., 189). *In the Cliffs of the River Shannon, near Kilrush, are remarkably good and large flags, with impression of almost every kind of animals, herb, etc. ...the flags are in beds, nearly horizontal, form one to six inches thick* (ibid.). The only thing that this reference reveals is that quarrying of some kind was taking place. However there are a number of buildings dating from the 18<sup>th</sup> century which were constructed using the local Namurian fissile sandstone.

In the area around Liscannor examples include the 18<sup>th</sup> century Moher House situated to the W of Liscannor village in the townland of Shingaunagh South. The house and outbuildings and roofs were constructed using the local fissile sandstone. In Ballyellery townland, NE of Liscannor village. Gliggrum House (now called Sandfield House) retained a stone slate roof until *circa* 1995. This house is marked on Henry Pelham's Grand Jury map (1787).



**Figure 6: A & B. View of the *circa* 1760 Ennistymon House (the present Falls Hotel). Render has been removed revealing the roughly coursed rubble walls constructed with the local sandstone.**

#### *19th Century*

The earliest written references to the use of this stone is found in *A Statistical Survey of the County of Clare* dating from of 1808 by Hely Dutton of the Farming Society of Ireland and includes details of building materials in Clare and more particularly in northwest Clare.

He describes the dwellings and outbuildings of the better off farmers and other more well off members of the population, and interestingly mentions the use of stone slate roofs. This class generally has *comfortable dwelling houses and convenient offices... The better kind of houses are slated either with a hard thin sandstone flag, procured in the western part of the county, and near Lough Lickin.*

In relation to stone slates he further states that *near Innistymon thin flags are raised, which are used for covering houses; they do not in general split into laminae thin enough, therefore require strong timbers in the roof.* (ibid., 13).

In 1845 G. Wilkinson wrote the *Practical Geology & Ancient Architecture of Ireland*. For the first time, quarrying of stone in the Liscannor area is referred to; Moher flags were also used in Ennistymon... *a hard dry flag, average thickness from 1 ½ to 3 inches cost 9d per yard at quarry, about 4 ½ for carriage* (ibid.).

However, cartographic evidence in the form of the 1<sup>st</sup> edition (1840) OS maps show a number of quarries in the Liscannor area and to the SE of Doolin, thus demonstrating that quarrying was already taking place in the pre 1840's. There is no mention of quarrying in the Lahinch area, although there are a number of quarries indicated further south near Milltown Malbay.

A number of the quarries shown on the GSI maps are not marked on the earlier 1<sup>st</sup> edition (1840) or the later 2<sup>nd</sup> edition (1913), perhaps indicating only small local workings. Moreover, a number of quarries are described as disused (*Old flag quarry*), indicating that quarrying had taken place in the past.

#### *Late 19th century & Early 20th century*

A study of the valuation records and 2<sup>nd</sup> edition (1913) maps show a boom in quarrying during the years 1890 to 1915, concentrated to the W and N of Liscannor in the townlands of Moher, Caherbarnagh, Luogh South and Doonagore. This commercial quarrying was carried out mainly by a number of English Companies who came from the Rossendale region of Lancashire (Johnson, R. January 2003, pers. comm.). This boom in quarrying lasted only about twenty years (1890-1910), but with the onset of the First World War and the closing of markets the companies eventually closed and left. The companies included the Liscannor Quarry Company, United Stone Firms, Wm. Hampson & Co. Ltd. And Geo. A. Watson & Co. Ltd.

One of the largest companies operating out of the area were Watson's at Doonagore. Their quarry works was one of the largest, covering thirty acres with three workings. Reflecting the ready market for the stone, G.O. Watsons and Co. constructed a tramway for a steam locomotive for the transport of the quarried material. It is thought to have opened in 1903/05 and run until the demise of Watsons Quarry in 1910/11. A steam locomotive worked the three-mile 4ft 8-½ inch gauge railway near the Doonagore quarry (Johnson 1997, 19 & 136).

The Geological Survey of Ireland Industrial Mineral Records demonstrates that the quarrying industry did not completely die out with the departure of the English Companies in the years after 1910. The tradition of local quarrying continued on though now concentrated in the area to the NW of Liscannor, along the Cliffs of Moher and SE of Doolin.

