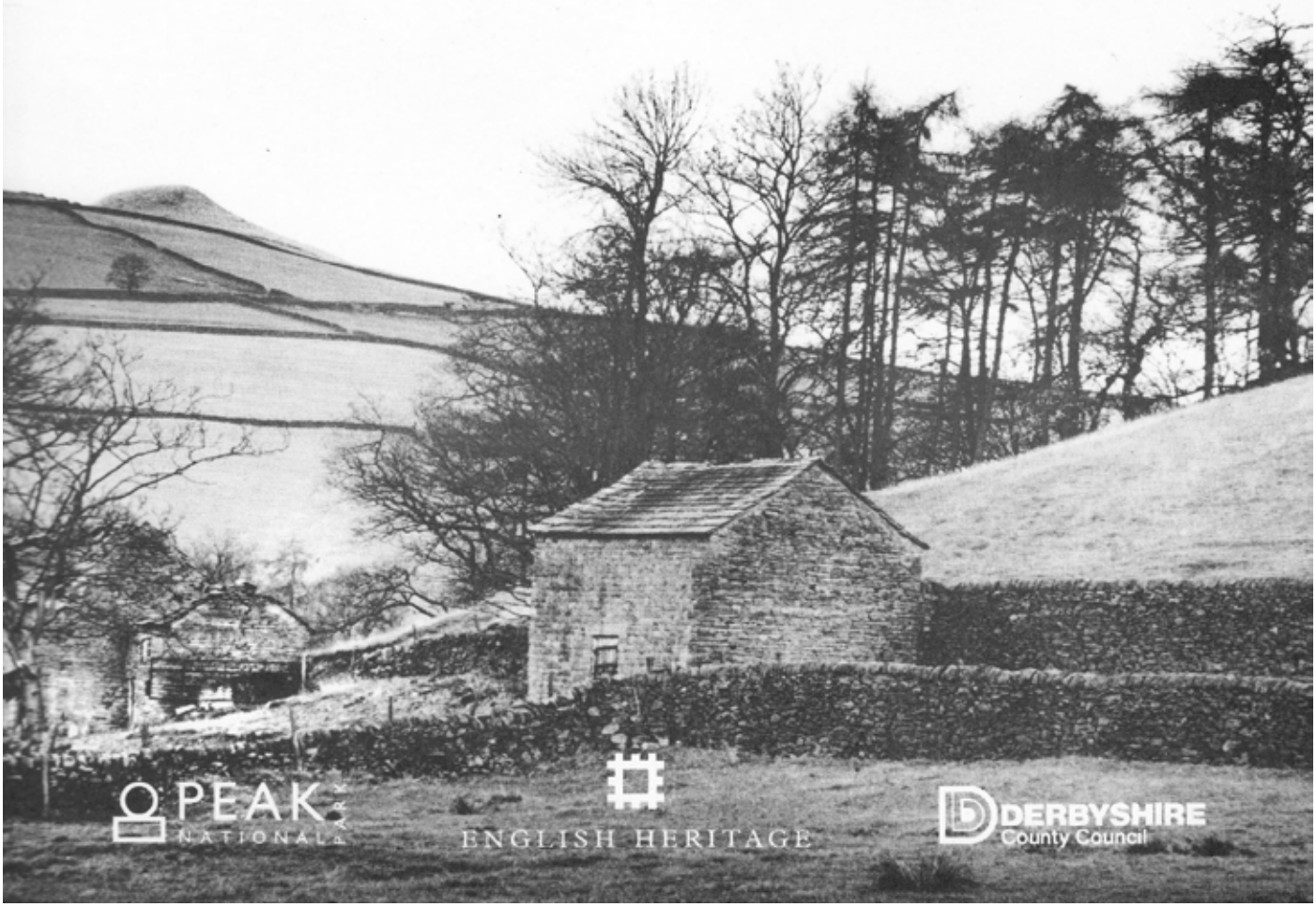
THE GREY SLATES *of the* SOUTH PENNINES

Report of a study into the potential to re-establish the roofing slate industry of the region

by Terry G Hughes FIoR

Volume One: The Industry



Thanks are due to the many people I encountered during this study. The consistent interest which greeted my enquires and the generous help which was given throughout the study must bode well for the future of the region's traditional roofs. I hope this report justifies the time that so many gave so generously.

Special thanks to Sue Macdonald, Mike Lea, Barry Joyce and Alan Morrison for their enthusiasm and forbearance. To Dr Pat Strange for writing the historical introduction to the study and for granting access to the records of the Derbyshire Historic Buildings Trust. And to Ian Thomas and the staff at the National Stone Centre which became my office for a year. Without their help and Ian's extensive knowledge of the geology of the region and his willingness to answer questions my task would have been immensely more difficult.

1995 was a very enjoyable year during which I discovered many beautiful places and friendly people. None were more friendly than Elizabeth and John Brassington. Their contribution to this study may be unseen but it was important. Thank you.

Terry

A note about terminology

Disagreement has arisen about the correct term to use to describe sandstone roofing products. The traditional and colloquial terms are stone slates or grey slates. "Grey slate" distinguishes the sandstones from blue or Welsh slates which are also a significant, though more recent feature of the South Pennine region. Grey or stone slate has the over-riding merit of being understood for precisely what it is within the region. To not use these terms in everyday conversation in the region is to risk not being understood.

The objection to the term slate in this context is that sandstones are not petrographically, slates. That is, they have not been metamorphosed and consequently they split along bedding rather than cleavage planes. Some geologists prefer the retronym tilestone; the author of the main report does not and neither do the geologists who contributed to the geological study to in this report. Slate certainly has the historical precedence and in the main body of the report the terms slate or stone slate are used to refer to the sandstone roofing of the region. However, in the parts of this report which have been abstracted from the geological report the term tilestone has sometimes been used.

Page numbers

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PREFACE

The extraordinary richness and diversity of England's architectural heritage is a constant reminder of man's ingenuity when responding to his surroundings: to their particular environmental and geographical characteristics. In this context, the distinctive quality of the Pennine landscape is defined to a large degree by its stone slate roofs. Their solid beauty achieves a visual harmony with the dry stone boundary walls of fields, stone built villages and the rocky crags of the hills around them, making this part of England visually unique.

Unfortunately, the local character and distinctiveness of the Peak District National Park and of Derbyshire in general are under threat - as locally produced building materials come to the end of their useful life and are replaced with imported substitutes thar have little in common with the regional vernacular tradition. Stone roofing is becoming increasingly rare. So conservation measures need to be taken to ensure that the special architectural and historic interest and appearance of towns, villages and the countryside are protected and enhanced through the maintenance, repair and restoration of this special Pennine feature, in an increasingly standardized world.

Conservation is all about understanding exactly what makes buildings and areas distinctive, and determining what balanced package of affordable measures may be needed, now and in the longer term, to manage change in order to preserve their special qualities. English Heritage, the Peak Park Joint Planning Board and Derbyshire County Council have joined forces to carry out research into issues surrounding stone slate roofing in order to retain and develop the modest indigenous industry in the Pennines. This document is the first public output from the project intended to brief all interested parties and to seek their comments. The work is intended as a national model to be applied in the future to solve similar regional problems in the other stone slate roofing areas of the country.

The project was developed on the basis that building conservation cannot be isolated from the social, economic, environmental and cultural forces at work in the region. An integrated approach needs to be made towards problem solving for conservation to be effective. For example, the revival of the stone slate roofing industry could promote economic growth and employment opportunities at the same time as achieving heritage goals. But development also needs to be finely balanced in order to preserve the environmental and social benefits now expected in the countryside. It is in the balancing of these interests that the greatest challenges lie.

There are opportunities offered in the conclusions of this report which can only serve to have positive benefits for the Peak District National Park and the county as a whole. A public response to the issues raised here is now invited.

Chris Green Chief Executive, English Heritage

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by Terry Hughes

Volume One: The Industry & the Market

Contents

Summary

This study was carried out during 1995 when the stone slate industry had all but disappeared in the South Pennines. Two hundred years of substitution by cheaper products has lead to declining demand and rising cost: a spiral which must be broken if the region is to avoid the complete disappearance of one of its most beautiful characteristics. In a time when initial cost is almost the only consideration it is all too easy to overlook the fact that stone slates last hundreds of years being reused time and time again, making them one of the cheapest roof coverings and the epitome of sustainable development.

Industry review

Manufacturing There is almost no production of stone slates within the region. One company has begun trial production since this study commenced.

Based on an assessment of production outside the region it is concluded that the level of technology currently employed is satisfactory and except for edge trimming of the slates there is little scope for mechanisation.

Stone slates need to be hand made because the source of their individuality is the craftsman's response to the character of the rock. Also it is the combination of hand and eye which maximises the output of slates from unpromising rock.

It is possible to mechanise some stages of the extraction and conversion process without detriment to the product. The exceptions are sawing to thickness and size. The former is completely unacceptable for technical and architectural reasons and such products should not be used nor qualify for grants. Sawing to size runs the risk of not producing the natural mix of random sizes and for this reason is undesirable. Because the edges must be dressed subsequently the claimed cost advantages of sawing may not be realised. Indeed it may be a more expensive option.

Market It has not been possible to draw firm conclusions on the size of the market due to a lack of information on the current level of activity in the stone roofing sector and incomplete records of the number of roofs which have been renewed recently enough to remove them from the replacement market.

However on the basis of the information provided by roofing contractors in the study region and surrounding counties there appears to be a market of at least 2000 tonnes a year in the region and the surrounding areas which it traditionally supplied.

Potentially the market could be increased substantially if those roofs which have been replaced with concrete tiles and other alien products in the last fifty years could be returned to stone slates as they came due for renewal. This would provide a very significant opportunity to recover the loss to the local heritage, to reverse the trend of declining demand leading to declining supply, and to provide the basis to sustain a stone slate industry well into the next century.

It is recommended that all roofs in conservation areas which have had their stone slates replaced with concrete tiles or other products in the past should, as these products reach the end of their lives, be re-roofed with stone slates and should qualify for grant support.

The revival of the industry may well need to be supported through its initial stages by special provisions. It is proposed that this can best be accomplished by eliminating the deliberate cannibalisation of old roofs and by directing roofing grant money more directly to the benefit of the manufacturers.

It is proposed that the competition from second-hand slates be reduced by the offer of grant aid being conditional upon the use of new slates, and the re-use of slates recovered from the same roof only.

It is further proposed that the grant support is paid directly to the supplier of new slates rather than to the building owners as is the case now. The grant for the roofing work could continue to be made to the building owner.

Manufacturers made need encouragement to build stocks for what is a small market. This objective could be achieved by the creation of a central stock holder. It is envisaged that a scheme could be created whereby the stockholder would guarantee the purchase of each member manufacturer's production up to an agreed level and at an agreed price. Roofing grant money could be used to fund the stock purchase and wholesaling activity but would be primarily applied to reduce the retail price.

Therefore it is recommended that a suitable, possibly a charitable, organisation be approached to consider this proposal. Alternatively a suitable organisation could be created under the control of the local authorities who currently administer the grant funding.

Marketing

Position. Stone roofing has a good technical and aesthetic reputation. It is recommended that manufacturers position the product in the top end of the market emphasising its beauty, historical and conservation importance and durability. The latter especially, is a strong counter to the perceived penalty of the high initial cost.

Price. The price of stone slates is undoubtedly high and is unlikely to fall significantly. Lifetime costs are however very much lower and this aspect should be promoted.

The system of pricing stone roofing is complex and confusing. A simpler standardised method is recommended based on the cost per square metre of roof at a standard head lap - 75 mm.

Profitability. It is very unlikely that a quarry could be economic if it produced only roofing slates. It is therefore recommended that for this, and for architectural conservation reasons, production of ancillary products such as flagging, kerbs and walling should be encouraged.

Competition. Almost every slate or tile exerts some competitive pressure on stone slates, generally on a cost basis. The main competition for manufacturers is from second hand stone slates and concrete imitations. The counter to the latter is seen to be an emphasis on life time costs and long term appearance. Past experience indicates that no concrete imitation will weather to look the same as the real thing.

Promotion. Currently product promotion is reactive although one company does promote its products through trade shows and literature. If the market for stone roofing is to develop in the future it will need to focus on the advantages of the product to counter the significant initial cost advantages of all alternative products.

The cost of promotion will be a significant handicap for smaller companies. One solution to this problem is seen to be the development of the guidance documents provided by national and local conservation organisations. Such documents can successfully promote conservation objectives as well as the selection of the most appropriate products and correct construction.

It is recommended that manufacturers explore the opportunities and advantages of joint

promotions at trade shows.

It is recognised that building refurbishment generally and heritage buildings especially, form a very significant segment of the market for stone slates. It is recommended that the industry should focus its promotional effort on events and organisations in this field.

The use of stone slates receives considerable promotional support from a variety of conservation organisations both regional and local. This support has included workshop events explaining the products and their use and which have acted as a point of contact between manufacturers and users. It is recommended that such activities are actively developed jointly between the conservation bodies, the manufacturers and the roofing industry.

Training

There is a pressing need for training in the manufacture of stone slates, their identification and the specification and execution of stone slate roofs.

It is recommended that training in the techniques of slate manufacture should be through the placement of suitably experienced persons at the quarry for a short initial period followed up by one day visits to ensure that the necessary expertise is being developed.

At present stone slating is not included in any conservation course in any of the English colleges or universities. It is recommended that a one day training course for specifiers and conservation professionals should be developed covering the products and materials of stone slating and the correct roofing techniques. This will need to be backed up with comprehensive written guidance. The course should be suitable for incorporation as a module within existing conservation courses.

At present the lack of slaters skilled in the use of stone slates is a serious threat and it will certainly get worse unless action is taken soon. It is recommended that local colleges should be encouraged to provide training in stone slating through the scope of the proposed National Vocational Qualification structure and that a short conversion course should be promoted for experienced slaters.

The Planning Environment

Minerals planning

It is concluded that there is a predisposition on the part of both the mineral planning authorities in the region to look favourably on applications to produce roofing slates provided

- the need for slates of a specific character can be demonstrated
- the scale of operations is modest
- the impacts can be limited to an acceptable level

and that there is a preference for production within existing quarries wherever possible.

In view of the general paucity of supply of those types of slate which are most prevalent or most distinctive it is recommended that an application for production of any of the types should be deemed to be for supply to an existing demand.

The absence of slate production in an existing quarry with the potential to do so may be due to a disinclination on the part of the present operators to change their production. Stone slates are viewed as a difficult product. It is recommended that the option to manufacture stone slates in an existing quarry should be explored by intending slate manufacturers before considering opening or reopening a quarry.

An enterprise based solely on stone slate production is unlikely to be economically viable. It is recommended that approval of an application to exploit a deposit of stone slate should not be restricted to the production of that product alone. For reasons of economic viability and local needs for ancillary products such as walling, kerbs, flagging and other paving, applications for the manufacture of these products should be regarded as a desirable concomitant of roofing slate production. Production of other products requiring more elaborate machinery and facilities should be judged on their own merit.

It is recommended that the options for waste disposal are assessed on both economic and environmental grounds.

Environmental impacts. It is concluded that the general operation of a quarry producing stone slates, walling and flagging will have an inherently low impact. When amortised over the full life of the products which may be two hundred years the environmental cost is low.

The need for mechanical excavation and muck shifting will probably be intermittent and/or of short duration.

Because quarries manufacturing roofing, flagging and walling products will almost inevitably be small-scale they are predisposed to have a low operational or visual impact. The effects of transport and on water supplies and agriculture will be slight or negligible. Impacts on recreational and social use, landscape, wildlife and geological interests will be site specific.

Energy consumption is probably lower for stone slates than for any other roofing product.

Little work has been done to assess the specific wildlife value of old quarries although many are in the Moor and Heath areas in which there is a presumption against development.

The geological importance of some quarries has been assessed and a small number have been designated as Regionally Important Geological Sites.

Apparently there has been no comprehensive study of the history of the stone slate industry. Considering its historical scale and importance this is surprising and leaves a significant gap in our understanding of the social and industrial development of the region and its vernacular architecture. It is desirable that such a study should be undertaken not only because of the historical and social interest but in order to provide a context in which to assess applications to re-open old quarries. This would be a suitable subject for a graduate or post graduate thesis or dissertation.

It is the opinion of the field workers in this study that there is a prima facie socio-historical and industrial archaeological case for conserving two sites, Cracken Edge SK 037835 (which is a RIGS) and Glossop Low SK 058964.

Architectural Conservation

Within the study region there is a wide range of slate types with differing colours, textures and size ranges. It is proposed that seven generic types would reasonably cover the historic range

The types are not restricted to their type locality. Some may occur widely but intermittently.

Only two of these types, the untextured Yorkstone and the Kerridge, are currently available newly manufactured and most reclaimed slates derive from the former source. Their use outside their own type area, though largely unavoidable at present, results in a loss of local distinctive-

ness.

Because a range of local slate types are not manufactured at present, current conservation planning policy unintentionally promotes the cannibalisation of other stone roofs to the detriment of the regional roofscape.

Yorkstone type	Flat, featureless, without substantial stepped bedding, fine to medium grained, buff to dark brown.
Kerridge type	Flat, featureless, without stepped bedding, fine grained, grey mica surface. The mica rapidly disappears on exposure to the weather.
Cracken Edge type	Textured, with or without stepped bedding, fine to coarse grained, white and buff to dark brown.
Teggs Nose type	Textured, with or without stepped bedding, fine to medium grained, pink.
Freebirch type	Strongly textured or ripple &c marked, fine to medium grained, buff to dark brown and olive to grey.
Wirksworth type	Strongly textured, medium grained, pink to red.
Whitwell type	Strongly textured or ripple marked, fine grained, grey or pink, magnesian limestone.

The Quarries

A database of 167 quarries has been created. As far as was possible each entry records the presence or absence of rock suitable for stone slate production and other geological, access and impact information.

In most cases there is little quarry specific information available on the historical, geological and biological importance of the quarries therefore the significance of these factors will have to be included in an environmental impact assessment for each site.

Photographic records have been made of quarries, slates and roofs. Together with a library of stone slates which is currently held at the National Stone Centre at Wirksworth they provide a record of the historical range of stone roofs in the region.

A review of the geology of the county with reference to the localities of fissile rock is provided.

The database and the review can be used to shortlist potential quarries for re-opening or to locate likely sources of suitable, fissile rock on new ground.

This study started at a time when the industry was in decline but there are many reasons to be optimistic about its future. The slate rock is available in abundance. There is a willingness to find solutions to the problems which the industry faces. The skills to make the slates and to create the roofs do still exist, but only just. Perhaps the most important asset is that there are people who care about stone slates and their importance to the character and beauty of the region. They can make the difference. What is needed now is enthusiasts to restart the industry. I hope this report helps them to do so.

Terry Hughes

Introduction

1.1 The British Isles has a rich heritage of stone roofing but everywhere it is under threat. The cycle of substitution by cheaper alternatives leading to declining production and increasing cost has been a feature of the industry since at least the early nineteenth century. The catalyst of this process was the development of transport systems which permitted the importation of cheaper, alien products from other regions of Britain. Today we can see the same process on an international scale. The consequence has been that the production of many stone slates ceased years ago and the few examples that are still available are in a precarious situation - largely dependent on grant support for their continued existence.

1.2 The richness of our national roofscape stems mainly from the great variety of British geology. Wherever a rock could be split to form a reasonably thin slab it has been exploited and examples exist in almost every geological period and rock type. The sizes of the slabs were of little importance - the difficulties of transport forced the use of whatever was available locally - although even in the earliest days larger sizes were preferred for their economy of labour and superior weatherproofing ability.

1.3 All stone roofs are random sized - arranged with the largest slates at the eaves and reducing evenly and regularly to the smallest at the ridge. But not all random slates are the same; lengths may vary from three or even four feet long down to four inches although very few roofs would encompass such a large range. More commonly roofs would be built from a smaller selection of sizes, either naturally occurring for a particular quarry or resulting from selection into two or more length ranges. And where the rock varied in the flatness of its split surface a choice might be offered between the flatter, more easily laid slates, or the rougher products.

1.4 These then were the raw materials which the slater had to turn into a roof and it was his skill and style of working which added the final dimension which created the local, and regional, distinctiveness of stone roofs. Distinctiveness derived from the colour and texture of the rock; the size, thickness, flatness and surface texture of the slates and the treatment of hips and valleys, ridges, dormers, eaves and abutments; all intended primarily to resist the weather but allowing the expression of the craftsman's artistry.

1.5 The South Pennine region is fortunate in the variety of its sandstone slates. The primary influences on their appearance were the conditions in which the beds of sand were deposited. In shallow water the beds might be rippled or braided and these features persist in the roofing slate. In deeper, calmer waters they would be flat, producing smooth, regular and generally larger slates. In slower moving water the sand particles would be smaller and so the slate's texture would be finer, less grainy. Add to this the variety of colours from pale yellow to red produced by iron staining and the local distinctiveness becomes truly local, changing from village to village. Difficult terrain ensured that each village did use its local stones, until improving roads and then the railways and canals made it easy to move the more competitive products to more distant markets. At first competition was local - between one stone slate and another - but gradually industrial development in the clay tiles of Staffordshire, the metamorphic slate quarries of Wales, and more recently the ubiquitous concrete tile had an increasing influence until, finally, stone slate production ceased in the Peak District.

1.6 Since then the repair and renewal of old stone slate roofs and the construction of new ones has had to rely on supplies of second hand slates or imports of new ones from outside the region. Neither of these sources are satisfactory, the former because it leads to the cannibalisation of other roofs, often deliberately and unnecessarily and at worst by theft, and the latter because they rarely match the originals.

1.7 A response to the difficulties described evolved over the years. This involved planning controls on the one hand and grants to help with the financial consequences of the control on the other. But it was recognised that though helpful, this approach was not encouraging the supply of new slates and worse, that the grant system was supporting the use of reclaimed slates in a way that lead to the further decline of the regional roofscape by encouraging the cannibalisation of other roofs. The architectural and conservation professionals also felt that they were ill-equipped to specify and control the use of the most appropriate products and that often roofs were constructed or repaired using unsuitable techniques.

1.8 It was also clear that these problems were not restricted to the South Pennine region. The same sorry situation exists almost everywhere that stone slates are a traditional roof covering.

1.9 In April 1993 a seminar on the issue was organised by Derbyshire County Council. It identified a need for research into the size of the market; the impact of policies for development and mineral planning control and historic building grant aid; educational and training needs; sources of financial support and the provision of information to specifiers, manufacturers and users.

1.10 It was against this background that the present study was established. Supported by English Heritage, Derbyshire County Council and The Peak Park Joint Planning Board the objectives were to:

- produce a database of historical sources of stone slates in the region including a description of the slates and a photographic record of slates and roofs, (See Annexes A, B & 3)
- review the state of the industry, the causes of cessation of production and the potential for its re-establishment
- review the market for stone slates, the sources of competition, restraints on its development and sources of support including grant aid,
- review the mineral and conservation planning environment to determine how present policies were assisting or contributing to the problem,
- review the training needs of manufacturers, roofing contractors, architects and planning and conservation officers in order to support and control the use of new and reclaimed stone slates,
- to develop a methodology which would be applicable to investigations of similar traditional building products in other regions.

1.11 The study was carried out over a period of one year from November 1994 and was managed by a steering group comprising representatives of the three supporting organisations: for English Heritage, Susan Macdonald, for Derbyshire County Council, Barry Joyce and Allan Morrison and for The Peak Park Joint Planning Board, Mike Lea.

1.12 At the outset it was recognised that there would be insufficient funds to carry out a full geological study of the source rocks. This potentially serious gap was filled by the Construction Products & Materials Sponsorship Division of the Department of the Environment which grant aided a parallel geological study.

This study was carried out by T G Hughes of Slate and Stone Consultants, I A Thomas of the National Stone Centre, Wirksworth and Dr P D Guion, A M O'Beirne and Dr G R Watt of the Department of Geology and Cartography at Oxford Brooks University. The results were reported in ROOFING STONES IN THE SOUTH PENNINES: A geological study of the origins, sources and suitability of sandstones for roofing, DoE (unpublished).

Traditional building materials in Derbyshire and their use.

2.1 Introduction

'Destruunt, aedificant, mutant quadrata rotundis' (Horace, Epistles I, i, 100)
'They tear down, they build up, they change square to round'

2.1.1 The study of the minor buildings of town and countryside, although having its beginnings in the last century, has, over the last thirty or so years, attracted the attention of scholars from a variety of disciplines including archaeologists, economic, social, agricultural and architectural historians. The term Vernacular Architecture has become, and remains the most appropriate to describe the majority of these buildings, that is those which, traditional to a given area, share in common the satisfaction of simple demands of family life, the activities, agricultural or industrial which sustained it and which are usually built from materials near at hand.

2.1.2 Whilst a multi-disciplinary approach may be needed for a full understanding of them, this introductory study using as a data source the Statutory Lists of Buildings of Special Architectural or Historic Interest is concerned with the materials of construction of the county's vernacular buildings. It assumes that the information comprising the lists represents a significant sample of the county's surviving early buildings. However an awareness of its limitations is all important. These are similar to all samples, but in particular result from its being nearly twenty years in the compiling, having had the involvement of an unknown number of compilers. For some of the data involves subjective assessments based on incomplete or changing scholarship and which from alterations and demolitions has created a continually changing population. Appendix A sets out some of the more obvious limitations in its validity, only those who use the data extensively will appreciate its objectivity, or otherwise! The subjective cannot be

dismissed entirely, firstly the visual dating of a building by its plan or other elements is at best imprecise and to that extent the Lists contain such imprecise information. Secondly, if we are to know what kind of buildings existed before competent records began to be made, then we must rely on re-constructed models based solely on the results of archaeology or on the observations of casual travellers. One such observer travelling through Derbyshire at the end of the C16 or in the early C17, although perhaps overawed by the 'black heaths, wild rock, black crags and naked hills', would, we now generally accept, have seen rural buildings not so different from those he had left behind in Leicestershire or Staffordshire nor so different from those he would see as he left the county northwards. Diverse they might have been in size, in meanness of construction and, had our traveller ventured inside, in planning, the greater part of them, would however, have been of timber; 'slightly set up with a few posts and many raddles, with stable and all offices under one roof..... and where plenty of wood is, covered with tiles (shingles), otherwise with straw, sedge or reed, except some quarry of slate be near-hand.' (1)

2.1.3 Whilst these comments of William Harrison relate largely to southern England in the late C16, this view of English vernacular buildings may not be inapplicable to C16 Derbyshire. Further south in the county, just such timber houses as those described by Harrison, have been excavated on the site of the former village of Barton Blount. Deserted in the C15, the latest houses, dating from the C14, were primitive framed buildings resting on pad-stones and had had a life of at least fifty years. A saw-pit containing oak saw-dust was also discovered. (2) Eighty years ago, C F Innocent, in his classic work on English Building Construction based on the results of his own fieldwork in and around north Derbyshire and south Yorkshire and following on that of Thomas Winder and S O Addy some thirty or so years earlier, observed that; 'Stone was only used for the foundations

in ordinary English buildings, up to the time of the Renaissance, and walls of worked stone, or 'ashlar' are scarcely to be found in the buildings of older England, except in those of importance..... There are probably few localities where the use of stone as the principal material for walls of minor buildings is of any antiquity.' (3)

2.1.4 This view of the impermanent and mean construction of the earliest vernacular houses is increasingly being confirmed by archaeology. 'Rural vernacular houses prior to the late Middle Ages appear, from the evidence of excavation, to have been of uniformly poor quality throughout the whole of England.' (4) Certainly, with few exceptions (perhaps a few cruck houses, see below), no yeoman houses and few minor gentry houses from the C16 or earlier, whether of timber or of stone, have survived in the stone areas of Derbyshire in recognisable form, although tree-ring dating is increasingly revealing C15 & early C16 dates for the more substantial gentry houses. Further south in the county, there survive, often as parts of later houses, significant remains of superior timber dwellings, generally of the C16, and, more widely, fragments of houses, originally timber framed and, now encased in later stone or brick shells. There survive also, (Figure 1), over 150 cruck framed buildings, some houses, some barns, and distributed mainly over the east and south of the county but by no means unknown in the west and north-west. They include at one extreme, the simplest and smallest surviving vernacular houses whilst the cruck barns are amongst the most impressive of the county's buildings. Tree-ring dating is again demonstrating that many of the latter date from the C15 and early C16 but more field work and research is needed to confirm to what extent the stone region crucks were associated with timber walling or whether, as now, they were always associated with stone walling. (5)

2.1.5 The evidence of Domesday(6) and the distribution of place-name elements(7) which are descriptive of woodlands directly, or indirectly to clearances in former woodland, (Figure 2) suggest that many parts of the county were, in the Middle Ages at least, heavily wooded. Their distribution suggests that extensive woodlands formerly covered the Derwent valley north of Derby, and to its east, the other main river valleys and east and north-east Derbyshire with the exception of the gritstone uplands and the magnesian limestone. To the west of Derby and in south Derbyshire along the Leicestershire border, there were also with the exception of the flood-plains of the Trent and Dove other concentrations of woodland. There were too, further woodlands in the north-west of the county beyond the apparently, near treeless limestone plateau and moors of the High Peak.

2.1.6 The survival or rate of loss of this once extensive woodland from the Middle Ages down to the C16 can only be guessed at, there were demands on it not only from encroachment but for fuel, for domestic building, implements and machinery and for all kinds of industrial purposes. Earlier, throughout the Middle Ages a wide variety of documentary evidence confirms the availability of timber for building albeit strictly regulated, but only for the great royal hunting forests of Duffield Frith and the Peak are there extensive records of the management of the woodland and its eventual replacement by agriculture in the C17.(8)

2.1.7 At the regular eyres (courts) for the Royal Forests of the Peak, there are frequent references to damage to the oak woods from timber removal. At the 1268 eyre, it was reported that the 'inhabitants of Bowden and its hamlets, since the last eyre (1250) had done damage to the woods of oak and whitethorn to the value of 30s (£1.50), and a hundred oaks had been destroyed.' The inhabitants of Bradwell too, had 'damaged the wood of Pyndale to the extent of 5s (25p); those of Thornhill and Aston their woods to the extent of 6s 8d (33p); and those of Fairfield and Buxton the wood of Boseworth to a like extent.' (9)

2.1.8 In Duffield Frith, a Commission in 1540 heard that '1,032 trees and loads of wood' had been felled over the previous 3 years and, a later Commission that between 1560 and 1587 some 56,000 or 95% of the 'large' oaks and 91% of the 'small' oaks had been removed. There were of course other demands on the woods, fuel for both domestic and for the growing industrial activities

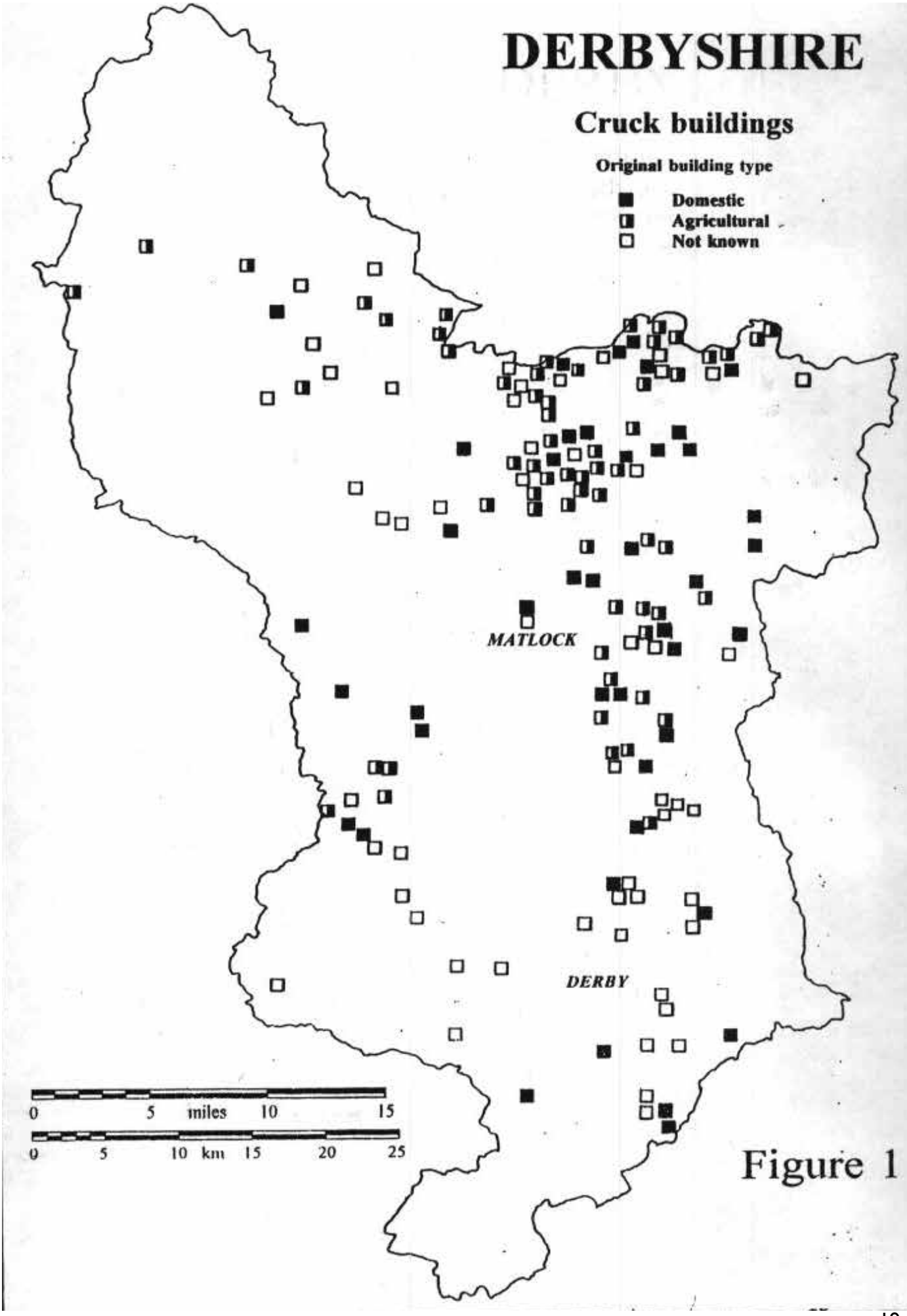
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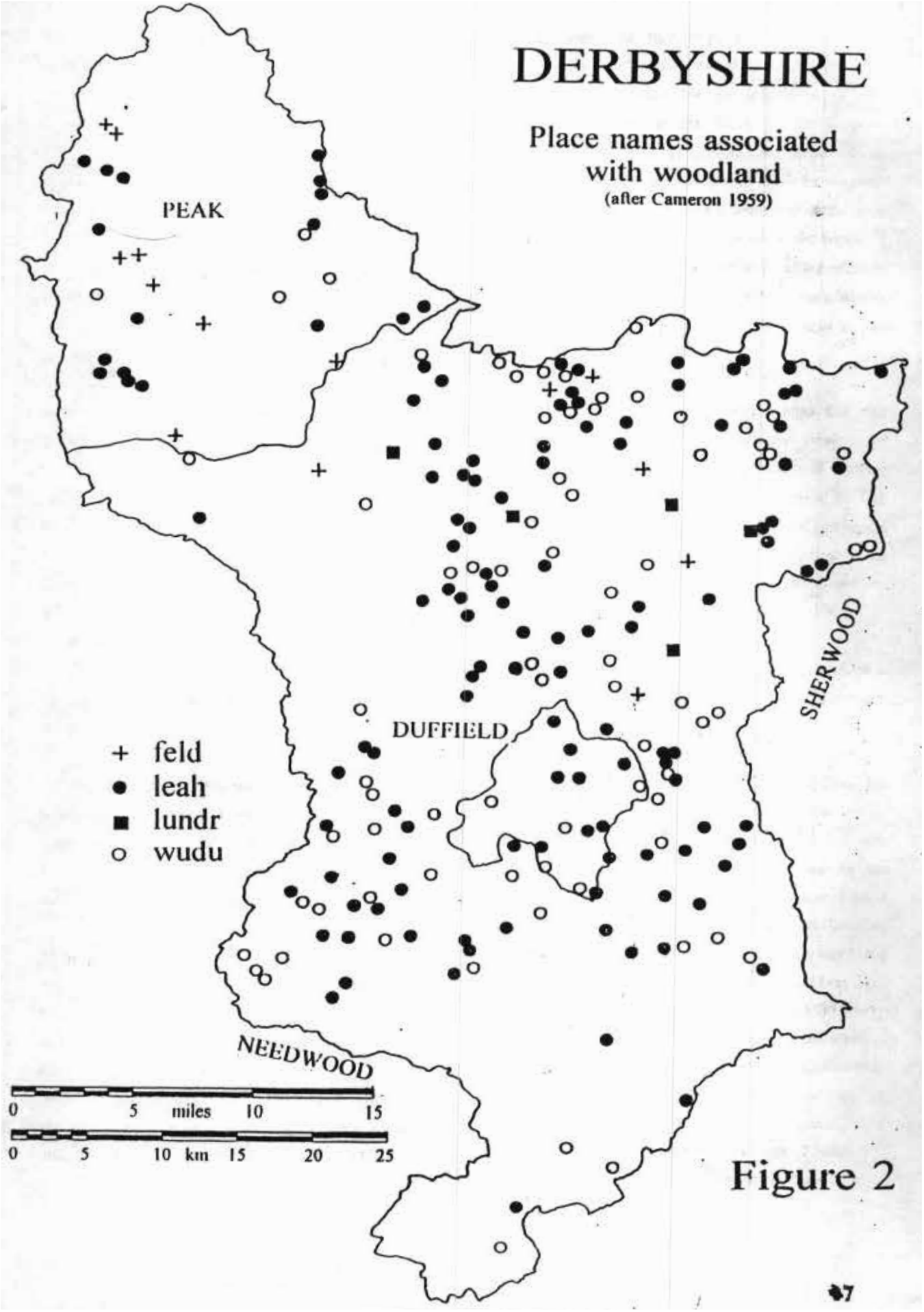
Figure 1


DERBYSHIRE
Place names associated with woodland
(after Cameron 1959)
PEAK
DUFFIELD
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0 5 10 km 15 20 25

Figure 2

in and around the Frith and for 'hedgehote out of the woods to hedge their common corn fields.' but with the exceptions of the high moors and the limestone plateau the picture is one of a ready availability of timber throughout the Middle Ages and perhaps later in some areas of the county. (10) The distribution of the county's listed timber-framed buildings is shown in Figure 3.(11) In the east of the county the distribution lies mainly along the north-south line of the coal measures, extending southwards to the Leicestershire border and over the Keuper marls of south-west Derbyshire southwards to the Dove. Whilst the geographical distribution appears to closely parallel that of cruck framed buildings (Figure 1), the density of survival of the two forms of construction are distinctly different with crucks representing the dominant form in the north, timber frames the dominant form in the south and south west. On the basis of the existing evidence, it seems that most crucks in the north of the county are represented by barns as opposed to houses but often in association with a later farmhouse. In the south and south west they are generally houses whilst the timber framed buildings may be either.

2.1.9 An early-C17 traveller through the Peak might have noticed too, here and there, brand new or significantly re-built farmhouses in stone, with roofs perhaps still in straw thatch, but more often in stone slate. Elsewhere, away from the stone districts and perhaps some years later, a similar re-building, perhaps in timber but more likely in brick would also take place. Beginning at the highest social levels, at different dates and driven by a complex variety of reasons and opportunities this apparent great re-building of (mainly rural) England has been studied and documented by a host of historians. It remains, and the reasons for it, since Hoskins' observation in the 1950's of the extensive remodelling of medieval and sub-medieval houses and the construction of newly planned houses which he suggested had occurred between 1570 and 1640, one of the most debated topics in the study of English vernacular houses. (12) Later research has demonstrated that whilst such a major re-building had occurred it was taking place along a 'moving frontier of modernisation' and continued to at least the end of the C18. (13)

2.1.10 Whatever the driving forces behind this now recognised major upheaval in English rural housing, the implications of it on the use and provision of building materials are considerable. Timber, by the end of the C16 was already in short supply over parts of the county and could only be replaced by local stone or locally fired bricks: the economic transport of non-local materials in quantity was still nearly 200 years away.

2.1.11 The beginnings of an expansion (or perhaps a resurgence, see note 14) in quarrying had almost certainly begun before the end of the C16, brought about by the rebuilding and re-modelling of houses at supra-vernacular and gentry level. At Hardwick (Old Hall 1580's, New Hall 1590's), Haddon (throughout C16), new or major rebuildings in stone were taking place. Quarries near Rowsley and on Stanton Moor provided stone for the alterations at Haddon whilst at Hardwick, stone from a quarry within the Park and stone slate for the Old Hall from quarries in Walton, Whittington and elsewhere was being used.(15) In the south, Longford Hall (C16), Sudbury Hall (c1620 and 1660's) and Weston on Trent Hall (1630's) were all of locally fired brick. Bess of Hardwick's first house at Chatsworth (completed 1576) had been an ambitious edifice in brick whilst at Repton, Prior Overton's Tower (1436) represents the earliest brick house of the region.(16) The contrast between the old and the new ways of building is nowhere better seen than at Hardwick where, during September and October 1591 John Worthington was getting and dressing slates 'at the old Feld', 'Walton Spring' and 'Walton Hey' for the roof of the Old Hall, yet some 2 years later payment was being made 'to the plumer.. for coveryng the new buylding roof' (at the New Hall) in lead.(17) Whilst the parapetted roofs of the newly fashioned houses were in lead, for other, more traditional new rebuild houses the choice of roofing probably remained much the same as it had been for their predecessors. Only with the coming of the canals in the late C18 and the railways some fifty or so years later were the options for roof covering widened to include slates, whether Swithland, Welsh, Cumbrian or even further afield and tiles whether Derbyshire, Staffordshire or pantiles.(18) The consequences of this widened choice are reflected in the character of the roofs

we see today.

2.1.12 The Statutary Lists of Buildings of Special Architectural or Historic Interest comprise an inventory of almost four and a half thousand of the county's most visually obvious or well-known historic buildings. A wide variety of information on dates, materials and architecture is included in many of the list descriptions but as with all sampled data, for the lists represent only a sample of all surviving older buildings, the lists do have their limitations. However, notwithstanding these limitations, the data enables the statistics and distribution of many characteristics of the county's older buildings to be calculated.