In 1966, another Englishman, Harold Phillipson moved into the area and started quarrying as a result of being told about the existence of the flaggy sandstone rock. In Lancashire Phillipson had worked with a blacksmith who had been employed in Watson's Quarry at Doonagore prior to the 1<sup>st</sup> World War. Harold Phillipson came from a tradition of quarrying similar rock in the Rossendale Valley in Lancashire. At that time there were only a few local men working the quarries at Moher and Luogh at that time. As there was not much of a market for the sandstone at the time quarrying was not a full time occupation, it was generally a sideline to the main occupation of farming.

Harold Phillipson's first quarry works was situated near where the present Liscannor Stone Company headquarters is in Luogh townland. This was at the time of rural electrification and Phillipson paid £15,000 to be connected to the ESB. He employed locals but work initially was very slow as there was not much of a market. During this period there was very little building going on and the order of stone for the Kennedy Memorial Park saved the company from going under. Orders began to come in, for example: for the rent an Irish cottage schemes and from the Office of Public Works. The main market was for flags for flooring, buildings stone and walls, but not stone slates. In 1968, Roger Johnson joined him. The company developed further with the help of small industries grants. Johnson later bought the company in partnership with P.J. Ryan from Phillipson to form the present Liscannor Stone Company (Phillipson, H. 23/02/03 pers. comm.).

### **Similar Examples of Stone Slate in Ireland**

The underlying geology of West Clare consists of Namurian sandstone. Similar geological formations occur in the north Kerry/west Limerick area, in the border areas of Carlow, Kilkenny, Laois and Tipperary and in county Leitrim. There appear to be no present day references to stone roofs surviving in these areas.

Nevertheless despite the lack of present day references, evidence has come to light demonstrating that stone slates were indeed used to roof buildings in similar geological areas.

The border areas of Carlow, Kilkenny, Laois and Tipperary form part of the Castlecomber Plateau. Wilkinson (1845) describes the Carlow flags (although called Carlow flags they were actually quarried at Kellymount and Shankhill in Kilkenny) as a thin bedded siliceous grit, fine grained, dark grayish brown in colour, *very hard and very durable; the face of the bed is sufficiently smooth, and they do not require any dressing..... Besides their use as flagging, they are much employed for roofs and other coverings, where the weight is not objectionable* (Wilkinson 1845, 210-211). Although this 19<sup>th</sup> century reference mentions the local sandstone being used as a roofing material, today there is only one stone slated outbuilding known in the area (Conry, M. January 2003, pers. comm.).

The low number of surviving stone slate roofs can be partly attributed to the closure of the quarries early in the last century, but also the influx of readily available natural slate and subsequently artificial slate must have also played a role.

A similar geological formation also occurs in County Leitrim and North Roscommon. There is still a small number of examples of stone slated buildings found in both these counties, mostly comprised of out buildings. One of the more interesting examples is located near the small town of Frenchpark in County Roscommon in the grounds of the former Frenchpark Demesne. The mid seventeenth century Jacobean estate house is long gone but there are physical reminders of the former large demesne including gatehouses, walled gardens and an unusual circular smokehouse which is roofed with Namurian



sandstone. This structure is thought to date from the mid to late eighteenth century.

### **Survival of Stone Slate in North West Clare**

There are many historical references to the existence of stone slates outside NW Clare, although these seem to have diminished over the last 300 hundred years. The development of the local slate industry provided a lighter, more easily workable roof covering than stone slates. However in areas where natural slate was not easily available, the continuing use of stone slates made more economic sense.

Interestingly there is evidence of stone slate roofs in similar geological areas, but the local practice of using the stone slates as roofing material appears to have died out much earlier. As mentioned earlier this is due to the growing availability of cheaper and lighter materials such as natural and artificial slates and also corrugated iron. The survival of stone slated structures in NW Clare is therefore in many respects unusual.

One explanation is that unlike Co. Carlow, quarries in NW Clare continued to be worked. Another important factor in both cases is location.

NW Clare was located in the periphery away from larger centres of trade, such as Kilrush and Ennis. In the post famine years, much of the west coast of Ireland, including NW Clare at this time was suffering from extreme poverty. This resulted in the establishment of the Congested Districts Board in 1891, which included NW Clare, to encourage the economic development in these areas (Killen 1997, 211). The Boards work included a range of activities from improving and building dwelling houses to the construction of roads and piers (ibid.). However in NW Clare no new piers or harbours were constructed and the main trading centres continued to be Kilrush and Ennis. If metamorphic slates were required there would have been substantial haulage costs whereas the continued usage of the locally available stone slates made far more economic sense.