2.2 The character of Derbyshire buildings - evidence for a C17 re-building

2.2.1 The Derbyshire lists include over two hundred and eighty vernacular houses having inscribed dates within the period 1600-1800. Dates are found chiefly on door lintels but other dated features include cast rainwater goods, rectangular or oval plaques set into walls, plasterwork, glazed headers set into brick gables walls, and so on. Others have discussed at length, the importance which may be ascribed to such evidence; suffice to say, the conscious effort of incorporating inscribed dates of some form may in part be ascribed to fashion or tradition and may also support the view that investment in new building or improvements is more likely in times of economic prosperity. (19)

2.2.2 The Derbyshire data together with data on a sample of 3,345 houses covering 17 other counties in England is shown as decennial figures in Figure 4. For the English (and very much larger) sample the outstanding decade for dated houses was the 1690's. Taking this sample only, the data gives a regular pyramid broken only by falls in the 1640's (the years of the civil war), the 1740's (a decade of severe agricultural depression) and a rise in the 1770's. The

Derbyshire sample reflects faithfully the two former and, nationally perceived falls albeit with an apparent lag but significantly increased building activity after the civil war years. Not surprisingly, with such a relatively small Derbyshire sample, there are other variations in trend between the two samples, however, the 1680's appear to be a decade of peak building activities between the 1660's and the depression years of the 1740's. Thereafter, a significant resurgence seems to have taken place with a peak in the 1770's. (20)

2.2.3 The validity of even these general conclusions rests on a supposition that the likelihood of a date inscription being associated with new or re-building work was much the same throughout the C18 and C19 and much the same throughout the county. This hypothesis can be tested in part, by examining, on an area basis, what proportion of all the 1,500 C17 and C18 houses have date inscriptions. Overall, for the areas shown in Figure 5, approximately 1 in 8 houses (13.1%) will have a date inscription. There are however, variations over the 7 regions: in the north-west over 1 in 5 (22.1%) of houses are dated by inscription, whilst in south Derbyshire and the area west of Derby the numbers are significantly less, 6.8% and 4.8% respectively.

2.2.4 Subjective as dating assessments based solely on visual or architectural features may be, the listing descriptions provide a further and much larger sample of dated buildings which can be used to examine the geographical variations in building activity. A date profile for all the county's vernacular buildings is shown plotted for various regions of the county in Figure 5, the chosen regions broadly reflecting the major geological divisions. Omitted areas are those for which the lists are deficient in their dating information. (see Appendix A)

2.2.5 The profile clearly demonstrates that the northern half of the coal measures and the magnesian limestone have the highest density of C16 and C17 vernacular buildings, the survivors presumably of the re-building discussed above, that is, buildings in stone, largely stone slated. Else-

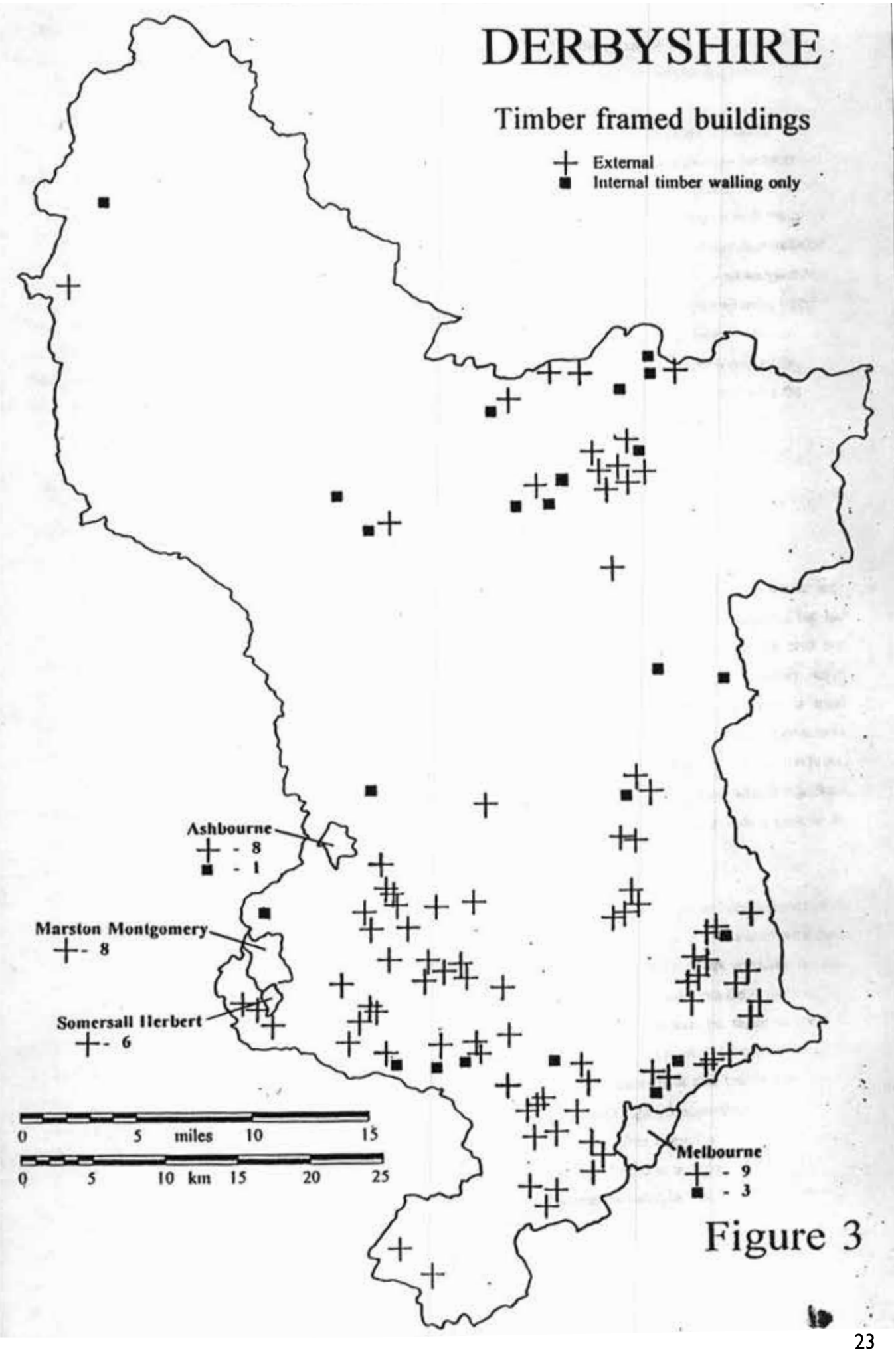

DERBYSHIRE
Timber framed buildings
External
Internal timber walling only
Ashbourne
- 8
- 1
Marston Montgomery
- 8
Somersall Herbert
- 6
Melbourne
- 9
- 3
0 5 miles 10 15
0 5 10 km 15 20 25

Figure 3

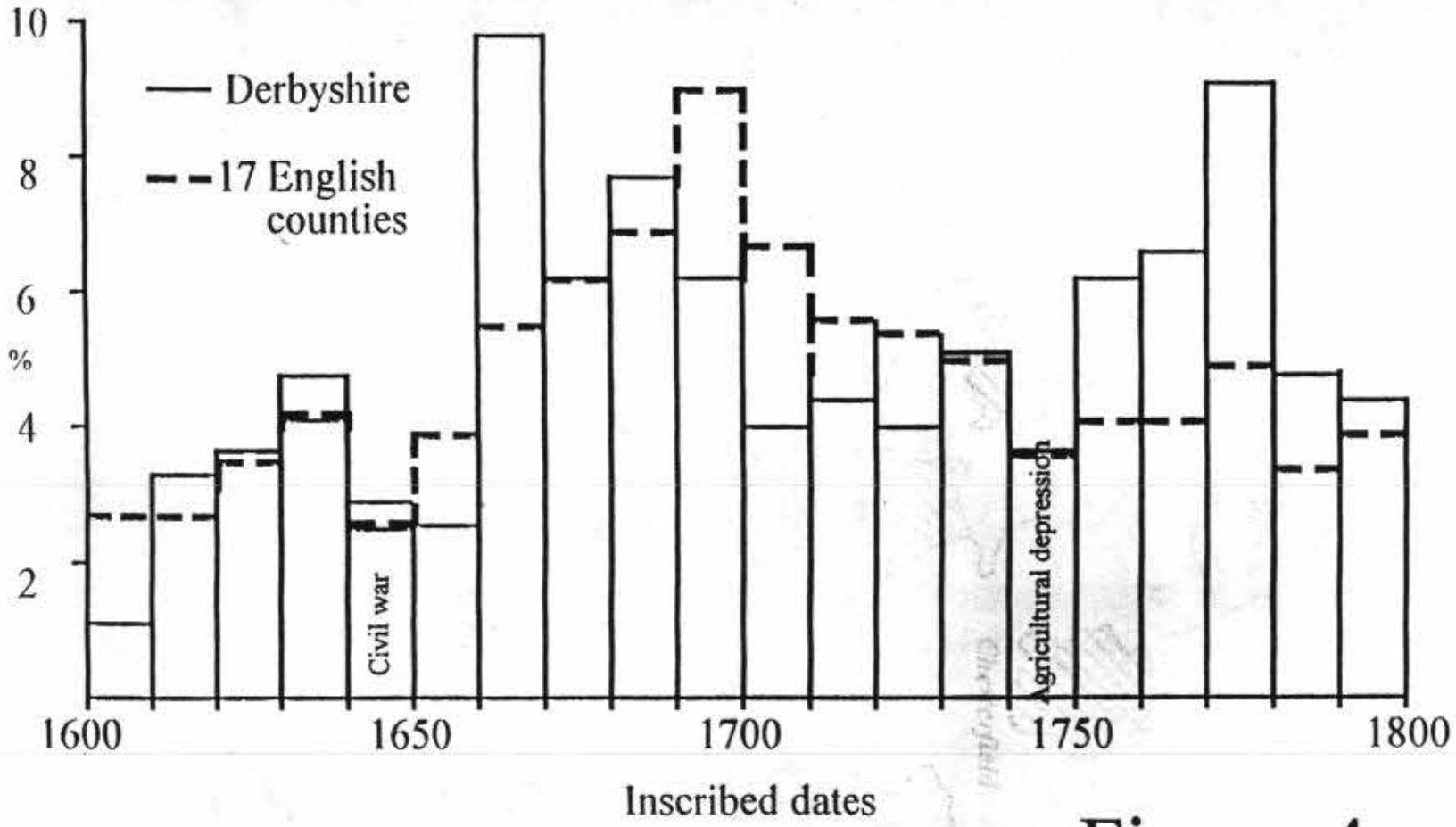

10
8
6
%
4
2
Derbyshire
17 English counties
Civil war
Agricultural depression
1600
1650
1700
1750
1800
Inscribed dates

Figure 4

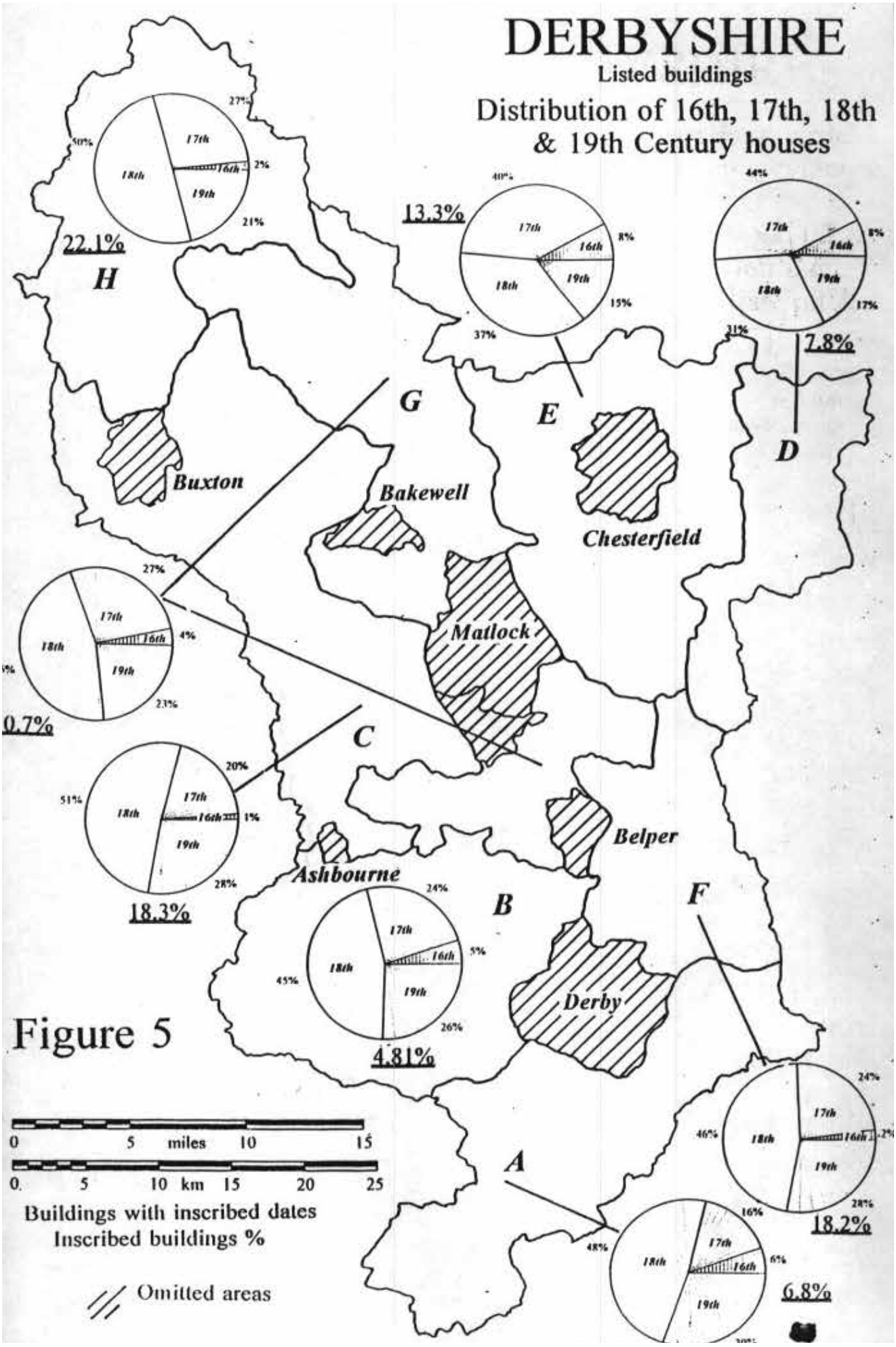

DERBYSHIRE
Listed buildings
Distribution of 16th, 17th, 18th & 19th Century houses
22.1%
H
13.3%
7.8%
G
E
D
Buxton
Bakewell
Chesterfield
Matlock
C
Belper
Ashbourne
B
F
Derby
A
18.3%
4.81%
18.2%
6.8%
17th
16th
18th
19th
0 5 miles 10 15
0 5 10 km 15 20 25
Buildings with inscribed dates
Inscribed buildings %
Omitted areas

Figure 5

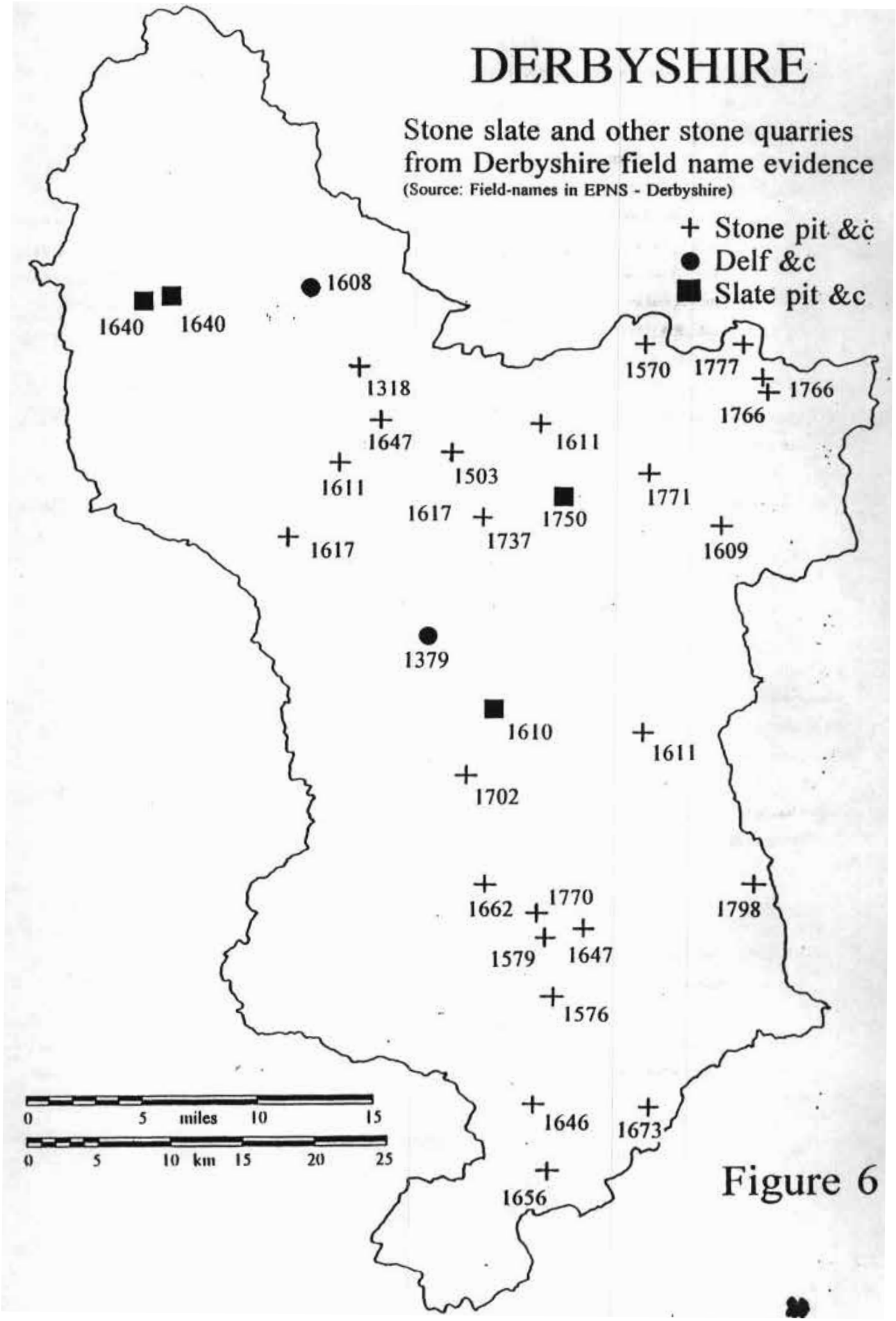

DERBYSHIRE
Stone slate and other stone quarries from Derbyshire field name evidence
(Source: Field-names in EPNS - Derbyshire)
Stone pit &c
Delf &c
Slate pit &c
1608
1640
1640
1318
1647
1611
1503
1611
1617
1750
1737
1617
1570
1777
1766
1766
1771
1609
1379
1610
1611
1702
1662
1770
1579
1647
1798
1576
1646
1673
1656
0 5 miles 10 15
0 5 10 km 15 20 25

Figure 6

where, although there are surviving earlier buildings, the picture is one of a mainly C18 building and re-building in brick with tiled roofs. Whilst the generally prevailing economic climate must have affected the inclinations and ability of the rural population to rebuild or improve their own houses, other factors could also determine the ability to generate surplus wealth with which to carry it out. Northern parts of the county had long been regions of dual economies; with industry ie. lead mining, woollen textiles or metal working providing an ability to create wealth alongside agriculture. It is chiefly in these areas that, for whatever reason, farmers and the minor gentry were able in the C16 and C17 to replace or perhaps significantly rebuild their homes in stone. Elsewhere in the county, although such rebuilding had also begun, it was not until the C18 century that new or replacement building in more permanent material, perhaps stone but mainly brick, began to take place.

2.3 The use of building and roofing materials

2.3.1 Evidence for an apparent expansion of stone quarrying in the C16 and C17 is provided by the evidence of field names associated with that activity (Figure 6) and demonstrates the extent to which quarried stone was available throughout the upper and lower Derwent Valley in particular. At what date one could begin to refer to stone quarrying as an industry is uncertain since in most instances the right to take stone from the 'commons or wastes' for local use was enshrined together with other customary rights of the manor.