The Namurian sandstone formations of Leitrim and Carlow occur in inland areas, away from the high coastal winds of the west coast. The mean monthly wind speed in January in Kilkenny is 7.4 miles per hour while on the west coast (Belmullet) it is nearly twice that at 14.7 miles per hour (Met Eireann 2003, *Met Eireann* website). The continuation of stone slates as a roofing material for dwelling houses and outbuildings in NW Clare reflects the necessity of a heavy roof covering in this largely exposed coastal area. In 1863, the houses of the seaside resort of Lahinch were described as having *one very great peculiarity – they are roofed with heavy flags, admirably cemented together, capable of resisting the winds which blow for the greater part of the year with uncommon strength* (*Clare Journal*, August 25<sup>th</sup>, 1863).

## 4. TRADITIONAL STONE ROOFING

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The examination of traditional stone slate roofing in Clare has been compiled from a variety of sources: from roof case studies, from fieldwork and local sources.

Bennett and Pinion in their 1948 book titled *Roof Slating and Tiling* describe the construction techniques of a simple roof. The roof would comprise of timbers set at a pitch of 35° with hips and ridge. The roof itself comprises of rafters (4" by 2") placed at 14" centres, and supported midway up their length by purlins (7" by 3"). The rafters stop down onto a fascia 5" by 1", and support a tiling fillet (3" by 2"). The eaves project 10" from the exterior wall face. One chimneystack stands out from the ridge, the rafters on the lower front being held off by trimmers (4" by 2"). The ridge board (9" by 1 1/2") at the top of the roof and the hip rafters (7" by 2") at the angles receive the upper ends of the common rafters (Bennet & Pionion 2000 ed., 15).

### *Roof Construction:*

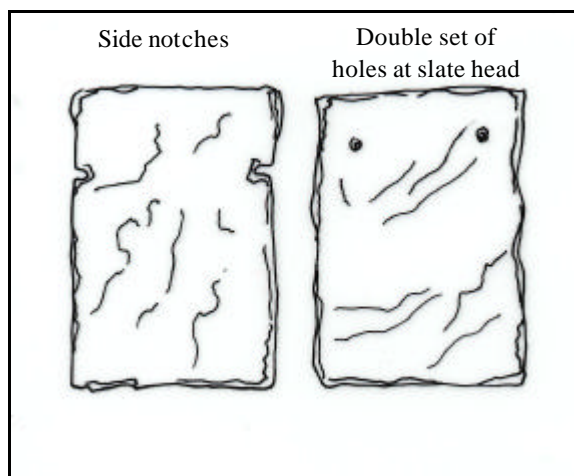
The stone slate roofs of NW Clare differ slightly from this system of construction. The stone slates are quarried locally (today and in the past) and generally consist of either the Luogh or Moher Slate. The size and weight of the slates (max. of 1150mm x 880mm to min. of 450mm x 450mm with thickness varying between 13mm to 25mm - 1/2" to 1") imposed a number of restrictions and added requirements on the house, builder and slater. Most buildings have simple gable ended roofs with very little or no examples of hipped roofs, dormer windows, or valleys. This paucity of roof types reflects the limitations imposed by the large and somewhat cumbersome stone slates but also reflects the simple vernacular architectural style. Given the immense roof weight that buildings and roofs would have to support, many roofs display solid timber trusses and purlins. Pitches of more than 40° are generally not found. Rafter centers were generally in the region of between 310mm to 380mm. In nearly all cases battens were attached directly onto the rafters. There was only one example of roofing felt found. Stout to more slender purlins were also sometimes used measuring between 185mm and 150mm in section. Through purlins were generally used with one example of butt purlins used. The wall thicknesses varied between 540mm to 755mm. In all cases a ridge plank was used to form the apex.

### *Laying & Fixing::*

The stone slates were generally randomly sized, with varying widths and lengths. The slates were laid to diminishing courses with the heavier and larger slates placed near the eaves and the smaller ones near the ridge. Each successive course of slates was chosen to provide adequate head and side lap over the previous course of slates. According to local sources the traditional system was to lay the battens to the size of the flag or slates coming out of the quarry at that time. However, there was little in the line of information on specific methods of slate laying employed, but it is likely that it was similar to methods employed in England.



The randomly sized slates are initially sorted by length (length below the nail/peg holes) and the total width of each length measured. This width is then divided into the width of the roof to give the number of courses for each length. The roof battening is then set out to suit. However, as the spacing of the battens is calculated (spacing/gauging is calculated by subtracting the head lap from the length and dividing by 2) adjustments have to be made at each change of course (when the slate length reduces). This is achieved by increasing the head lap in the equation by half the difference in the lengths (e.g. if the slates reduce from 24" to 22" the head lap is increased from 3" to 4"). If this adjustment is not made, in effect 2" is removed from the bottom edge of the shorter slates and the head lap will be too small and there will be wide margins above narrow margins (Hughes, T. 28/02/03, pers.comm.).



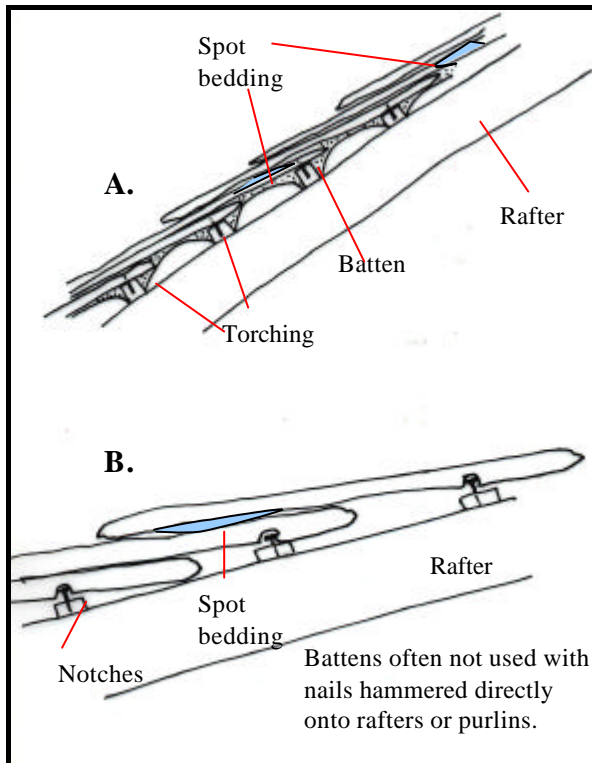
**Figure 7: Illustration of stone slates.**

According to a local builder, recalling stone slate roofing that he saw carried out in the 1950's, the battens were laid as the work progressed because of the randomly sized slates (McNamara, M. 14/02/03, pers. comm.). If this is the case, it shows that already at an early stage in the decline of stone slate roofing some of the traditional skills were being lost.

The average head lap varied between 127mm and 203mm (between 5" and 8" on roof case studies). This lap was larger than in the case of natural slate due to the characteristic undulations of the sandstone especially found in the Moher slate with its characteristic fossilised trails. Luogh slate due to its smoother nature could be laid to a lesser lap. It was imperative that a range of widths was available to the slater to allow sufficient side laps otherwise slates would have to be cut to fit which in today's terms would be a waste of expensive slates and labour.

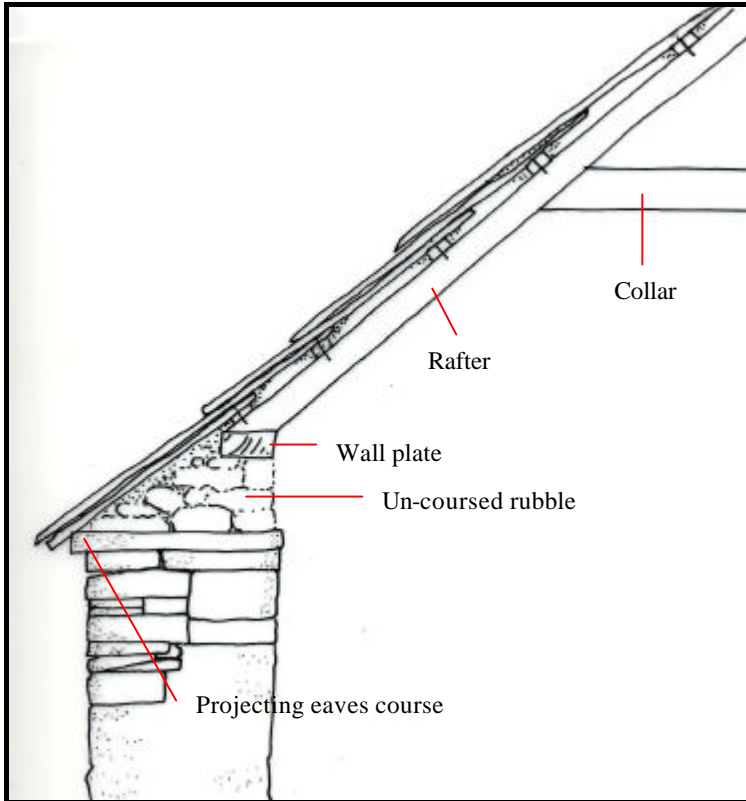
The slates were attached by iron nails through a double set of holes near the head of the slate or via side notches (Fig. 8). The heavier and thicker slates (known locally as flags) used on outbuildings were often just hung from nails, which rested in notches picked out from the underside of the stone. The stone slates used on outbuildings are known as flags