2.3.2 A Parliamentary Survey of the Manor of Eckington made in 1650 confirmed that the Copyholders of the Manor have 'used to have Tymber & Stone within the Lord's Wastgrounds (as often as need shall require) for the repairing of their Houses'.(21) Over 60 years later the Manor Court Books record numerous fines for unauthorised sale of

stone and failure to fence stone quarries on the wastes and commons. On 1st May 1718 John Mettem was fined 1s 8d (8p) 'for getting stone within the waste of the manor and selling the same to others besides the copyhold tenants' (22) whilst 3 years later, Richard Newton was threatened with a fine of 10s (50p) if he failed to fence 'Noehill quarrell' and Robert Osburne similarly for 'Bramley Moor quarrell'. (23)

2.3.3 In 1811 Farey includes in his List of Freestone Quarries the quarry at Eckington Marsh perhaps the same quarry where nearly a century earlier 'ye persons who belonged to ye Quarrey on ye Marsh' were threatened with a fine of 3s 4d (16p) for not fencing or filling up the same. (24) Similar and frequent references elsewhere suggest that opening up quarries for stone getting or for removal of other building materials from the commons or wastes was subject to only the loosest of control through the manorial courts. In Abney the copyholders were allowed to remove without payment 'clods for the repair of their houses and fences' (25) and likewise in Holmesfield where the copyholders claimed the rights 'to digg and gett at their pleasure turves peates heath or linge, ferne earth for mortar and such lyke thinge and all mannr of stone in all the Lordes wastes... without payinge anythinge...for the same.' (26)

2.3.4 However, stone for sale outside the manor or to other tenants or freeholders did command a value; in 1388 a third part of the quarries of lord de Vernon in Baslow was assigned for dowry of Juliance Vernon. (27) There are numerous references too, in the manor court rolls to the letting of the quarry; in 1356 'Roger de Wynfeld and John de Crech came and took the quarry...paying 66s 8d (£3.33).' (28) By the time of the Dissolution, if not significantly earlier, the demand for stone for monastic and church building must have been in serious decline; the county's few great feudal houses would represent but an intermittent demand and the problems of transport to any distance would almost certainly rule out the use of stone for any but the most local of building projects. The quarrying and use of stone slates too must have been subject to similar cycles and constraints. The Alderwasley district had been renowned for its 'minera de sclateston' but the quarry (probably

later known as Rowcliff quarry) which, in c1260 had returned a rent of £11 pa was, by 1323 unlet, with 'neither farmer holding it nor any quarryman working therein.'(29)

2.3.5 In 1421, John Bullock of Norton (then in Derbyshire) was permitted to erect buildings within the manor and 'should have such timber as exists within the desmesne there...[and]...should have Sclatestones and any other stones within the desmesne'. (30) Here is a suggestion that in the C15, where stone slates were locally available, gentry, and perhaps other houses were being so roofed. We know nothing of the nature or size of these early slates. Archaeology has recovered 'four complete stone roof-tiles, and fragments of a further fifteen...eight were Charnwood slate, five from magnesian limestone, three from limestone, one from mudstone and one from sandstone' on the site of the South range at Dale Abbey.(31) Earlier excavations here (carried out by H M Colvin), had also produced stone roofing slabs with holes as well as Swithland slates and ceramic roof and ridge tiles. Unfortunately neither report gives any information on size. Elsewhere, stone slates in thin lamellar sandstone from field walking over the site of the C15? former house of the Okeovers just in Staffordshire were too fragmented to size. Place name evidence (Figure 6), provides only four specific references to 'slate pits' directly, but it is highly probable that some of the C16, C17 and C18 'stone pits' described, might also be able to provide lamellar grit- or sandstone suitable for slating. Farey's 1811 list of stone slate quarries includes some 13 which were also described as freestone quarries.

2.3.6 The extent to which a re-building in stone had gathered pace in the mid and south parts of the county by the early C18 is perhaps suggested by William Wolley in his History of Derbyshire. In Staunton [Harold] he notes 'diverse stone quarries' whilst Hartshorne had 'quarries of freestone, limestone and coal' and, further north, Duffield Bank was described as 'a pretty large ridge of hills between Holbrook and Horseley full of stone quarries'. Breadsall had 'some quarries of gritstone which works well and is good for paving'. (32)

2.3.7 Farey's list of freestone quarries (Figure 7) compiled a century later shows the extent to which quarrying for building stone had extended.(33) All the geological measures were then being exploited and even allowing for any deficiencies in his list, few areas of the county were not within a few miles or so of a building stone quarry although presumably only with improvements in roads locally and the coming of first, the canals in the late C18, and then the railways some fifty or so years later could dimensional stone be moved in significant quantities. Some of the most comprehensive comments on the variety of building materials in use over the county are due also to Farey. His survey, 'when the whole County, and its environs, had been minutely gone over.' had begun in 1807 and extended over the next two years. 'Over about two-thirds of the County of Derby, Limestone or Grit-stone Buildings almost universally prevail; the Walls being very substantially built, and gable-ends, with chimnies in the end walls, being nearly general; in the Red Marl and Gravelly districts at the south end of the County, and in the Coal-district there, and in part of that near the eastern side of the County, Bricks are generally used in the walls; red, and of a pretty durable kind....The Roofs of the Buildings in Derbyshire seem sharper pitched, or more acute at the Ridge, than is usual in the south of England, particularly, in perhaps one-third of their whole number, which are covered with the grey and white Slates or Tile-stones of the district.... The Red Tiles made in Derbyshire, perhaps for want of washing and more perfectly tempering their Clays are found less durable, as well as thought less handsome by many, than a sort of black or very dark blue dull glazed Tiles, almost the colour of new cast Iron, which are brought out of the Pottery district of Staffordshire... and are pretty extensively used, in the southern part of the County.

I saw but one remaining instance, of the Shingles of cleaved Oak, or wooden Tiles, which probably was once much more common, and that was on the Church at Walton on Trent: this method of covering Buildings, Churches in particular, still continues in Sussex, Kent, Essex, and some other Counties, to waste some of the very best of our Oak Timber, and ought to be speedily discontinued. (34) No considerable quantity of the Straw of Derbyshire, is, fortunately, diverted from

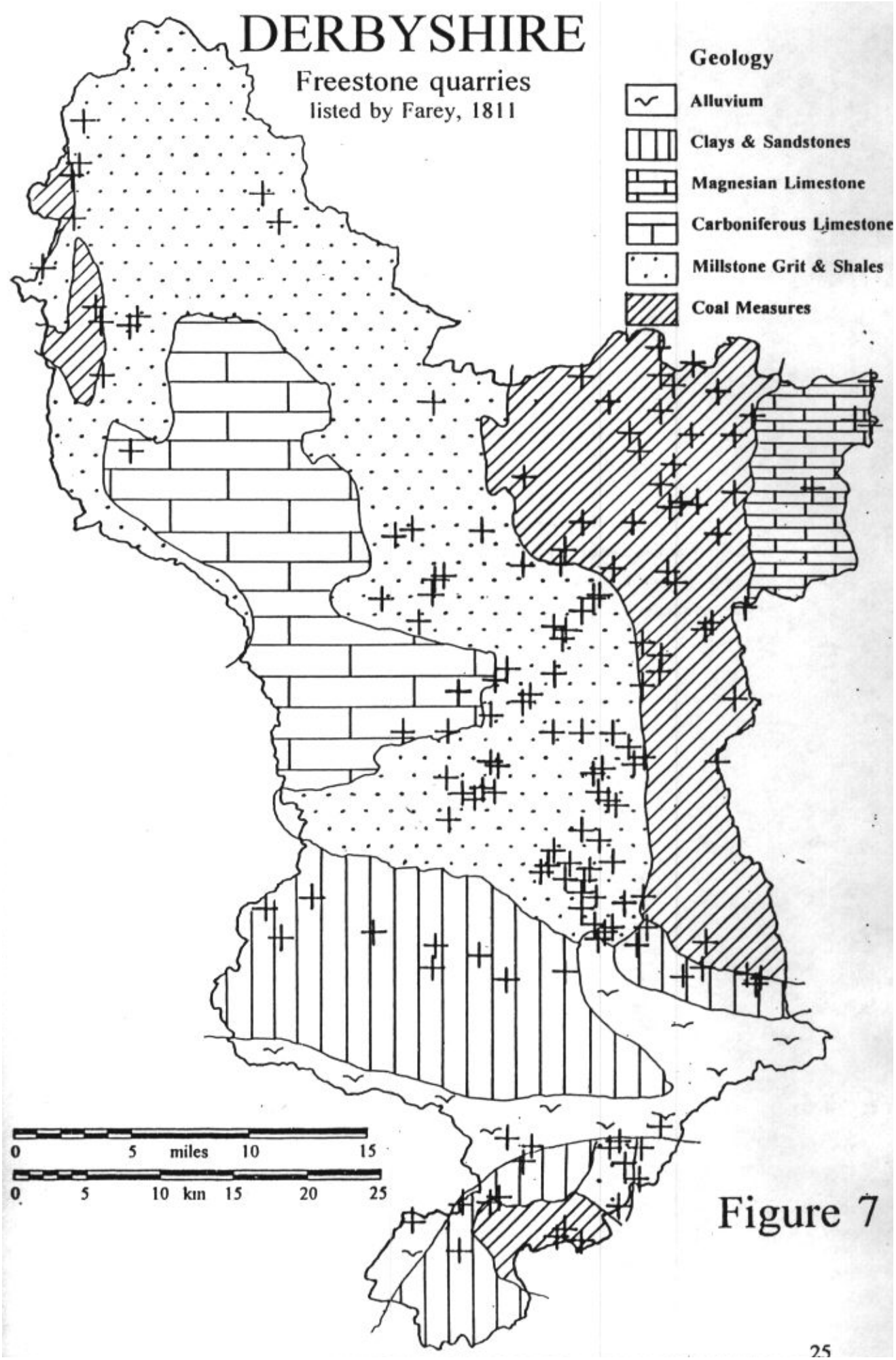

DERBYSHIRE
Freestone quarries
listed by Farey, 1811
Geology
Alluvium
Clays & Sandstones
Magnesian Limestone
Carboniferous Limestone
Millstone Grit & Shales
Coal Measures
0 5 miles 10 15
0 5 10 km 15 20 25

Figure 7

25

the more important purposes of litter and manure, to cover permanent Buildings; and the few Thatched Farms.

Houses and Cottages which are still found, ought to give place to Tiles, or Tile-stone coverings.... In the northern parts of the County it is common, when Thatch is used, to lay it on a course of strong Eaves-slates or Tile-stones, which prevent the Cattle from pulling the Thatch off low Buildings surrounding a yard, or against a field; and ladders, &c. occasionally place against such Buildings, do less damage to thatch Eaves; and about Mansfield, Notts, such Eaves-slates are used to Tiled Buildings with the same view.' (35)

2.3.8 Commenting on the timber-framed buildings which he saw, Farey observed that this mode of building ought 'to be entirely abolished, and Stone, Brick, or Pise Earth walls, universally adopted in Buildings.' (36) Farey was writing at a time when the canals connecting south, north-west and east Derbyshire with the industrial areas of Staffordshire, the Midlands and the north as well as the River Trent had for some two or three decades provided easy transport for industrial goods. One sees in his account already the decline of thatch as a roofing material and its replacement by plain Staffordshire tiles.

2.3.9 By 1830, English annual production of plain tiles was in excess of 41,700,000, and that for pan and ridge tiles 20,600,000. Staffordshire production in 1832 was estimated at over 11 million. (37) Table 1, showing the relative usage of various roof coverings has been compiled from data for 3003 roofs contained in the Statutory Lists for the rural areas of Derbyshire.

Table 1. Surviving traditional roof coverings on listed buildings in Derbyshire

(see Figure 5 for omitted areas)

Pan Tile	Plain tile	Slate	Stone slate	Thatch	Modern & other
30.	1075	927	770	33	168
1%	36%	31%	26%	1%	5%

2.3.10 The distribution of these traditional roofing materials is shown in Figures 8 - 11 and confirms the general conclusions of earlier writers such as Brunskill who have attempted to identify their use and distribution.(38) The data also demonstrates the rate of their loss resulting from unauthorised roof repairs or substitution, or, perhaps from re-roofing before listing.

2.3.11 In the north-east and east of the county the highly localised use of traditional pantiles relates to their long established use further east in Nottinghamshire and Lincolnshire. Locally their use occasionally overlaps that of stone slates and in a few instances stone eaves slates are associated with pantile roofs.

2.3.12 The surviving thatched buildings, mainly in the area south and west of Derby, may be divided into two distinct groups. Notwithstanding Farey's comments above, there remain a few older houses, cottages and outbuildings presumably always or long since thatched and generally timber framed, with to the south of Ashbourne, a group of mainly C19 thatched estate cottages in the vernacular tradition. Innocent(39), makes much of the traditional forms of thatching still then surviving in the region in the early years of the C20 but regular re-thatching using alien materials and techniques has to all intents displaced them. Perhaps Lodge Farm, Hollington with its thatched roof long since covered over with corrugated iron sheeting represents a sole survivor of earlier and more traditional techniques of thatching.

2.3.13 In Derbyshire, plain tiles and slates are the roofing materials of the Industrial Revolution. It may be possible that Swithland Slates (north Leicestershire) were being used in the south of

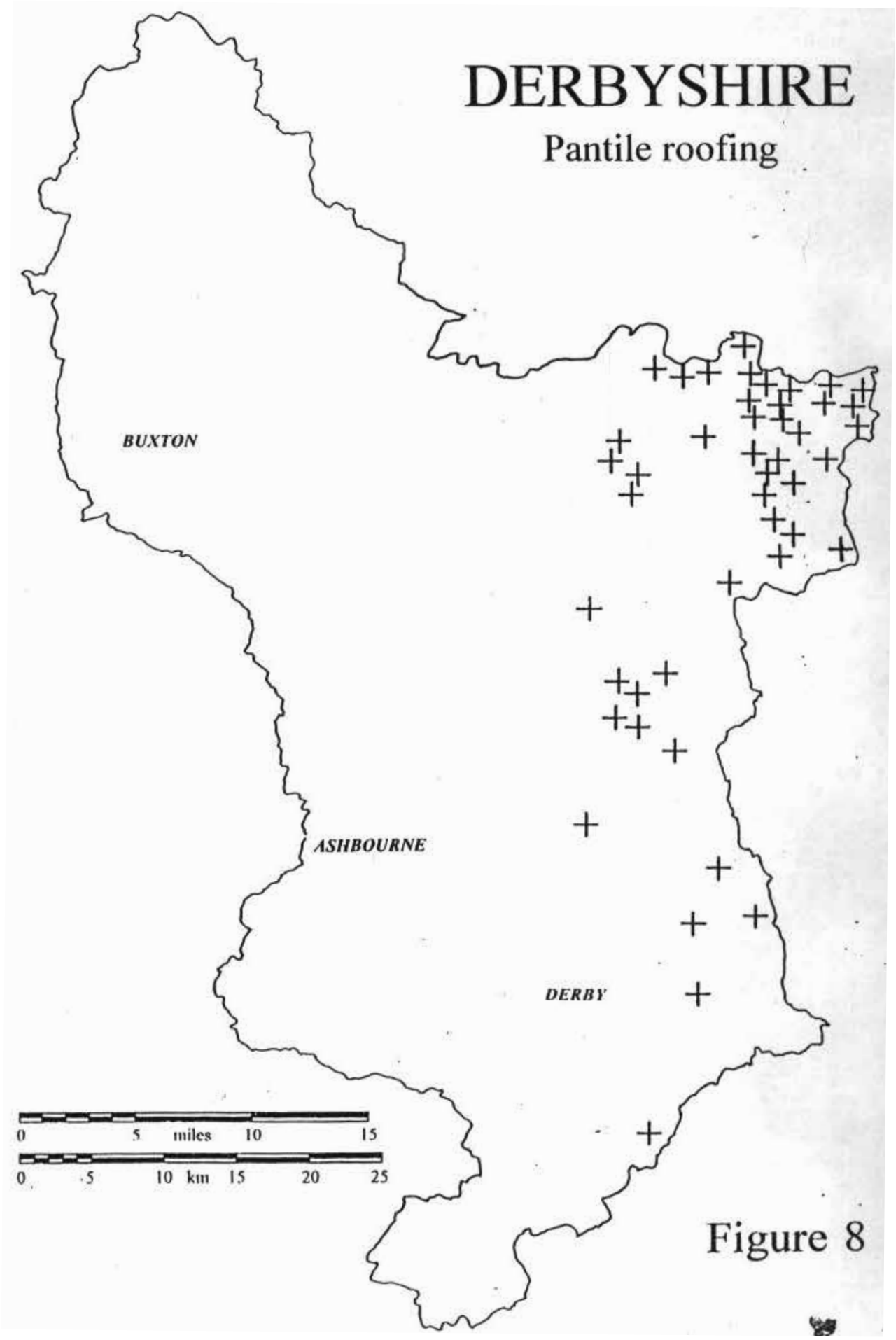

DERBYSHIRE
Pantile roofing
BUXTON
ASHBOURNE
DERBY
0 5 miles 10 15
0 5 10 km 15 20 25

Figure 8

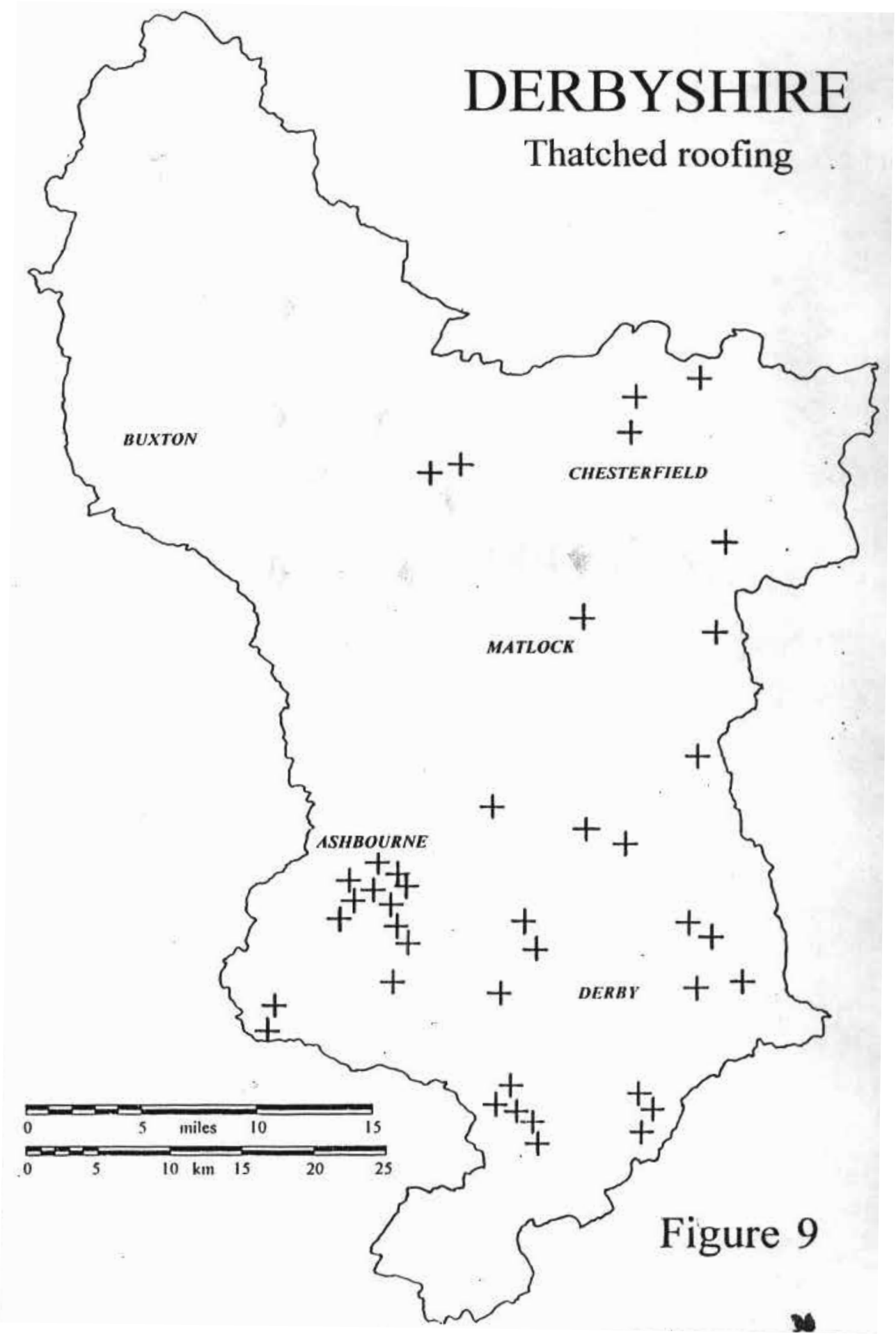

DERBYSHIRE
Thatched roofing
BUXTON
CHESTERFIELD
MATLOCK
ASHBOURNE
DERBY
0 5 miles 10 15
0 5 10 km 15 20 25

Figure 9

Figure 10

DERBYSHIRE

Slate & Plain tile roofing

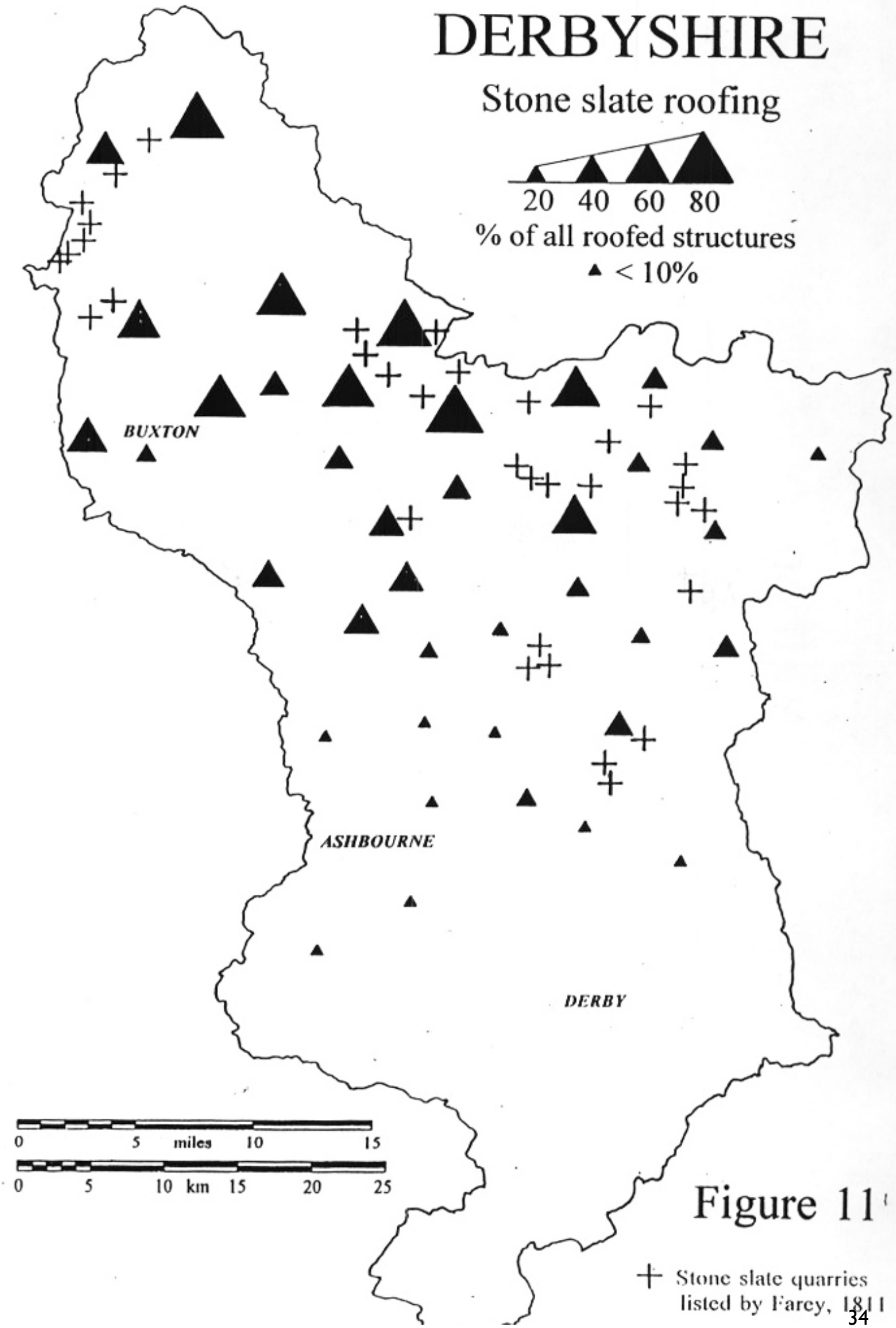

DERBYSHIRE
Stone slate roofing
20 40 60 80
% of all roofed structures
< 10%
BUXTON
ASHBOURNE
DERBY
0 5 miles 10 15
0 5 10 km 15 20 25
Stone slate quarries listed by Farey, 1811

Figure 11

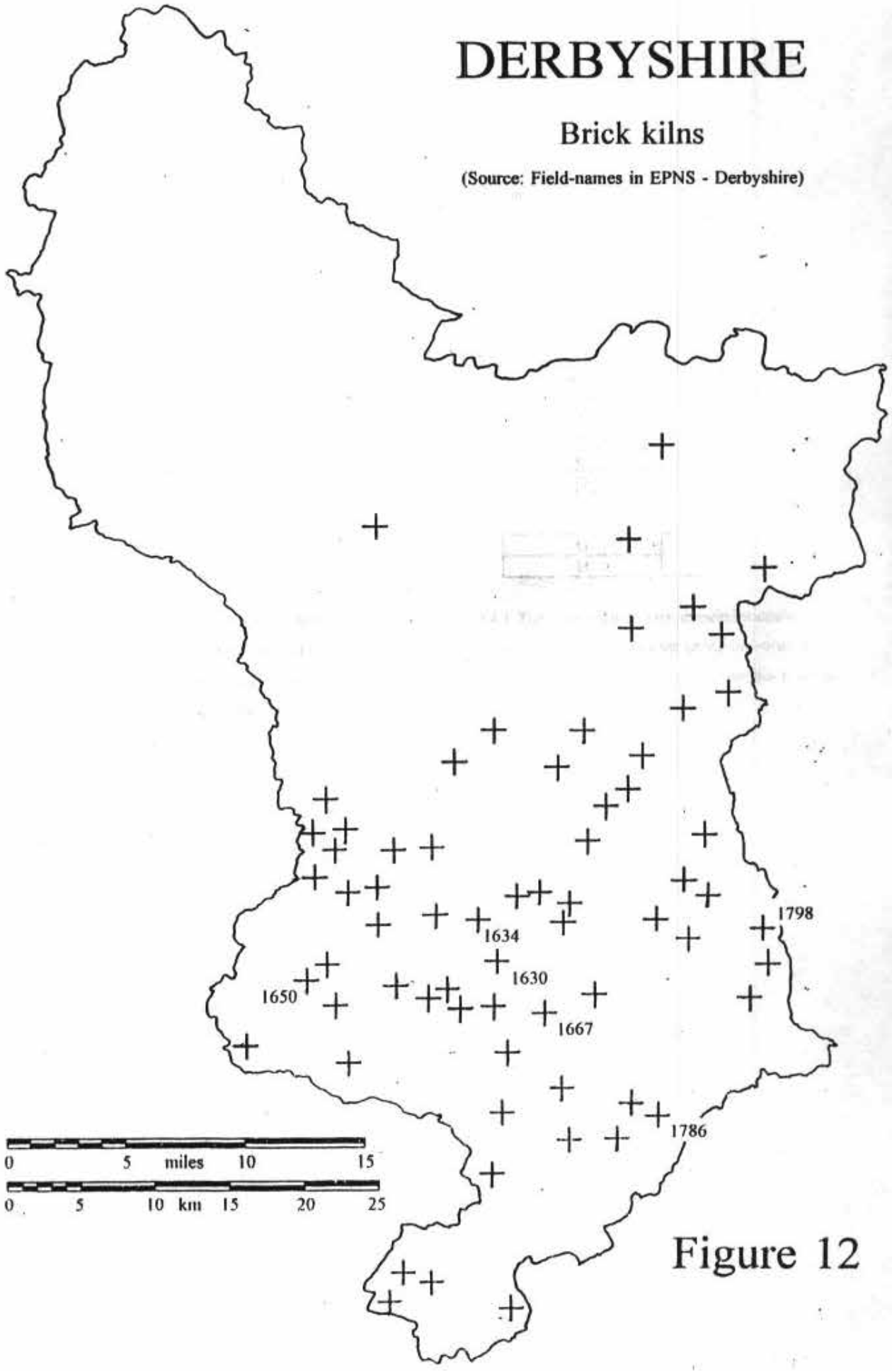

DERBYSHIRE
Brick kilns
(Source: Field-names in EPNS - Derbyshire)
1798
1634
1630
1650
1667
1786
0 5 miles 10 15
0 5 10 km 15 20 25

Figure 12

the county before the late C18 but unfortunately the List descriptions do not differentiate between these and slates from elsewhere.

2.3.14 Just a few roofs, particularly around Melbourne, are described as being of red plain tiles. Further research may also reveal the extent to which the highly local brick makers engaged in the late C17 and early C18 building and rebuilding in south and south-west Derbyshire were also providing the red plain tiles condemned by Farey before their replacement by tiles from Staffordshire. The extent of this highly local brick making activity is well illustrated (Figure 12) by the survival of field names associated it.

2.3.15 The use and distribution of plain tiles is almost uniformly and totally confined to the southern half of the county in an area south of a line through Matlock. For parishes in the western half of this area they represent almost the sole form of traditional roof covering (a little thatch excepted) whilst in the parishes further east approximately 50% of roofs are in plain tiles, 50% in slates. North of Matlock, and especially the north-west, when roofs are not of stone slate they are likely to be of slate but seldom forming the predominant material. In the north-east, no one material is dominant with pantiles, slate and stone slates all surviving.

2.4 Stone slate roofing

2.4.1 The distribution and density of use of stone slate roofing is shown in Figure 11. Whilst the highest densities are to be found in the parishes of the north-west, the upper Derwent Valley and the 'non-pantile' parishes of north-east Derbyshire, their use extends over the full northern half of the county. Outside the northern areas, where stone slate roofs form from 50-80% of all roof coverings they are, in the more southern examples, generally at less than 10% density. Figure 11 shows also the stone slate quarries listed by Farey in 1811(40) and suggests that the areas of highest density of survival (and presumably original use) of stone slate roofs are still, in general, closely associated with the areas which had the highest density of quarries. If we accept Farey's list as comprehensive, then, in the absence of nearby quarries just over the boundary into Staffordshire, Figure 11 suggests that in west Derbyshire at least, stone slates were being transported up to about 15 miles. The missing data for the mid-Derwent valley arises from the deficiency of information on roof coverings in the Belper and Matlock old Urban District area lists.

2.4.2 The predominant stone slate roofing areas are also those areas where the highest density of modern replacement roof coverings are to be found.

2.4.3 Overall, for the areas included in the survey, approximately 5% of all listed roofed structures have their original roof coverings. Although we can never be sure what

were the original materials in such cases, it seems that, with the highest losses in the predominantly stone slate areas, these are the roofs which have in the past been most at risk from replacement with modern materials.

Table 2. Loss of traditional roof coverings

Area (see figure 5)	Percent of roofs with modern coverings
A	2.1
B	1.2
C	5.7
D	< 1
E	14.8
F	8.9

G	6.6
H	3.2

2.4.4 The data used in this report includes almost 800 listed stone slate roofed buildings, increasing the survey to include the omitted areas would perhaps increase this to about 900 and including other stone slated buildings within the curtilage of listed buildings, to about 1000. All non-listed, but stone slate roofed buildings in Conservation Areas too, are potentially at risk from inappropriate roof repairs and could be added to this total suggesting that, in the absence of a supply of new or salvaged slates, a total of perhaps 2000 stone slate roofs are potentially at risk. Elsewhere in the countryside, the loss of stone slated roofs is further to be deplored.

2.5 Notes and References

2.5.1 Note on Terminology

Over the years, a variety of terms have been used to describe the split or lamellar (generally) sandstones used for Derbyshire roof coverings. They have been commonly referred to as stone slates, slate-stones, grey slates, stone flags &c., terms still in use and understood today. For the purposes of consistency they will in this introduction be referred to as stone slates, a term in general and widespread use and a term almost
universally adopted in the Statutory List descriptions. Likewise, although many of the traditional geological terms have been revised, it is far simpler to retain those which through long usage are more easily and generally understood.

2.5.2 References

(1) Georges Edelen ed., The description of England by William Harrison. (Cornell University Press, 1969). p.196.
(2) G Beresford, The Medieval Clay-land Village: excavations at Goltho and Barton Blount. Society for Post Medieval Archaeology. Monograph No 6, 1975. p.40.
(3) CF Innocent, The development of English Building Construction. (CUP, 1916). Pp.118 - 119.
(4) E Mercer, English Vernacular Houses. (London, 1975). p.8.
(5) NW Alcock, Cruck construction: An Introduction and Catalogue. CBA Research Report No. 42, (London, 1981). Vernacular Architecture now publishes annually the latest additions to the Derbyshire and Peak District list of tree-ring dated buildings.
(6) HC Darby, Domesday Geography of Northern England. (CUP, 1962), p. 309.
(7) K Cameron, Place Names of Derbyshire, 3 vols., English Place-Name Society, 27, 1959. The real or apparent absence of field names associated with woodland or Derbyshire may be explained by a paucity of surviving early documentary sources for many parishes in this area, yet, this is an areas with a high density of surviving timber framed buildings. The flood-plains of the Trent and Dove also have a high density of surviving such buildings.
(8) JC Cox, Forestry. VCH, Derbyshire. 1, 1905, p.406.
(9) JC Cox & F Strutt, 'Duffield Forest in the sixteenth century'. DAJ, 25, 1903, pp.184-216.
(10) Cox, op cit., p.418.
(11) see Appendix A for comments on the use of the Statutory Lists.
(12) W G Hoskins, 'The re-building of rural England, 1540-1640'. Past & Present, 4, 1953, pp.44-59. Hoskins originally coined the term Great Re-building to describe what he saw as a peak in the building of new houses and in challenge to Hoskin's hypothesis came in R. Machin's 'The Great Re-building: a re-assessment'. ibid., 77, 1977, pp. 33-56. Further discussion may be found in the same author's The houses of Yetminster, (University of Bristol, Department of Extra-Mural Studies, 1978); CRJ Currie, 'Time and change: modelling the attrition of old houses', Vernacular Architecture, 19, 1988, pp.1-9; R Taylor, 'Population explosions and housing 1550-1850', ibid., 23, 1992, pp.24-29. but for two more recent re-appraisals see C. Platt, The Great Re-building of Tudor and Stuart England. (UCL Press, 1994) and Chapter 1 of M Johnson's Housing Culture. (UCL Press, 1993).

(13) C Platt, op cit., p. 2.
(14) For a history of quarrying in the Middle Ages see D Parsons, Quarrying & Building in England, AD 43-525. (Phillimore, 1990). A history of freestone and stone slate quarrying in Derbyshire has yet to be written.
(15) D Durant & P Riden eds., The Building of Hardwick Hall. 1, Derbyshire Record Series, 4, 980, p. xxiv.
(16) For a comprehensive description, including useful comments on the source of their building materials, of the houses of the gentry and the nobility in the county see M Craven & M Stanley, The Derbyshire Country House. (Breedon Books, 1991).
(17) D Durant & P Riden eds., The Building of Hardwick Hall Part 2: The New Hall, 1591-98. Derbyshire Record Series, 9, 1984, p.210.
(18) Roof tiles were almost certainly being made in Derbyshire, together with bricks, from marls from the Keuper measures as early as the C17. Farey (below), 1, 148, comments on the suitability of these marls for brick and tile making. He also lists brick and tiles kilns on other geological measures. ibid., p.445, pp.452-453.
(19) Machin op cit., p.40. see also B Hutton 'Re-building in Yorkshire: the evidence of inscribed dates'. Vernacular Architecture, 8, 1977, pp.819-824. and Giles op cit., Chapter 4.
(20) Machin op cit., pp.36-39.
(21) TW Hall (compiler), Court Roll & Parliamentary Survey of Eckington. Descriptive Catalogue of the Edmunds Collection (in Sheffield City Library). Sheffield 1924. p.80.
(22) ibid., p.186.
(23) ibid., p.190.
(24) ibid., p.187.
(25) CEB Bowles, 'The Manor of Abney: its Boundaries and Court Rolls', DAJ, 29, 1907, p.140.
(26) HC Fanshawe, 'Court Rolls of the Manor of Holmesfield', ibid., 30, 1908, p.184.
(27) C Kerry, 'The Court Rolls of Baslow', ibid., 23, 1901, p.4.
(28) ibid., 22, 1900, p.69.
(29) PRO Mins Accts, bundle 1146, no.11.
(30) Indenture of Lease, Collection, Sheffield City Library, No 651. I am indebted to Miss JC Sinar for translating and interpreting this lease.
(31) C Drage, 'Dale Abbey: the South Range excavation and survey 1985-87', DAJ, 110, 1990, p.75.
(32) C Glover and P Riden eds.,William Wooley's History of Derbyshire, Derbyshire Record Society, 6, 1981, see entries for the places named.
(33) J Farey, General View of the Agriculture and Minerals of Derbyshire. 3 vols.(London 1811). 1, pp.416-422.
(34) an early reference to the use of shingles is given by Cox & Strutt, op cit., p.183. In 1314 the building or re-building of the Earl of Lancaster's mansion in Ravensdale (part of Duffield Frith) called for amongst other materials, '1,300 roofing shingles'.
(35) Farey, op cit., 2, pp.12-14. He also describes other topics, rough-casting of walls, launders, cottage and barn floors &c. pp.12-20.
(36) Farey, op cit., 2, p.14.
(37) Statement of Duties on Slates &c., House of Commons Parliamentary Papers, 1830-31, (354).
(38) R W Brunskill, 'Distribution of Building Materials &c.', Trans. Ancient Monuments Society, NS 23, 1978, pp.41-65. See also his Illustrated Handbook of Vernacular Architecture. (Faber, 1978), pp.194-196.
(39) Innocent op cit., chapter xiii.
(40) Farey, op cit., 1, pp.428-430. Farey's list includes 13 or so freestone quarries which were also producing stone slates.

Appendix 2.A. Using the Statutary Lists

2.A.1 The distribution maps of dates, roofing materials and other statistics are derived from the Statutary Lists of Buildings of Special Architectural or Historic Interest for the county. These Lists presently comprise about 5500 'Listed Buildings' of which about 80%, or 4400, comprise roofed buildings, the remainder being 'structures' such as bridges, mileposts, churchyard monuments, walls &c. A very small percentage may also be scheduled Ancient Monuments.

2.A.2 Derbyshire is covered by some 51 volumes of list entries or 'Greenbacks' as they are usually known, covering the old Urban District Council and Borough areas existing before the 1973 re-organisation of local government together with the remainder of the (present) county in groups of adjacent parishes. Some lists may include as few as 15-20 buildings and structures, others some few hundreds although their total number is continually changing as amendments are made: buildings may be added to the lists either individually or as the result of re-surveying whilst demolition is removing perhaps 10 or so each year from the total.

2.A.3 The Lists represent an underappreciated source for the study of buildings, particularly vernacular buildings, but like all sampled data, for that is what they comprise, the limitations on their use as a representative sample must be fully understood.

i) Many of the present lists, particularly those covering urban areas, are based on surveys of the early 1970's and reflect the priorities and scholarship of that period. Descriptions are usually very brief and superficial whilst groups such as terraces or houses with ancillary buildings or structures are often dealt with under just one list entry.

ii) In some instances, buildings and structures within the curtilage of a listed building are also deemed to be listed although not specifically mentioned or described.

iii) The process of re-surveying is an ongoing one, particularly of those areas covered by the early lists yet the current Derbyshire lists range in date from about 1970 to 1995. Later lists are much more comprehensive in their descriptions, the level of understanding and scholarship of surveyors is much greater, more recent buildings are now being listed and more 'lesser' buildings are now being included with their own specific list entry.

2.A.4 For the purposes of this study, most early urban area lists, ie those for Buxton, Matlock, Wirksworth, Ashbourne, Bakewell, Derby, Chesterfield, Glossop, and Belper have been omitted. Not only do they frequently omit the type of roof covering, but in many instances group many buildings together under one entry. This is particularly the case with the industrial communities such as Belper (Long Row), Matlock (Cromford Hill) but also applies to Bolsover (New Bolsover), Litton (Cressbrook) &c. Estate villages comprising mainly 'polite' architecture or C19 cottages and houses built consciously in the vernacular tradition and where their numbers are significant may also distort the data.

Appendix 2.B List of Figures

The Industry Today

3.1 At the start of the study this section would have warranted a one word entry: non-existent; at least in the study region it would have done so. There is some production in Yorkshire and this section is largely based on the quarries in that area. Happily since work started one quarry - Mac-Stone at Kerridge SK 942765 Q8/2 - has started trial production and another, very small, quarry has been discovered operating at Fulwood Booth, near Ringinglow SK 275853 Q67. These quarries exemplify the whole range of activity within the industry today. However they can only supply one each of the seven slate types which occur in the region.

3.2 It had also been assumed at the start that the manufacture of stone slates had died out early in the present century. In fact there appears to have been a significant level of production until the 1950's when the boom in house building and the expansion of the concrete tile industry which it fuelled almost wiped out the vestiges of the industry which remained. Not that competition from cheaper products was a new phenomenon. During the 19th and the early part of the 20th century the Welsh and the Cumbrian slate industries had made inroads into the natural market for stone slates. The Welsh quarries in particular developed a product specifically designed to supplant stone slates - large and random sized in imitation of the local product they were known as ton slates. Lighter in weight than the traditional product they were not only cheaper to buy but also needed less timber to support them and could be transported on the developing canal and rail networks at acceptable cost. Later they in turn were supplanted by the cheaper and even lighter single sized slates which became the speciality of the Welsh quarries. Their success is still evident on the mills and other industrial buildings of the region and on the houses which grew up around them.

3.3 If competition from other products was not enough of a handicap an added difficulty for the manufacturer of stone slates is that they last for so long. Even for roofs needing re-slating after one hundred years or more a large proportion can be reused. So unless there is a booming building industry the demand will be small and for every stone slated building which is lost to other products when it is re-roofed the future demand dwindles further and the supply of second hand is sustained.

3.4 During the post war period and until quite recently reclaimed slates were also available in large quantities from the demolition of factories resulting in particular from the decline of the textile industry. Although demolition has now declined substantially it has not ceased entirely.

3.5 Another factor which had worked against the stone slate industry up until the end of the first half of this century was the loss of skilled workers during the two world wars. Contemporary accounts by the quarrying industry describe the difficulties of maintaining production in the face of competition from munitions factories and other essential industries. Even after 1945 the industry was complaining of the difficulty in recruiting labour and their unwillingness to work in the arduous and uncomfortable conditions which prevailed in many quarries. With insufficient labour production declined and shortage of supply was added to the reasons for choosing other products.
3.6 So competition from cheap products, availability of second hand slates and the loss of skilled labour were the causes of the decline of the industry. Fortunately a small industry survived and with it the skills necessary to bring about its regeneration.

3.7 The following sections deal primarily with the manufacture, marketing and sales of stone roofing slates. However elsewhere in this report it is argued that production of stone slates alone is not feasible or at least is uneconomic and so, where appropriate, comment is made on other products, such as flags and kerbs, which would be closely similar to stone slates in production technology and marketing and sales.

Manufacture.

3.8 Quarrying. Overburden removal which may only involve a few centimetres depth is generally carried out with small back-hoes or face shovels. Where the slate rock is close to the surface care is essential and it is only where the overburden depth is significant that large contractors plant would be appropriate.

3.9 Waste is generally carried to the tip in a face shovel or small builders dump truck. Temporary tips are sometimes created to be cleared with larger plant at infrequent intervals. As far as overburden rock or waste transportation is concerned there seems little need for more sophisticated plant.

3.10 Extraction for production is generally low tech and even at its most mechanised it does not justify the description high tech. This is not to criticise the method but to acknowledge that slate needs careful extraction. There is a strong belief amongst manufacturers that once uncovered fissile rock should be extracted by hand using bars or jack hammers. In view of the essentially fragile nature of the slate and the overwhelming need to produce sheets as large as possible this is certainly the preferable method.