due their immense weight and size and could be up to 55mm (2") thick. The immense size and weight of the stone meant that as a rule they stayed insitu. Battens were often not used so nails were hammered directly into rafters or purlins. A house in Doolin, prior to its present Luogh slate roof, had an earlier stone slate roof. The stone slates of this earlier roof were attached to battens with bog deal pegs. The pegs tapered to a point which were inserted into the battens to attach the stone slates (Shannon, M. 22/02/03, pers. comm.).

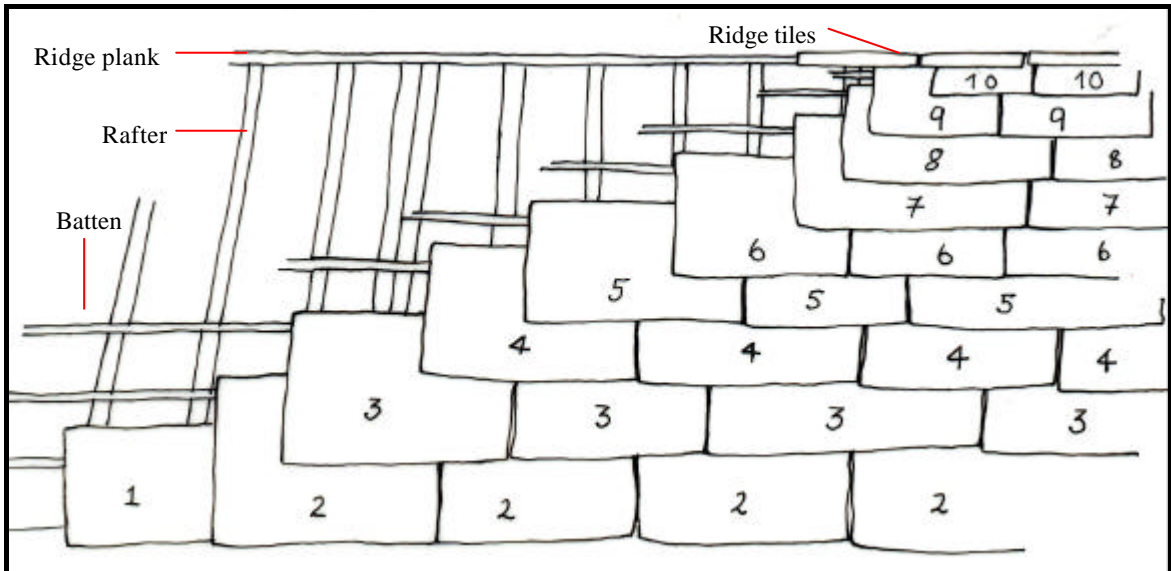


**Figure 8: Diagram showing methods of attaching/hanging stone slate. A: Stone slates attached with nails through holes at head of slate. B: Thick stone slates (flags) hung from notches on underside of slates unpointed.**

The top of the sidewalls had a projecting eaves course consisting of projecting slabs/flags, over which the first two slate courses projected (Fig. 9). The wall was then built up further with rubble to create the eaves roof slope. The wall plate was laid on the interior side of this wall. The first course of stone slates was usually bedded on top of the wall and would appear to have also been nailed into the first batten. This course, though shorter in length than successive courses, was very wide. The second course of slates was attached to the second batten and was laid so that the tails of the first and second course would meet. The first and second courses projected an average of 100mm from the exterior wall face to allow rainwater to run off.