3.11 Normally the rock is extracted by taking advantage of the natural beds and joints. Where large blocks of rock occur they have in the past been pulled out of the quarry face with winches. This was always done slowly to avoid jarring the rock. The option to drill and blast is completely inappropriate for slate production since it would certainly shatter the slabs. Sawing by diamond wire or circular blade although less destructive than blasting has little to offer since it would cut across the jointing and result in smaller slabs.

3.12 Today the rock is sometimes worked in benches of a few metres height and blocks are lifted in the face with a face shovel. Although, as might be expected, this does tend to break some of the largest slabs it has the benefit of higher productivity and in the quarry where it is used still produces reasonable sizes - up to about a metre long. Nonetheless the method is probably unsuitable for most quarries.

3.13 It is concluded that generally the present level of quarrying technology is satisfactory.

3.14 Conversion. Traditionally this was entirely a hand process and unsurprisingly specialised tools have developed for each step in the process. It involves -

- splitting to the final thickness with a chisel
- trimming the edges “square” and bevelling with a hammer
- holing with a spiked hammer.

3.15 Whilst there are still adherents to the hand made tradition a certain level of mechanisation has appeared in recent years. This has not always been welcomed by the architectural conservationists because it has changed the appearance of the product.

3.16 The most revolutionary innovation is sawing block to thickness. This is completely unsatisfactory for at least three reasons.

- Firstly it permits the use of any sandstone even that which may be entirely unsuited to a roofing application. The risk is very poor durability.
- Secondly it is almost impossible to control the sawing parallel to the bed. This means that the beds which would normally be on the surface or entirely within the thickness of the slate will now “outcrop” as bands across the surface. Whereas these beds might not have materially

affected the durability of the slate when correctly manufactured, exposed bands, if susceptible, will deteriorate very rapidly perhaps lasting no more than a few years.

- Thirdly it produces a constant thickness and an entirely flat and bland surface with none of the character which is so important to the real product.

3.17 Sawing is also being used to size slates. The claimed logic here is that it is cheaper to saw a block to size before splitting it to thickness. This is not necessarily so and its adoption may stem more from a familiarity with the advantages of sawing for masonry than with an understanding of slate manufacture. It has the drawback that it makes the bevelling of the edges an extra task at added cost and encourages both the manufacturer and purchaser to regard bevelling as undesirable. This is unfortunate because bevelling is an important characteristic of the traditional product and it tends to reduce the range of widths available to the slater making his task more difficult and the roof more uniform. On balance the cost of sawing and subsequent bevelling may be greater than for the traditional method.

3.18 In most cases bevelling is still a hand process although one manufacturer has developed a machine to carry out the task. This is very desirable as it not only increases productivity but also produces an authentic edge. It would be of benefit to the industry generally to adopt this innovation.

3.19 Holing. Traditionally a slow and careful hand process carried out by specialists travelling from quarry to quarry it is now generally done with an electric drill. In most cases however the quarry leaves the job to the roofer.

3.20 The traditional hole was hourglass shaped, having been formed from both sides, and this helped to grip the wooden peg from which the slate was hung. (Pegs were dried before use and as they absorbed moisture they swelled and became secure in the hole.) With the advent of large nails driven into the battens the tapered hole is no longer required. If however slates are hung over the battens on metal pegs then it is essential that the holes should provide a close fit to the peg to prevent it from twisting in the hole allowing the slate to slip. Alternatively the peg can be held in place with a second batten or by torching (provided underslating felt is omitted). If wooden pegs are used then shaped holes are desirable although the same techniques of torching or an extra batten will suffice.

3.21 On balance mechanically drilled holes are acceptable and provide a distinct cost advantage.

3.22 It is concluded that the level of technology currently employed is satisfactory and except for edge trimming there is little scope for improvement. In most cases the introduction of modern technology has not been detrimental to the product. The exceptions are sawing to thickness and size. The former is completely unacceptable and such products should not be used nor qualify for grants. The latter is acceptable if the edges are subsequently bevelled but this may increase costs overall.

3.23 Mobile production. It is recognised that some slate types will probably only ever command a small market. The extreme example is the Whitwell type of the magnesian limestone of which there are only a few remaining roofs. Others might include the small stone slates of Abney or the pink Wirksworth type. The solution to production of such small volumes is seen to be intermittent quarrying using a mobile operation. This would typically comprise a small excavator, a builders dump truck and a secure cabin in which to store tools and product. Such a system could be operated out of a permanent quarry and with the addition of a more sophisticated extraction system such as track mounted circular saws might be equally appropriate for production of masonry stones or metamorphic slates with similar small demands such as those at Swithland in Leicestershire.

The market for stone slates

4.1 Market size

4.1.1 All attempts to obtain a reliable estimate of the demand for stone slates have been frustrated by the lack of information. Enquiries were made to local authority conservation departments within the region and to architects, merchants and roofing contractors both in the region and in adjacent counties.

4.1.2 There are about 1000 listed buildings in the Peak Park and Derbyshire with stone slate roofs. A listing of stone slates for buildings in the database compiled by Derbyshire Historic Buildings Trust produced the distribution within the county shown in Table 1.1. It does not include any roofs which might have been entered as flags and so may be a slight underestimate. The distribution is illustrated in Figure 11 section 2.3.10 It proved impossible to determine how many of these have had their roofs renewed recently enough to place them outside the market for new slates.

4.1.3 Within the important adjacent area of Macclesfield which historically drew stone slate supplies from within the Peak Park there are about 2000 listed buildings. About 750 of these have stone roofs, of which about 50% have been renewed. This leaves a market of something over 350 buildings. This figure does not include the buildings within the Conservation Area Partnership around Rainow, SJ950762, and Kerridge, SJ937770 which receives grant aid from Macclesfield Borough Council and English Heritage.

4.1.4 The information available from conservation departments was quite variable. They have records of listed or other designated buildings within their area but where the authority does not operate a policy of grant aid the records of other buildings, especially agricultural buildings, with stone slate roofs may be incomplete or non-existent. Sometimes the personal knowledge of individual conservation officers can fill the gaps. In areas where grant aid is available there are records of re-roofing which received such support but these were not always complete.

4.1.5 In Derbyshire outside the Peak Park 25 re-roofing schemes were completed between 1979 and 1995 with grant aid totalling £165,000. At the other extreme some authorities provide no grant aid but have ensured the conservation of at least some of the buildings within their area by ensuring action by the owners of properties included in the Buildings at Risk register.

4.1.6 Architects could not provide any useful evidence about the level of demand for stone slates. Although all those who had been involved with stone roofing agreed about the difficulty in obtaining supplies of slates, generally they were involved with so few stone roofs that their opinions could not be quantified. Data obtained from local architects is also an unreliable guide to the level of work within the region because often they are not involved in the re-roofing process or because those architects who are involved may not be locally based.

Table 1.1

4.1.7 A questionnaire was circulated to roofing contractors within Derbyshire and the surrounding counties. They were selected from Yellow Pages and the membership of the National Federation of Roofing Contractors. Within the Yellow Pages those which were obviously not slaters were excluded and for the NFRC only those listed as slating and tiling specialists were included. Of 114 sent out 24 were returned. It was carefully explained that the enquiry was about stone slates but in spite of this there was some confusion in the replies between stone and metamorphic slates.

4.1.8 As part of the questionnaire the slating companies were asked how much stone slate they

needed to buy from any source to complete an average year's work. The total for the 24 responding companies which carry out stone roofing was 2000 tonnes and accounted for a total of 114 buildings of all sizes. This is an average of less than 18 tonnes per building equating to about 123 m2 of roof. This estimate includes both repairs and new roofs and extensions to existing properties.

4.1.9 The other important factor for the size of the market is that the stock of roofs which are currently be reconstructed or repaired can be assumed to be good for the next 50 to 100 years. Therefore the market might be assumed to be dwindling away. In fact this is not the whole story. A very substantial part of the stock of stone slate roofs disappeared during the 1950's and 60's when, because stone slates were unavailable, they were replaced with other roof products, predominately concrete interlocking tiles. This was a more substantial loss than is occurring now. These tiles have proved to be a very poor substitute because not only are they very flat and regularly sized but they have also developed a covering of black moss entirely different to the lichens &c which grow on stone slates. Fifty years on these roofs are coming to the end of their lives. If all those in conservation areas were returned to stone slates as they became due for renewal it would provide a very significant opportunity to recover the loss to the local heritage, to reverse the trend of declining demand leading to declining supply, and to provide the basis to sustain a stone slate industry well into the next century. Such reinstatement should qualify for grant aid.

4.2 Supporting the market.

4.2.1 The unfortunate situation has come about where public money is being used to encourage the deliberate removal of stone slate roofs to the detriment of the roofscape of the region. The solution to these problems is seen to be two fold: improved supply of new slates and control of the use of second-hand to eliminate their supply from unsatisfactory sources.

4.2.2. Improved supply has three aspects; sufficient production, control of stocks and price support. The former is dealt with elsewhere in this report. The second and third aspects are interrelated and are influenced by grants.

4.2.3 It may be confidently anticipated that any new slates will continue to face competition from second-hand materials if only because some will always come into the market legitimately and these will always find a purchaser even if prices have to be reduced. However, unless the price of new slates drops so low that their production is not economically feasible the price of reclaimed slates will remain high enough to perpetuate roof demolition or even theft. Market forces are therefore unlikely to prevent the continuing deliberate cannibalisation of roofs. Under these circumstances it becomes necessary to impose some form of deliberate control to counter deliberate cannibalisation. Since it is almost impossible to control or even identify the source of reclaimed slates which are to be used on a building the only option is to preclude the use of any second-hand slates except those reclaimed from the same building.

4.2.4 It is proposed that the competition from second-hand slates be reduced by the offer of grant aid being conditional upon the use of new slates, and the re-use of slates recovered from the same roof only.

4.2.5 This will require careful supervision by the grant giving authorities but this may well be no more onerous than the supervision which is presently carried out for conservation and building control purposes.

4.2.6 It is further proposed that the grant support is paid directly to the slate supplier rather than to the building owners as is the case now. The grant for the roofing work could continue to be made to the building owner.

4.2.7 This would have the effect of making the grant money unavailable to second-hand sources and at the same time rendering the new product equally cheap to purchasers. There are options as to how the grant money could be applied to achieve this. Almost anywhere in the supply chain might be feasible. The most suitable options appear to be payments direct to the manufacturer or to an intermediary organisation acting as a “wholesaler.

4.2.8 Payments to suppliers could be made on the basis of material supplied to specific buildings. The level of payment should preferable be based on the area of roof covered as this is simpler to check than weight or area of slate supplied. It would also avoid overpayments due to oversupply or underestimates of coverage.

4.2.9 At present the supply of slates for roofing
and re-roofing is only loosely structured. New slates may be purchased by the building owner, general builder or the roofing contractor either directly from the manufacturer or from a builders merchant or specialist roofing merchant. In such a complex structure it may well prove difficult to control the payment of grants with a consequent high administrative cost. Therefore it is concluded that at least in the initial stages an independent organisation might be the best choice to take on this role.

4.2.10 Although such a system would help to eliminate some of the detrimental aspects of the present system it might not achieve the level of confidence required to encourage entrepreneurs to start up production or for existing manufacturers to create stocks. These objectives could be achieved by the creation of a central stock holder. It is envisaged that a scheme could be created whereby the stockholder would guarantee the purchase of each member manufacturer’s production up to an agreed level and at an agreed price. Grant money could be used to fund the stock purchase and wholesaling activity but would be primarily applied to reduce the retail price. If grant aid was conditional on purchasing slates from the central stock holder it would avoid the risk of overproduction and hence competition from the member manufacturers.

4.2.11 It is acknowledged that such an organisation could be seen to be in direct competition with commercial organisations which currently wholesale and retail roofing and stone products and in so far as public money was being applied to the cost of the operation this competition would be perceived as unfair. Three factors might mitigate against this perception: such an organisation might only be required for a short period until supply and demand become balanced; it could eventually become self funding and the competitive
commercial companies may gain benefit from its existence.

4.2.12 Therefore it is recommended that a suitable, possibly a charitable, organisation be approached to consider this proposal. Alternatively a suitable organisation could be created under the control of the local authorities who currently administer the grant funding.

4.2.13 It is suggested that the National Stone Centre at Wirksworth might be a suitable and willing body to undertake this role.

4.3 Marketing

4.3.1 Position. Within the overall roofing market stone slates are a high quality product in both aesthetic and durability terms. To own a house with a genuine stone slate roof is regarded as desirable. This image is aided by the support provided for its use by conservationist and by its cost and rarity. Since there is little prospect of the cost being substantially reduced this image should be fostered by the manufacturers. They should aim to position the product in the top end of the market emphasising its beauty, historical and conservation importance, durability and long term

economy as a counter to the initial expense. Above all they should resist treating it as a commodity which will only play into the hands of the imitators: a pricing game which they cannot win.

4.3.2 Price. The product is expensive both to purchase and install - amongst the most expensive of all roof coverings. Typical prices in early 1996 were £250 per tonne for second hand and about £500 for new. One tonne is sufficient to cover about 7 square metres of roof on average although there can be considerable variation depending primarily on thickness but also on sizes. It is unlikely that this can be substantially reduced by the application of technology or by productivity gains. Consequently it is unlikely that the point will be reached when grant support could be removed without a fall in sales. Nonetheless there is a constant demand and continual complaints from roofers about the difficulty of obtaining supplies. Therefore the present subsidised cost is not a barrier to the present level of trade and it may be confidently anticipated that present prices will not inhibit increased sales should the supply improve.

4.3.3 There is an important lesson to be learned here from the metamorphic (blue) slate industry - supply creates demand. At the end of the 1970's the British roofing slate industry was declining because of high prices and poor demand. But in the early 1980's demand improved and this was supported by both increased home production and imports. Had the industry not responded in this way the market would have probably continued to decline. In fact sales continued to outgrow demand until the start of the recession in 1989. Since then this market has recovered faster than any other roofing product.

4.3.4 Actually the reputation for being expensive is unfair when the initial cost is amortised over the life of the slates. A study carried out in 1995 produced comparative life time costings for a range of roofing coverings. These are given in the following table together with those for stone slates. Taking into account that stone slates will be reused at least once and perhaps several times the life time cost is very much less than that over the 100 years basis.

4.3.5 Price and coverage. Stone slates in common with other random slates are normally sold by weight with an indication of the area which can typically be covered by a given weight assuming a given head lap - normally 75mm. To anyone unfamiliar with the system this is a confusing and cumbersome method of deciding how much slate they need. It is also a long standing problem. In 1695 the anonymous author of The Art of Building or an Introduction to Young Surveyors in Common Structures complained that

"*their proportions in covering houfes are uncertain, so I cannot affign a certain number, unlefs the builders fhall prefcribe a true proportion for the Slate.*"

It is difficult to be precise about coverage because there are many imponderables. Firstly the thickness of stone slates varies considerably. Then there is the mismatch between the number of slates of each length in a consignment and the width of the building. It is the roofers responsibility to make the mix of slates fit the shape of the roof but inevitably there will be too many slates of some lengths to complete a whole number of courses exactly with a consequent waste of slate and reduction of coverage. Further, for technical reasons, the head lap must be altered whenever there is a change of slate length but the extent by which this reduces the coverage cannot be estimated without knowing how many courses there will be of each length range.

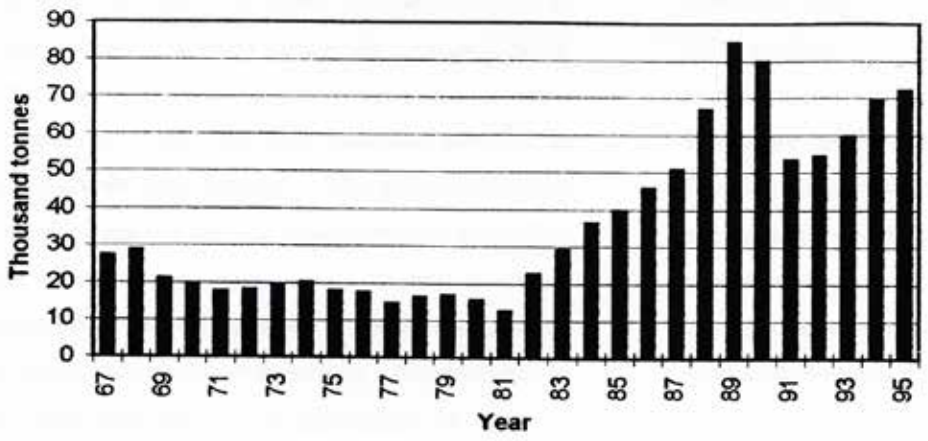
4.3.6 In fact, the confusion surrounding coverage is made worse than it needs to be by the use of a mixture of metric and imperial units - weights are given in tons or tonnes; areas covered in square metres, square yards or squares (100 square feet). Even worse suppliers are tempted to over-estimate the coverage of their products in an attempt to appear to be cheaper. The upshot is at best that the building owner is confused, frustrated and unable to make an objective comparison of costs. At worst the purchaser and supplier end up in dispute about shortfalls in promised cover-

Comparative lifetime costing of roofing products (1995)

Product	Maintenance period in years	Initial cost for supply and fix / m^2	Repair and maintenance % of initial cost	Cost for 100 year cycle £/m^2
Aluminium sheet	40	£32.50	2%	£102
Copper sheet	65	£42.50	1%	£73
Lead sheet	100	£55.00	1%	£59
Stainless steel sheet	100	£42.50	1%	£46
Zinc sheet	40	£37.50	2%	£114
Clay tiles	40	£33.00	10%	£113
Concrete tiles	30	£12.50	10%	£85
Fibre cement slates	30	£24.50	12%	£134
Resin slates	30	£28.00	12%	£149
Welsh slates	100	£46.00	12%	£56
Stone slates	100	£110.00	12%	£133

Sources Comparison Chart of 11 Roofing Products. F Moal Eurocom Enterprises Ltd. Feb 1995
Industry Costs Update. Davis Langdon Everest. AJ Focus July 1995

Figure 13 Sales of metamorphic roofing slates



age.

4.3.7 In marketing terms this is typical of a production orientated industry - “Its the customers problem. Its always been this way. Why should we?” Units could easily be standardised. The construction industry has been metricated long enough for everyone to be familiar with metres and tonnes. Considering the small volumes involved it would also be perfectly possible for a manufacturer to list the total width of each length of slate in a consignment. This has long been the practice in the American slate industry. The roofer will have to do this anyway so any manufacturers providing such information will be improving their competitiveness. Of course, a really competitive manufacturer would give serious consideration to supplying sufficient slate guaranteed to cover a given area on the basis of a constant 75 mm head lap. The arithmetic, though a little complicated is well within the capabilities of a simple computer spread sheet. This would remove most of the uncertainty in the transaction with the roofer only left to apply an estimate of the extra slates required to accommodate changes in lap.

4.3.8 It is recommended that stone slate should be sold in terms of the area which can be covered at 75 mm constant head lap. If this is unacceptable the industry should standardise sales in square metres of cover per tonne.

4.3.9 Promotion. Most companies recognise the need to promote their products although for some, such is the shortfall in supply, that this involves little more than maintaining contact with established customers.

4.3.10 The conservation departments of the local authorities contribute to the promotion of the product. As part of this policy the Peak Park and Derbyshire CC provide guidance1 on sources within and outside the region and although at present these leaflets do not relate the source to the slate type this could easily be done if supplies of specific types become available.

4.3.11 In a new initiative which has grown out of
this study the joint partners are developing a mobile exhibition explaining the problems stemming from the decline in the manufacture of stone roofing nationally, the work which is in hand to reverse this trend and to generally promote an increased understanding and use of the product. The intention is to exhibit at the major trade and conservation events but also to make the exhibition available to local conservation conferences and anyone else who needs it. Manufacturers should be encouraged to attend these exhibitions to promote their products.

4.3.12 At least two companies have formal literature displaying their range of products and some technical information on strength and durability. One company attends stone exhibitions to promote their full range of products. None attend specialist roofing exhibitions such as Rooftech or the main construction industry event, Interbuild.

4.3.13 The cost of attending exhibitions is a barrier and could be especially so for a small manufacturer with a narrow product range or a single slate type with a small market. Co-operative promotion could provide a solution. The recent success of the thatch industry has to a large extent resulted from the formation of an industry body which developed a mobile exhibition and attended all the construction, roofing and conservation exhibitions. The Natural Slate Quarries Association which promotes the use of metamorphic roofing slates has found it beneficial to share the cost of attending small exhibitions with an association display within which individual members products are promoted. However at the anticipated scale of the stone slate industry this may be too much to ask. But unless the industry’s products are promoted it is unlikely to grow to a size which can support the production of the full range of slate types.
4.3.14 Therefore it is recommended that if and when production expands the two local authorities should consider developing a campaign to publicise the importance to the region of stone slates

and the ancillary quarry products. Based round press releases this can be inexpensive. Care will be needed to co-ordinate publicity with supply so as to avoid stimulating a demand which cannot be satisfied.

4.3.15 The use of the product already receives significant and effective promotion by both national and local conservation bodies through their survey and specification activities. Since these bodies fulfil the roles of promoters, users and "quality controllers" for both the specification and construction of roofs it would be most effective for manufacturers to focus promotional efforts directly at such organisations and at conservation events.

4.3.16 The survey and specification process is extremely important in supporting the market. However there is a shortage of readily available information to help building owners, architects, conservation officers, builders and slaters to correctly specify and construct stone roofs. Derbyshire County Council and the Peak Park publish guidance on stone roofing and the re-roofing process and this is currently being updated. It includes a model specification which when implemented goes a long way towards ensuring that the appropriate materials are used and that the construction is correctly executed. Nonetheless many architects and conservation officers feel they are ill equipped to fulfil their roles and often have to rely on advice from sources which are sometimes no better informed than themselves or not motivated by the best interests of conservation. This often results in disputes on site especially over what is the correct or most suitable product, material or technique and over what is possible.
4.3.17 If stone slates are to secure a market it is very important that this situation is rectified. Clearly what is needed is improved guidance and training and a system which ensures competent and experienced slaters are always employed. The subject of training is dealt with in section 5 below.

4.3.18 At present there is no formal definition of product quality for stone slates such as a British Standard although there are both European and British Standards Institution committees which have such products within their ambit. As a consequence the technical advantages of the product cannot be promoted in a formal context but, with the low level of production and the apparent absence of unsatisfactory products in the market, this is not a handicap to sales. However if supplies became available from other sources either locally or from abroad, as has occurred with limestone slates, the need may arise to be able to demonstrate satisfactory performance.

4.3.19 If quarries are brought into production it will be important to ensure that the slates are durable. The lack of durability tests makes this difficult and it is therefore recommended that a study of the geological factors which influence durability be implemented.

4.3.20 Product mix and profitability - the case for other products. It is the first principle of any quarry operation and of sustainable development that as much quarried rock as possible should be converted to products. The economics of manufacturing slates alone may not be viable without a considerable or even an uneconomic or unacceptable level of subsidy.

4.3.21 The character of the region's landscape is that of its geology, not only in its dales and heaths but just as much from the products of its rocks. Its
stone walls and barns, houses, churches, lanes and bridges have all evolved into a distinctive style in harmony with the fields and moors. No less than the stone slates the kerbs, flags and walling have contributed to this and they are often as distinctive and variable as the roofing. Already it is possible to see repairs to field boundaries changing their character as alien stones or different shaped cresting is carried in from outside the natural source area. The replacement of stone flags with concrete paviours is especially intrusive. Planning policies already recognise the need for such products and the economic operation of a stone slate quarry could provide the sources which would maintain the local distinctiveness.

4.3.22 There will therefore be an economic, a conservation and a market case for extraction to a greater depth than that required for slate and for the production of ancillary products such as flagstones and other paving, kerbs and walling stone. None of these would need extra machinery beyond a simple hydraulic block splitter. A case could equally be made for the production of sawn masonry but this would require more sophisticated machinery and electricity and water supplies.

4.3.23 Basis of competition. Within the stone slates competition hardly exists. With the exception of second hand slates it is entirely a seller's market although in the present recession neither building owners nor contractors will accept a price without resistance. Where a stone slate must be used the main, indeed the only basis on which prices are held down is the availability of second hand stone slates. This supply is not good and so has limited effect. However the vendors of stolen slates will presumably be under some pressure to dispose of their "stocks" as quickly as possible and therefore may have to accept lower prices than they otherwise would have to do. This then places a base under the sale price of "legal" slates.
4.3.24 Other products which may be substituted for stone slates include Welsh slates, sometimes new but more often second hand, imitation - normally concrete - stone slates and plain concrete interlocking tiles. Where the option is available to use such products they exert strong price competition not only because they are cheaper but also because of the lower roofing labour cost involved.

4.3.25 Imitation tiles attempt to reproduce the appearance of stone slates, often without notable success. As they weather they support the growth of different vegetation to sandstone and ultimately come to look very different from the real stone slate. Nonetheless some consider them to be more acceptable than plain concrete tiles and conservation departments have sometimes accepted their use outside the most sensitive areas because of the unavailability of stone slates. However any use of these ersatz products is detrimental to the re-establishment and sustainabilty of a stone slate industry.

4.3.26 The comparative costs for each of these products is given in Table 2. There is considerable variation in the cost of re-claimed slates depending on their availability.

Table 2. Cost of roofing products.

Product	£ per m^2 of roof
New stone slates	70
Reclaimed stone slates	33
Imitation stone slates	14 - 22
New Welsh slates	15 - 47
Reclaimed Welsh slates	15
Imitation Welsh slates	9 - 15
Concrete tiles	4 - 5

4.3.27 For manufacturers there is some opportunity to avoid strict competition by swapping products. Roofing thickness slabs are sometimes sold as interior flooring. This helps to support the price for the "product" as activity in these two stone market sectors fluctuates.

4.3.28 Supply chain. In general purchasers seek as from manufacturer directly to building owner. Some sales are made to merchants generally
specialists in roofing materials - there are several established second hand roof material suppliers in the region - main contractors but most often to roofing contractors because they have the experience to be able to locate suppliers with stocks

Training needs

5.1 Manufacture.

5.1.1 Manufacturers venturing into stone slate production for the first time are likely to have difficulty in finding experienced slate makers. Indeed the craft may have entirely died out within the region. It should be possible however to find an experienced person from outside the region to provide initial training. Once inducted into the basic skills any quarry worker experienced in stone should be able to develop the necessary expertise.

5.1.2 It is recommended that training in the techniques of stone slate manufacture should be through the placement of suitably experienced persons at the quarry for a short initial period followed up by one day visits to ensure that the necessary expertise is being developed.

5.2 Conservation and design.

5.2.1 Architects, conservation professionals and other specifiers have expressed a need for training in the identification and selection of slates and in correct constructional methods. It should not be overlooked that roofing companies and merchants also have a role in the specification process and it is equally important that they should be well informed about the suitability of different slate types for particular situations.

5.2.2 For specifiers and conservation professionals a one day course would be sufficient to provide an understanding of the basics of slate types and construction methods and if this could be linked to both written guidance and sources of expertise to deal with the more difficult issues most of the problems could be overcome. A prototype for such a one day event was organised by the Society for the Protection of Ancient Buildings (SPAB) and Derbyshire County Council at the National Stone Centre at Wirksworth in 1994. This covered Southern Pennine roofing. It was repeated for Cotswold stone slating as a joint SPAB and English Heritage event in 1996. These events were to some extent an exploration of the problems currently faced by stone slating but the format is perfectly suitable for a more training focused approach. With a suitable adjustment of the content and the development of written backup this could provide all that is needed for the basic grounding in the subject.

5.2.3 Where more detailed technical guidance is required enquirers would need to be refered to individuals with the necessary wide experience in the field of roof construction generally as well as the use of stone slates. Such people are not common and since enquirers usually expect to obtain advice without charge they are not always willing to give the time required to provide such a service. This is a perennial problem and is usually overcome by the product manufacturers who either individually or through a trade association provide a technical service. It is unlikely that stone slate manufacturers would have the time or expertise to take on this role and there is no prospect of a trade association at present. Under these circumstances the need can best be answered by comprehensive written guidance, preferably in a form which relates stone roofing to the recommendations of BS 5534 Code of practice for slating and tiling and
BS 8000 Workmanship on building sites Part 6.

5.2.4 It is recommended that training for specifiers and conservation professionals should be through the medium of a one day course covering the products and materials of stone slating and the correct roofing techniques backed up with comprehensive written guidance.

5.2.5 At present no university or college in the country includes stone slating within their archi-

tectural courses. This clearly leaves the professionals on whom we rely for the conservation of historic buildings and the sensitive design of new buildings ill equipped to carry out this role. This omission needs to be addressed with some urgency and seems to fall within the remit of English Heritage. It is therefore recommended that English Heritage considers developing a short course on the subject to be made available to colleges with if possible a visiting lecturer.

5.3 Roof construction

5.3.1 Training for slaters is even more important but much less easy to achieve. Currently training for slaters is provided by a number of colleges although these do not all include random slating. A structure for National Vocational Qualification Training (NVQ) for slaters and tilers is currently being developed and is expected to be implemented by the end of 1996. This will include stone slating as one of the modules at Level 3.

Proposed structure for NVQ Slating and Tiling

Level 1 Basic non craft skills
Level 2A Application of roofing materials to new work
• Responsibilities of the specialist sub-contractor
• Fixed and variable gauge single lap tiles
• Fixed and variable gauge double lap tiles
• Artificial slates
• Associated weatherings. Stage 1
• Access and scaffolding. Stage 1
Level 2B Responsibilities of the roofing contractor for re-roofing
Re-roofing including stripping slates and plain tiles
Associated weatherings. Stage 1
Access and scaffolding. Stage 1
Level 3 Recognition of vernacular materials
• Regular size natural slating
• Centre nailed random slating
• Head nailed random slating
• Complex and radial slating and tiling
• Shingles
• Artificial random slates
• Stone slating
• Associated weatherings. Stage 2
• Access and scaffolding. Stage 2

5.3.2 The inclusion of formal modules for random and stone slating is a very welcome development since there is a significant amount of bad stone roofing practice evident in the region and nationally. Its inclusion, however, within the NVQ structure whilst suitable for training apprentices may fail to recruit the older roofer. A stand alone course for experienced craftsmen is very desirable and could be developed from the NVQ structure and provided by roofing colleges.

5.3.3 It is recommended that local colleges should be encouraged to provide training in stone slating through the scope of the proposed NVQ structure and that from this a short conversion course

should be developed for experienced slaters.

5.4 Training providers

5.4.1 The Training and Enterprise Councils have responsibility for ensuring adequate provision for training. Their role in the field of stone slating would be focused on support to the established college system.

5.4.2 Training in some rural crafts is provided by the Rural Development Commission. The Commission has the objective of ensuring the provision of training directed towards the skills required by local small industry and commerce in rural areas and such objectives have been included

within their strategy statements by some Rural Development Areas.

5.4.3 As one means of achieving this objective the RDC runs two training programmes; the New Entrants Training Scheme (NETS) and Open Courses. These are designed to help small rural firms by providing supported training in a range of craft skills. One example is the training of thatchers and as part of the course the Commission has published a comprehensive book on the subject. The latter is equally useful to specifiers and conservation officers as to roofers. Unfortunately the RDC's current programme does not allow for any new craft training courses. Hopefully this may change in the future.

5.4.4 Alternatively such training might be provided by English Heritage's own Training Centre at Fort Brockhurst.

The Planning Context

6.1.1 In April 1993 a seminar was held in Matlock to debate the issue of the resumption of stone roofing production in Derbyshire and the Peak Park. Amongst those attending were representatives of the local planning authorities responsible for mineral planning, development control and architectural conservation. As the organisation responsible for advising the Department of National Heritage on architectural conservation matters and as the provider of grants directed towards the conservation of stone slate roofs, English Heritage was also represented.

6.1.2 The debate reached the following conclusions -

- Planning Policies - Mineral Applications. The mineral planning authorities need to consider whether their existing or proposed policies or, if not their policies, their requirements for determination of applications, might need amendment to ensure that the planning process does not inadvertently constrain the opening of small quarries for dimension stone extraction.
-
- The planning authorities should also consider to what extent it might be acceptable for a small quarrying company specialising in the production of stone slates also to make other products, on a small scale, such as, for example, concrete paving slabs faced in quarry waste (if this was the only way to make the production of stone slates economically viable).
-
- Planning Policies - Development Control. The local planning authorities, especially the Peak Park, need to review the existing practice of requiring, in certain circumstances, the use of stone slate for roofing new buildings as, in the present circumstances, this is stimulating the market in reclaimed stone slate probably to the detriment of the County's existing traditional building stock. Consideration should be given to requiring the use of new roofing slate in such circumstances.
-
- Historic Building Grant Aid Policies. At present grant aid from local authorities, English Heritage and the Ministry of Agriculture, Fisheries and Food for the repair of stone slate roofs in Derbyshire inevitably fuels the stone slate reclamation trade and the cannibalisation of repairable roofs.
-
- Consideration should be given to whether or not grant aid policy should be adjusted to favour the use of new, as opposed to reclaimed, stone slates.

Minerals planning.

6.2 The Derbyshire County Council Minerals Plan is considered in detail here as an example. The policy within the Peak Park Minerals Plan includes essentially the same objectives and constraints.

6.2.1 The Derbyshire County Council Minerals Plan (February 1996)

- identifies production of building sandstone within the county as very small scale, 5 - 6,000 tones per annum
- recognises that natural stone is sometimes needed as a building material for environmental reasons when building projects are proposed in sensitive areas such as Conservation Areas and that this should be taken into account in the planning process
- specifically recognises the importance for the built environment of the availability of local stone for the repair of historic buildings, field boundaries, paving, the construction of new buildings and, in particular, the production of stone roofing "slate."
- recognises that most sandstone reserves in the county lie within areas of high quality land-

scape some being designated as Special Landscape Areas.

- states that the need to safeguard the landscape will be a significant constraint on new proposals to work the reserves but recognises that, in practice, building stone operations are often small in scale with modest production levels enabling their impact to be minimised.

6.2.2 In view of the above factors the stated policy for Minerals Planning 15 Building Stone is -

Proposals for the extraction of rock for use as building stone will be permitted provided that:

- the mineral authority is satisfied that there is a need for mineral of a specific character to be worked in that location: and

- the proposal is small in scale and includes measures to ensure that its effect on interests of acknowledged environmental importance can be kept to an acceptable level.

Within the plan there is also a preference for extensions to existing operations over new developments.

6.2.3 The mineral planning regulations permit the development of quarries on farms for use within and for the purposes of the same farm without the requirement for formal planning applications. In view of the large number of quarries in the database which are on, and presumably supplied the roofs for, farms the intermittent operation of such quarries could be very significant especially within the great estates of the region. They could well be operated for even single building repair using the mobile operation described in 3.23 above.

6.2.4 It is concluded that there is a predisposition on the part of both of the region's mineral planning authorities to look favourably on applications to produce roofing slates provided

- the need for slates of a specific character can be demonstrated
- the scale of operations is modest
- the impacts can be limited to an acceptable level

and that there is a preference for production within existing quarries wherever possible.

6.3 Satisfying planning controls

6.3.1 The special issues that need to be assessed in determining an application for slate production, that is, not including those such as environmental impacts which would apply to any other planning application, are -

- the need for a slate of a specific character,
- whether an existing quarry could supply the demand and
- the extent to which production of other products might be permitted to ensure the economic viability of the enterprise.

6.3.2 Elsewhere in this report it is proposed that there are seven generic slate types in the region. Of these it is probable that there would be a continuing demand for six types. Annexes A, B & 3 illustrate some of the features. The seventh, the magnesian limestone of the Whitwell area, SK5576, has so few examples remaining that there is virtually no market for the product.

6.3.3 Unfortunately it has not been possible to quantify the market for stone slates in the region because of a lack of reliable and consistent information. In view of this it is impossible to estimate the specific demand for any of the types. In aggregate it will be small in comparison to other quarrying activities including the acknowledged very small building stone industry. Although the abso-

lute level of demand is unknown it has been possible to rank the existing prevalence of the various types in order of magnitude. From the most to the least prevalent they are considered to be -

Generic type	Locality in the region
Cracken Edge	The north west from Roaches to Saddleworth +
Teggs Nose	The north west from Roaches to Bollington +
Kerridge *	The north west from Macclesfield to Bollington+
Yorkstone	The north and north east of the Peak Park, east Derbyshire
Freebirch	The east around Holymoorside to Unthank
Wirksworth	Matlock, Cromford, Wirksworth and Belper
Magnesian Limestone	The east in the area around Whitfield

* The prevalence of the Kerridge type may be underestimated because the mica surface may disappear soon after installation on a roof rendering it equivalent to the Cracken Edge type.

+ These types extend into the large conurbations of the East Cheshire plain.

6.3.4 At present only two quarries are known to be producing slates within the region, at Kerridge (Kerridge type) (SJ 943757) and at Fulwood Booth (Yorkstone type) near Ringinglow (SK275853). The latter is very small scale.

6.3.5 It is acknowledged however that demand for the Yorkstone type could be supplied from existing quarries outside the region and that this is preferable to new developments provided the existing quarries can supply the demand. Enquiries during 1995 indicate that the sufficiency of this

supply might be variable. Manufacturers indicated

low demand citing competition from reclaimed material as a cause. Users complained of inadequate supply but normally would only use new material as the last choice prefering cheaper, reclaimed slates.

6.3.6 Since the supply of reclaimed slate is often from undesirable sources and one objective of this study is to eliminate this then it is anticipated that the demand for new slate of any type will increase. Therefore even the Yorkstone type may require increased production.

6.3.7 In view of the general paucity of supply of those types of slate which are most prevalent or most distinctive it is recommended that an application for production of any of the types should be deemed to be for supply to an existing demand.

6.4 Extensions of existing quarries.

6.4.1. The mineral planning process would give preference to new or extended operations in an existing quarry with consent. All of the quarry operators listed in Annex 2.5, Volume 2, who were not producing slates, were asked if they could produce slate. All said they couldn't or wouldn't. Clearly some of these had been slate quarries in the past - the remains of fissile rock could be seen at the surface of the workings - but present day production objectives or methods make small-scale, hand-made products unattractive.

6.4.2 These companies produce either aggregates, where the extraction by fragmentation blasting is incompatible with slate manufacture, or masonry products. The latter quarries have generally been developed into deep workings. Fissile rock almost always exists as a relatively thin surface layer which necessitates much larger extractive areas and hence more extensive planning approv-

al. Whilst this might seem to some companies to be unattractive within existing operating plans it is not considered to be an insurmountable objection. Indeed one company which has fissile rock at a deep level has recently commenced intermittent slate production in response to demand. Where surface fissile rock does not fall within current production it is envisaged that extraction could be subcontracted without interfering with the main operations. The worked areas could be either re-instated or left for future extension of the deep quarry. Since every quarry would eventually have to remove the overburden this could provide considerable cost savings.

6.4.3 It is therefore concluded that the absence of slate production in an existing quarry with the potential to do so need not be an absolute barrier. It is recommended that this option should be given serious consideration by intending slate manufacturers.

6.5 The need to produce other products.

6.5.1 It is the first principle of any quarry operation and of sustainable development that as much quarried rock as possible should be converted to products. The economics of manufacturing slates alone may not be viable without a considerable or even an uneconomic or unacceptable level of subsidy.

6.5.2 In section 4.3.2 above an economic, conservation and market case is made for extraction to a greater depth than that required for slate and for the production of ancillary products such as flagstones and other paving, kerbs and walling stone. None of these would need extra machinery beyond a simple hydraulic block splitter. A case could equally be made for the production of sawn masonry but this would require more sophisticated machinery and electricity and water supplies.

6.5.3 It is recommended that approval of an application to exploit a deposit of stone slate should not be restricted to the production of that product alone. For reasons of economic viability and local needs for ancillary products such as walling, kerbs, flagging and other paving, applications for production of these products should be regarded as a desirable concomitant of slate production. Production of
other products requiring more elaborate machinery and facilities should be judged on their own merit.

6.5.4 Even if all possible products are manufactured there will inevitably be a certain amount of waste rock. This constitutes both an economic and environmental handicap to a manufacturer.

6.5.5 Waste can be either -

- disposed of on site into old workings if they are available or onto the surrounding area or
- carried away for disposal in a more acceptable way or
- converted into a crushed product such as construction aggregates.

6.5.6 None of these options will be devoid of environmental impact although that of tipping into old workings will probably be the least objectionable. Indeed it can, because of the bulking up of broken stone, make a significant contribution to the re-instatement of worked out ground albeit at a significant cost.

6.5.7 If unobtrusive disposal on site is not feasible then crushing of waste may be an acceptable alternative. It is likely to take place only at long intervals and for a short period of time using mobile crushers. Inevitably it will require more substantial access routes than the minimum required to operate the quarry. For small volumes of waste it is unlikely to pay for itself.

6.5.8 It is recommended that the options for waste disposal are assessed on both economic and environmental grounds.

Environmental Impacts

7.1 Environmental policy

7.1.1 The policies of both Derbyshire County Council and the Peak Park Joint Planning Board is that proposals for mineral workings will be permitted provided that their likely impact on the environment is acceptable having regard to the effects on, local communities, agriculture, water supplies, landscape, topography, wildlife, geology, the built environment, rights of way and recreation, and their visual effect and transport implications. A formidable list but not one which requires special pleading on behalf of stone slate production.

7.1.2 Applications to develop a quarry must provide an environmental assessment (EA) to ensure that the likely effects of the development on the environment are fully understood and taken into account before the development is allowed to go ahead. The full details are set out in EC Directive 85/37/EEC. The procedures and requirements of an environmental assessment are explained in ENVIRONMENTAL ASSESSMENT. A GUIDE TO THE PROCEDURES published by HMSO.

7.1.3 The regulations apply to two separate lists of projects: Schedule 1, for which an EA is required in every case, and Schedule 2 for which an EA is required only if the particular project is judged likely to give rise to significant environmental effects. The quarrying of stone slates falls within Schedule 2.

7.1.4 For Schedule 2 the significance of a development will essentially be assessed on the following criteria,

1. whether the project is of more than local significance, principally in terms of physical scale;
2. whether the project is intended for a particularly sensitive location, for example, a national park or a site of special scientific interest (SSSI), and for that reason may have significant effects on the area's environment even though the project is not on a major scale;
3. whether the project is thought likely to give rise to particularly complex or adverse effects, for example, in terms of the discharge of pollutants.

7.1.5 For a stone slate quarry criteria 1 and 3 are unlikely to be significant but given the location of many old quarries within the Peak District National Park or within moor and heath areas criterion 2 may well apply.

7.1.6 The assessment criteria are amplified in Appendix 1 and for Schedule 2 projects in the extractive industry specific reference is made to "extracting minerals ... such as marble" These will require an EA if they are likely to have significant effects on the environment by virtue of factors such as their nature, size or location.