**Figure 9: Partial section through stone slated roof showing eaves detail, collared rafter roof, wall plate, torching & courses.**



**Figure 10: Diagram of simple vernacular roof type with roof of collared rafters, showing rafters, battens, ridge tiles & stone slates laid to diminishing courses.**

### *Ridges & Copings:*

The ridge appears always to be composed of clay ridge tiles of blue-black/dark grey colour, which blend in well with the stone roof. The ridge was bedded in mortar. The stone slates were generally not carried onto the outer edge of the building, as most of them had copings. Copings were traditionally composed of stone slabs bedded in mortar.

### *Torching & Pointing:*

The underside of the slates was frequently torched and evidence of single, double and fully torched roofs was found. Torching was a mix of lime, sand and hair which was applied as a render to the underside of the slates. Prior to the availability of roofing felt this was used to weatherproof the roof. *The effectiveness of the torching largely depended on the correct mix of lime, sand and cow hair being used and in the way it was applied. If areas were missed the covering internally would be penetrated by the weather, and if the torching were to intrude too far into the lap, water could soak up through the torching and into the roof void through capillary action. The benefits of torching have in recent years been eclipsed by the general utilisation of roofing felt* (Derbyshire County Council 1996, 4).

Pointing of the exposed exterior joints with a lime based mix was also carried out, sometimes in conjunction with torching. The uneven nature of the stone slate, especially Moher, often resulted in some inconsistencies in the sitting of the slates, which over time could allow driving rain or indeed snow to be forced up over the slates and into the roof. Lumps of lime mortar are also used between courses of slates. It would appear to have been used to even off inconsistencies on the base of the flags, pieces of stone were also used for this process.

It is generally agreed (Bennett & Pinion 2000 ed., 48, 69 & 195 & English Heritage 1998, 10-11) that the use of mortar in conjunction with the stone slates has the potential to draw moisture into the roof structure, although English Heritage would argue that the use of mortar bedding and pointing is *regionally specific and local practice should prevail* (English Heritage 1998, 10). However they do state that pointing and bedding should never be combined with torching. It is almost impossible to prevent the two coming in contact and forming a wick which continuously draws in water (English Heritage 1998, 11).

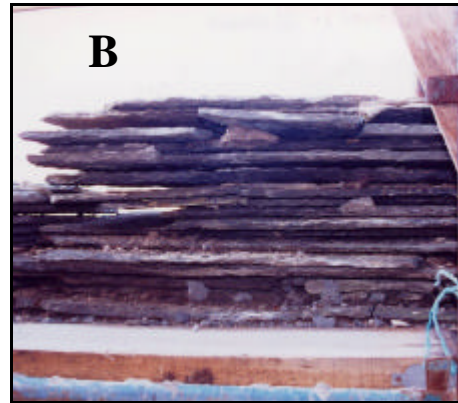


Figure 11: Figures A-C show stone slates after removal from roof. Note holes for nails in flag head below & the distinctive fossilized trails of the Moher slate.

## **5. EXAMINATION OF PRESENT DAY PRODUCTION & STONE SLATE ROOFING TECHNIQUES**

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The examination of stone slate roofing in Clare today has been compiled from a variety of sources: from case studies, from fieldwork and from questionnaires received back from stone slaters and from house owners.

### *Roof Construction*

In nearly all cases the roofs had been substantially or totally replaced, with the original roof pitch maintained. The new roof systems constructed to take the weight of the stone slates were in many cases substantially strengthened than they were previously. Given that these roofs were already supporting stone slate roofs, it is debateable as to whether all of this work was necessary or not. Many modern builders when confronted with buildings that do not comply with present standards are sceptical as to their continued survival.

### *Laying & Fixing*

Where possible the original slates were reused, generally this meant slates that were on the sheltered side of the roof. Moher slates on the sunward side of roof are often not suitable for reuse. While on the roof they generally remain intact but once removed and restacked for future reuse they crack. The harder Luogh slates can be reused to a greater degree (90% silica & 10% silt) while the Moher slates (70% silica & 30% silt) appear to be more prone to becoming brittle over time, subsequently cracking and spalling. It is the high percentage of silica which gives the stone its hard properties (Maher, P. 7/03/03, pers. comm.).

The old slate is re-cut to size to remove any cracks or weaknesses. The new slates are also machine sawed. The edges of these slates were generally left undressed leaving a sharp edge, whereas the original slates all had dressed edges. This resulted in a slight recess between each slate which allowed for the pointing to sit well between each slate, although today pointing is not required if felt is used.

Although random sized slates were used and laid to diminishing courses, they were often still cut to size. Although an effort was made to select the slates to fit with the underlying slates to provide adequate side lap, many of them were cut to the perpendicular/side joints centrally over the slate below. The resulting roof is pleasing to the eye, but the sharp undressed edges take away from its natural beauty, and in doing so loses one of the traditional characteristics of the stone slate roofs. Slates are now attached by galvanised rather than iron nails.

### *Torching & Pointing*

Given developments in roofing, torching of the underside of the slates is no longer required because roofing felt is now used. The new roofs are also not pointed, although the continued pointing of older roofs is still in evidence.

### **Present Day Production of Stone Slate in North West Clare**

In NW Clare there are three commercial quarries and a number of small scale local quarries still working the thin-bedded siliceous sandstone. They are located in the northwest of the county in the area around the Cliffs of Moher and also near Milltown Malbay. Many of the townlands in which quarries are still worked have had quarrying since at least 1840, for example at Luogh and Kineilty. These quarries all produce less than 100,000 tons per annum, much less than the limestone and other pits and quarries to the east of the county which produce between 100,000 to 500,000 tons and more per annum.

#### *Sources for Repair and Conservation Work*

In NW Clare, it is advantageous that there are still working quarries. However, despite the local working of the stone, sourcing affordable stone slate for re-roofing and repair is a large problem. In the NW Clare region the purchasing of new slate is seen as too expensive. Quarries can charge more for the larger, more easily worked flags. The stone from the thicker beds is more readily available and easier to work. The time required to quarry the thinner beds and provide large slates intact is seen as too time consuming, especially when a return can be had for broken pieces of flag and slate for crazy paving, wall and building cladding. The smaller local quarries are cheaper, but one would have to give considerable notice to amass the amount of stone required to roof a building.

Therefore second hand slate is currently the most realistic option. Up to a year or two ago, sourcing second hand slate was not difficult. There was little demand for the material, which was reflected in its cheap price. Since then County Clare's Conservation Office requires that all stone slated structures that go through the planning process must retain their stone slate roofs and if in need of repair or replacement they must use stone slate. The subsequent upsurge in demand for the slate has resulted in higher prices and it has become increasingly difficult to source the stone.

It is clear that many of the traditional techniques involved in stone slating are now no longer practiced, such as torching and pointing. Techniques such as hand dressing and random slate sizing are also being lost. Current practitioners are new to the skill and there is a lack of understanding of traditional techniques.

But the already prohibitive cost of stone slating means that an element of mechanisation must be accepted. The viability and continuance of stone slates as a roofing material will only be made possible if its use is allowed to develop with the times. This must be done carefully to preserve the authentic appearance of the roof.

Consequently, before further mechanisation is allowed, there must be discussion as to what is acceptable. For example, the traditional practice of using random slate sizes

results in less cutting of the stone and thus is more economic. Currently there are no guidelines or advice available for slaters or house owners carrying out this work, making it difficult for them to know what is best practice.

Another issue that has arisen is the problem of sourcing affordable slates. This is by far the most problematic issue that needs to be addressed, as the continuance of stone slated buildings will only be possible with a ready supply of new slates. If new slate is not made available at a more reasonable cost, the present demand for second hand slates will continue. This will inevitably lead to the unscrupulous stripping of other stone slated buildings in the area, thus destroying the very buildings the present policy is trying to protect. Another issue which is not yet a problem in NW Clare but is increasingly so in some parts of England is the growing availability of cheap sandstone slates from India. The use of this imported slate should not be permitted as it is the very local nature of the stone slates which contribute to its value, both as a vernacular building material and as an important aspect of landscape character. The introduction of imported material would render any reasons for the continuance of stone slating in NW Clare invalid.



## 6. CURRENT STATUS OF STONE ROOFING IN IRELAND

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*These structures are imbued with a message from the past, the historic monuments of generations of people remain to the present day as living witnesses of their age-old traditions (ICOMOS 1964, The Venice Charter, 1).*

There has been a demonstrated rate of decline in stone roofed buildings in NW Clare. Coastal towns and villages such as Lahinch, Liscannor and Doolin have undergone considerable development and change. Lahinch has only ten surviving stone roofed structures (including outbuildings) compared to at least thirty two in the late 19<sup>th</sup> century. The nearby town of Ennistymon has been suffering from economic decline, yet it has been this decline which explains the survival of so many of its stone slated structures. It has a total of forty two remaining stone roofed structures although this still demonstrates a loss of at least half its stone roofed structures when compared to late 19<sup>th</sup> century numbers.



**Figure 12: View of stone roofed house in NW Clare undergoing conservation work**

The Charter on the Built Vernacular Heritage has stated that the *built vernacular heritage is important; it is the fundamental expression of the culture of a community, of its relationship with its territory and, at the same time, the expression of the world's cultural diversity* (ICOMOS 1999, 1). The quarrying of stone flags in northwest Clare has long provided stone for the international market and also provided local building material. The local availability and use of the material for everyday structures such as houses, out houses, field boundaries, floors and roofs makes it a highly regional vernacular building material, *arising from the distinctive local geology and fundamental to the distinctive local character of vernacular buildings* (McDonald 1998, 1).



**Figure 13: View of stone wall & pier situated on eastern limits of Liscannor village, on the Cliffs of Moher Road.**

The decline of this roof covering does not just result in the decline of individual roofs but also in the loss of character of a street, a group of structures, an area and ultimately a landscape. The material provides a sense of place and adds to the relationship between the land and its people, thus making it a valuable feature of the landscape. Elements of the landscape's past history of use such as ringforts, holy wells and old field systems are already protected, so is it too much to ask that this characteristic element be protected and retained as well?

The main areas of concern are low awareness of the importance of this roof type, the lack of an understanding of traditional roofing practices and the lack of funding. Traditional mechanisms of listing and grant aiding are not sufficient on their own to tackle the decline in numbers. Training, guidelines, an inventory of present numbers and encouragement of production are some of the suggested means and devices to combat the further demise of this distinctive building type. However to implement any kind of workable policy more funding is required. Without the allocation of further resources the decline of this roof type will continue and without a more comprehensive understanding of traditional craft techniques high re-roofing prices are set to continue.

## 7. REFERENCES & SOURCES

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In Clare, stone slated structures are generally limited to west Clare. The use of stone as a roofing material in west Clare is partly explained by the underlying geology, which is largely shaped by sandstone formations. Given the restrictions of timescale, the area of study was restricted to NW Clare, although references to the historical use of stone slate in W Clare were looked at.

The research of the thesis consisted of a range of sources:

- **Documentary:** Both primary and secondary sources. Primary sources included historical accounts and various archives. These included the National Photographic Archive, the National Archives, the Irish Architectural Archives and the Trinity Map (See [Sources](#) for detailed list of archives and libraries consulted). A range of publications on stone roofing (in the UK) and vernacular architecture were also studied.
- **Cartographic:** A range of cartographic sources were looked at including the Down Survey (1685), Henry Pelham's Grand Jury maps (1787), 1<sup>st</sup> and 2<sup>nd</sup> edition OS maps for County Clare, and the OS Discovery Series (See [Bibliography](#) for a detailed list of maps consulted).
- **Fieldwork:** This was undertaken in order to compile a building inventory of surviving stone slate structures in four settlements in NW Clare, Doolin, Ennistymon, Lahinch and Liscannor, in total 79 structures. In an attempt to try and understand the techniques of stone slating 7 stone slated roofs were surveyed, described and photographed in detail.
- **Interviews/personal contacts:** local historians, stone slate house owners, stone slaters, building contractors, quarry owners, stone slate specialist (Terry Hughes) were all approached for information about stone slating in the past and present, geological information, quarrying, stone slating in other areas etc. (See [Sources](#) for detailed list of personal contacts).
- **Government Sponsored agencies:** National Monuments Section and Architectural section of Dúchas, the Heritage Service were approached for information on this topic.
- **Clare County Council:** Risteard UaCróinín, Conservation Officer with Clare County Council made all the information he had on this topic (and on his work in general) available to me.

The initial work on this topic revealed that there is very little written about stone slating in NW Clare or indeed in Ireland. There is a dearth of readily available information about stone slates. An attempt was made to try and identify other similar geological areas where stone slating was carried out. Only two other areas were positively identified but there are likely to be more within similar geological formations and other formations where fissile thin bedded stone was available. Researching the methods of stone slating roofs was equally difficult as the traditional methods have not been recorded and much of this knowledge is now forgotten. Most of the sources and the full bibliography of the thesis have been included.

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