7.1.7 The developer's assessment of a projects likely environmental effects is presented as an environmental statement. The content of this statement is set out in Appendix 2 of the guide. It must contain, amongst other information, a description of the likely effects, direct and indirect, on the environment of the development explained

by reference to its possible impact on -

- human beings
- flora
- fauna
- soil

- water
- air
- climate
- the landscape
- the inter-action between any of the forgoing
- material assets
- the cultural heritage

7.1.8 Detailed guidance on the assessment of the effects on each of these is given in section 3 of the guide.

7.2 Operational impact

7.2.1 Because the demand for stone slates is never likely to be very large the manufacturing will inevitably be small-scale and will have a correspondingly small potential impact. To this extent any proposed development should find it comparatively easy to satisfy the environmental constraints.

7.2.2 The manufacture is to a large extent a hand-made process and is likely to remain so. Nonetheless productivity will be as important a factor in the production of stone slates as for any other product. And so it should be if the producers are to avoid pricing themselves out of even a subsidised market. Consequently mechanical handling should be adopted wherever it is feasible. This will predominantly be for top soil removal and stacking, perhaps stripping of overburden - most slate deposits are immediately under the top soil - and waste removal. The need to remove top soil

and overburden may be infrequent - a quarry operated for slate and flagging in Yorkshire carries out these processes once every few years. Alternatively if a quarry was operated for slate and flagging only and it occurred near the surface, stripping and reinstatement could take place weekly or monthly.

7.2.3 The production process may therefore be envisaged as -

- Removal and stacking of top soil (with or without overburden stripping) by backhoe or face shovel possibly by contract hire at infrequent intervals.
- Extraction of fissile rock by hand or winch
- Hand splitting
- Edge trimming and holing by hand or small machine
- Packing for despatch by hand
- Despatch by small truck or pick-up
- Removal and tipping of waste by hand or small excavator
- Reinstatement possibly by contract hire or as a continuous process.

7.2.4 With the exception of the initial and final steps it can be seen that this is more of a craft industry than what is normally understood as quarrying in the 20th century.

7.2.5 It is therefore concluded that the general operation of a quarry producing stone slates, walling and flagging will have an inherently low impact. The need for mechanical excavation and muck shifting will probably be intermittent and/or of short duration.

7.3 Recreational and social use.

7.3.1 Disused quarries provide a location for many recreational activities casual or organised, approved or simply tolerated. Examples encountered in this study ranged from Country Parks

managed by the local authority to casual picnic spaces. Activities included walking, mountain biking, trials biking, rock climbing and orienteering but generally these only occur in quarries close to a road. By far the most prevalent activity is the use of foot paths. Many of these are designated rights of way and probably originated as access to the quarries which they traverse or skirt. Some lie on the route of long distance paths such as the Gritstone Trail.

7.3.2 In so far as the route through an old quarry may have been chosen because of its quarrying interest the re-establishment of a small-scale operation need not be inconsistent with a footpath and indeed with appropriate interpretation may enhance the enjoyment of the trail.

7.4 Agriculture

The quarries envisaged will be quite small. Even if they were situated on high quality agricultural land they would not take much land out of production, perhaps only a few hectares. In fact many potential quarries are situated on land of poor agricultural value - heath or moorland.

7.5 Water supplies

The effect on water supplies would need to be assessed individually. Potentially water courses could be contaminated by fine particles of sandstone, diesel or other fuels and if block sawing took place by sawing additives. Otherwise such quarries are not users of chemicals. In practice it is unlikely that quarries will present a risk to water supplies or to the ecosystems they support.

7.6 Historical value of old workings.

7.6.1 The working of sandstone generally and stone slates specifically has considerable historical importance in the region. The quarries may be significant features of the historical landscape.

7.6.2 Few examples were found in this study of original buildings or machinery. Those few buildings which were encountered were generally simple shelters constructed from waste rock.

7.6.3 Unfortunately no studies have been carried out in this field which means there is no context in which to assess the historical importance of specific sites. It is possible that the database produced by this study may form the basis of such an investigation.

7.6.4 In the absence of any formal studies it is the opinion of the field workers for this and the geological study that there is a prima facie case for conserving two quarries. Cracken Edge (SK 037835) - including White Rakes (SK 037843) - and Glossop Low (SK 058964). The former is a RIGS and together they represent two of the systems of extraction and were clearly of great commercial significance. Because they stand virtually unchanged since they closed they provide an opportunity to develop an understanding of the techniques of slate quarrying. Teggs Nose (SJ 948725) is another site which has considerable historical and geological significance. It demonstrates two methods of extraction and has a large geological exposure showing a range of rock types of varying suitability for building products. It is already protected in so far as it is a Countryside Park.

7.7 Landscape and topography

7.7.1 Many disused quarries occur in remote areas often on the skyline. Consequently they are prominent in the landscape.

7.7.2 Unless a re-established quarry is particularly well hidden by the lie of the land it will certainly affect the local landscape although on nothing like the scale of the familiar aggregate and chemical limestone operations which are established in the region.

7.7.3 Given the range of slate types required and the other resource and economic constraints on a viable quarry it is unlikely that suitable potential quarries will be found which are completely without effect on the landscape.

7.8 Visual effects

7.8.1 Historically the sites in which slate quarrying has taken place appear to have been selected wherever possible for convenience of extraction. This has resulted in the vast majority of quarries investigated operating by one of three options -

- At the crest of a scarp slope with a face of about 10 m height and worked along the strike. Cracken Edge, (SK 037835), is a classic example of this form.
- In ground where the surface is parallel to the dip of the beds and close to horizontal. Extraction by a single shallow bench or series of small shallow pits with waste ideally being tipped into previously worked ground. Freebirch is one example.
- In steeper ground with the surface parallel to the dip of the beds. Extraction by a series of benches working up slope. The benches may develop into a series of distinct quarries of modest height.

7.8.2 In the first of these cases the quarry will almost always be visible. In both of the others visibility will vary depending on the situation. Examples exist where the quarry is virtually undetectable from close by or at a distance. In other instances a quarry cut into a hillside may only be seen from directly opposite.

7.8.3 In all newly opened quarries the disposal of waste is likely to be obtrusive especially in the early stages of operation and until and if it can be back-filled into worked ground. Reopening an old quarry may provide an opportunity to tip into old workings.

7.8.4 Most of the workings visited in this study are remote from towns and villages and in many cases are only visible to people passing through the area on foot or by vehicle.

7.8.5 Quarries do need access for vehicles. However because the mobile plant and delivery vehicles need only be of modest size such access routes would have no more impact than farm tracks.

7.8.6 Existing operational quarries of the type under consideration do not use substantial buildings. Indeed one operates with only a shipping container in which to store equipment overnight and to provide a simple shelter during the day.

7.9 Wildlife

7.9.1 The wildlife interest of some old quarries is known and is recorded in the quarry data sheets and listed in Annex 2.6 of Volume 2. Many are included because of their presence in general areas of significance, on the Moor and Heath maps for example, rather than for some factor specific to the quarry. The conservation policy of the 1994 National Park Structure Plan would however, confer a presumption against development other than in exceptional circumstances on any quarry within a Moor and Heath area. Given the restricted occurrence of some slate types, their importance to the architectural heritage of the region and the small scale of a quarry required to produce them it may well be possible to argue that these are circumstances sufficiently exceptional to warrant approval.

7.9.2 Disused quarries have the potential to be special habitats supporting rare or unique species, communities or ecosystems. Little work has been carried out within the region to assess the old

quarries individually so specific guidance in this respect cannot be given here.

7.10 Geology

All quarries add to the understanding of local and regional geology by exposing the rock, often over considerable distances. Special locations are protected by designating them as Regionally Important Geological Sites (RIGS) and these are noted in the database and the quarry records. It is possible that some further old quarries may be designated RIGS as the work progresses. In any case any planning application to re-develop a quarry would be subject to such an assessment.

7.11 Transport requirements

7.11.1 The output of any quarry of the type described in Operational Impacts above will be quite modest. Based on the level of activity in similar quarries which are currently operating the day to day transport needs will probably involve no more than one or two journeys per day. They will, of course depend on whether products are sold from the quarry or removed to a central sales point. If sales are direct at most there are unlikely to be more than 10 or 20 visits from customers even on a busy day.

7.11.2 On the same basis it is estimated that transport for personnel and materials would account for about 15 return journeys per day.

7.11.3 Transport of mobile plant to and from the quarry would be very intermittent. Examples exist where it is as low as once every three years.

7.12 Sustainable development

Clearly any quarrying has an environmental impact but the specific environmental impacts of stone slates are less than they might at first appear. Being largely hand made and requiring little quarry plant their production has a very low fuel demand. Reliable figures for the fuel consumption of roofing products are not available but they will certainly be much lower for stone slates than any manufactured roofing product including concrete, resin or glass reinforced cement imitations. When additionally the environmental impact is spread over the life of the slates - at least one and maybe several hundred years - it is very small.

7.13 Conclusions

7.13.1 It is concluded that because quarries manufacturing roofing, flagging and walling products will almost inevitably be small-scale they are predisposed to have a low operational or visual impact. The effects of transport and on water supplies and agriculture will be slight or negligible. Impacts on recreational an social use, landscape, wildlife and geological interests will be site specific.

7.13.2 It is recommended that in assessing applications to operate quarries in areas in which there is a presumption against development account should be taken of the limited occurrence and architectural importance of some slate types and the small scale of quarrying involved in their production.

Planning control for architectural conservation

8.1 Government policy on the conservation of buildings is set out in Planning Policy Guidance document PPG 15 - Planning and the Historic Environment. This recognises the importance of the contribution of both groups of buildings and individual examples of special merit to local and national heritage and to the attractiveness of the communities in which people live, work and play. In the south Pennine region stone slates and walling flags and kerbs &c make a significant contribution to the appearance of both individual buildings as well as to extensive groupings of buildings in villages and towns.

8.2 Conservation policy in both the PPJPB and DCC supports the principles of PPG 15. Designation of conservation areas is the responsibility of local planning authorities. Scheduling of ancient monuments and listing of historic buildings are undertaken by the Secretary of State for the Department of National Heritage with the guidance of English Heritage.

8.3 Although the principle of conservation is that roofs should be maintained and renewed in their original materials in practice, in conservation areas, changes to roofs are only controlled if the are listed or if they have been made subject to an Article 4 Direction under the Town and Country Planning (General Permitted Development) Order. (GDO) The listing of a building automatically includes control of roofing materials and construction methods.

8.4 The substitution of one roof covering for another on a building which is not listed does not normally require planning permission. However under the provisions of either Article 4 (1) or (2) planning authorities can, where a case can be made, have the right of the property owner to do this removed, in which case such alterations become subject to planning control. The removal of such permitted development rights, is only used sparingly and generally only in conservation areas. Such controls only apply at present to about 10% of the conservation areas in Derbyshire and the ones affected are predominantly outside the stone slate areas.

8.5 Many stone slate roofs in the south Pennine region fall outside the control of listing and conservation areas. Most prominent amongst these are the field shelters and barns which contribute so much to the character of the countryside. These buildings are particularly vulnerable: to dilapidation because they often have no role in modern farming; to repair or replacement with inappropriate materials and, because they are often remote, to theft.

8.6 Redundancy of farm buildings is a significant factor in the changing appearance of the region. A review in 19884 [Darley, G., 1988, A Future for Farm buildings, SAVE Britan's Heritage] concluded that nationally barns are the subject of more listed building demolition applications than any other building type. Together with miscellaneous farm buildings they account for 20% of all such applications.

8.7 The greatest prevalence of stone slate roofs is in the north of the study region of which about half is in the Peak Park. Examples of such roofs are rare south of the southern borders of the Derbyshire Dales and Amber Valley District Council areas.

The map reproduced below indicates, for all the listed buildings within Derbyshire, the predominance of the north.

8.8 The Peak Park Joint Planning Board, Derbyshire County Council, the District Councils and English Heritage contribute to the conservation of the architectural heritage of the region by designating conservation areas, controlling alterations to listed buildings and where possible by assist-

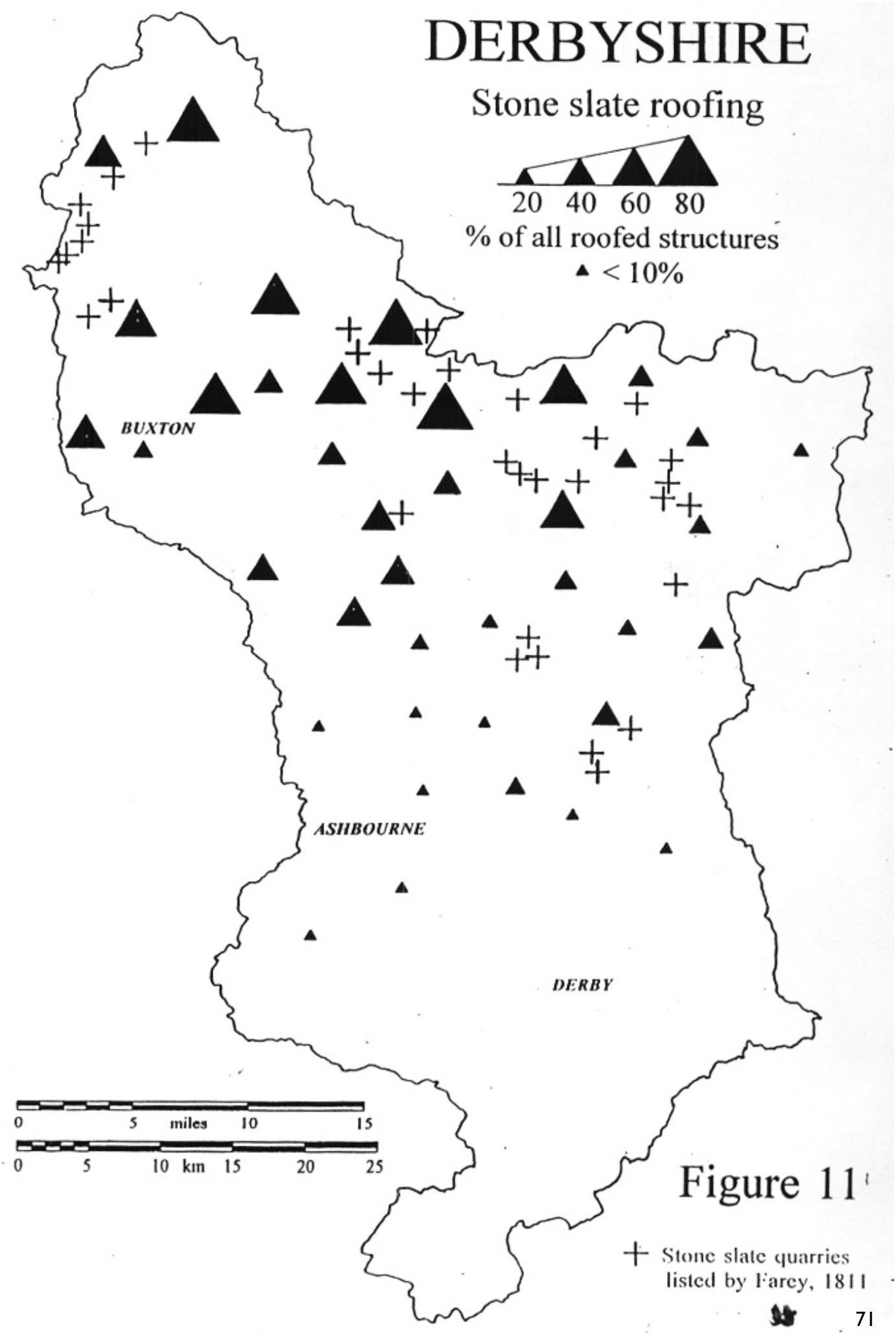

DERBYSHIRE
Stone slate roofing
20 40 60 80
% of all roofed structures
< 10%
BUXTON
ASHBOURNE
DERBY
0 5 miles 10 15
0 5 10 km 15 20 25
Stone slate quarries listed by Farey, 1811

Figure 11

ing with the cost of repairs.

8.9 Within the northern half of Derbyshire and in the Peak Park there are almost 100 conservation areas. In most of these stone slates are a significant feature of the roofscape: in many they predominate. There are also 1000 listed buildings in the study area with stone slate roofs and in the adjacent Macclesfield district which historically drew stone slates from what is now the Peak Park there are a further 2000.

8.10 The cost of carrying out repairs in stone slates is high both for materials and labour. Recognising this some local authorities provide grants for the roof restoration of individual buildings and English Heritage does so for listed Grade I and II* buildings and within Conservation Area Partnership Schemes. Roof repair takes the largest part of the building repair grant moneys available in the region. In some districts it accounts for the whole amount available in others none is provided. It is generally agreed that the amounts available are woefully inadequate with the result that many stone slate roofs are not conserved. The alternatives adopted under these circumstances - generally concrete imitations - are entirely unsatisfactory in that they are not convincing imitations initially, weather to a completely different appearance and their use is a deterrent to the revival of the stone slate industry.

8.11 The Countryside Stewardship Scheme (CSS)
Fisheries and Food has the objective, amongst others, of promoting the restoration of neglected land or features of the landscape including the restoration of traditional farm buildings, those built before 1940, using methods and materials appropriate to their age, function and location and constructed using vernacular materials.

8.12 This scheme also supports the conservation of field boundaries by management which follows traditional practices and uses local materials. The traditional stone walls of the region exist for two reasons. They were a convenient place to put stones picked up from the fields and they were readily available as a “waste” product from local quarries exploited primarily for roofing, flagging and masonry. In this context a local quarry would frequently have been the one operated for the farm on which it stood or for the immediate community. The importance of walling stone as a by-product of roofing manufacture and the enhanced economic viability of such quarries is emphasised in section 6.5.

8.13 The new Countryside Stewardship Scheme which came into effect in April 1996 placed a priority on the conservation of dry stone walls and vernacular buildings within the moorlands and uplands of Derbyshire and the Peak Park. (The Environmentally Sensitive Area in the south-west of the Peak Park is excluded.)

8.14 Under the scheme grant aid, usually at 50%, can be provided. Listed buildings and buildings in conservation areas are included within the scheme although work separately grant aided by other sources such as English Heritage may not qualify for a CSS grant. Non-listed buildings have in the past received grant aid jointly from the CSS and the Peak Park Joint Planning Board or Derbyshire County Council.

Roof conservation in practice

9. Conserving stone slates.

9.2.1 The policy and practice for the conservation of roofs (as well as other aspects of buildings) is set out in English Heritage publication The Repair of Historic Buildings by C Brereton3 and within the guidance for English Heritage Conservation Partnership Schemes: Specification requirements for grant aided work.

9.2.2 Both documents highlight the need to salvage as many as possible of the exiting slates and to reconstruct the roof to the same pattern of random sizes and diminishing courses as the original as far as is feasible. It is recognised that there will inevitably be a shortfall of reusable slates and hence a need to obtain similar slates to make up the deficit.

9.2.3 In obtaining slates to make up the deficit the preference is that “these should be new (where quarries exist and appropriate slates can be obtained) or sound second-hand natural stone slates to match the existing in size colour and texture.” Brereton points to the need to avoid the use of cannibalised slates from other old buildings. The intention here is to avoid cannibalisation purely to supply the demand for slates. It is, of course, desirable that slates should be reclaimed if a building is being demolished or the roof removed for other reasons. The difficulty arises in supporting the latter whilst avoiding the former.

9.2.4 Nevertheless in the absence of a reliable supply of new slates in the region the normal practice is that second-hand slates are almost always used for both repairs and new work. This has lead to a steady trade in these products with many roofers being obliged to spend a considerable amount of time and effort seeking out suppliers. In these circumstances it is hardly surprising that much of the supply comes from dubious sources including wholesale thefts of roofs; some more than once. Isolated barns are particularly vulnerable.

9.2 Criteria for roof conservation.

9.2.1 The appearance of a stone slate roof is an amalgam of many features: the texture, colour size and format of the slates; the pitch of the slopes and the treatment of their intersections and of the eaves, ridges, gables, verges, dormers and chimneys. Each of these features should be carefully recorded before restoration work commences and modern techniques and materials should only be substituted where there is a sound technical reason to do so. The same traditional techniques and styles should be applied to new construction, extensions and alterations. Guidance on the correct techniques for re-roofing is provide by the conservation departments of Derbyshire County Council and the Peak Park Joint Planning Board.1 Currently this guidance does not include criteria for the selection of replacement or additional stone slates. The following are suggested in order of importance to the appearance of the roof.

9.2.2 Rock type. Sandstone should never be replaced by metamorphic slate or limestone. Besides the aesthetic considerations limestone placed above sandstone can be very damaging to the latter. Limestone dissolved in rainwater will percolate into the sandstone interstices where it recrystalises as the roof dries, disrupting the sandstone and leading to spalling and early failure.

9.2.3 Size range and mix. Traditionally these would have been a consequence of the characteristics of the rock and the policy in the quarry. As far as possible the same sizes should be obtained as were originally used, however, because slates deteriorate at their top edges reclamation and removal of delaminated top edges leads to a reduction in length. It is very important that extra slates as long as the longest are obtained to make up this deficiency.

Photographs of stone slates

Source	Volume 1			Volume 2
	Annex A	Annex B	Annex C	Annex 3
Bakestonedale				Q9 & 3.69
Bole Hill, Bamford				Q24 & 3.69
Brown Edge				Q23 & 3.69
Carbonaceous siltstone	A14			
Cartledge			C27	
Chunal				Q10 & 3.69
Concrete imitations		B13		
Cracken Edge	A12			Q4 & 3.69
Cromford			C28	
Eccles Fold	A2			
Eccles Hill Yorkshire	A9		C18 - 20	
Flash			C3 & 4	
Freebirch	A8 & 11		C30 & 31	Q19 & 3.69
Goytes Clough	A3			Q1 & 3.69
Harden Clough	A10		C21 - 24	
Hathersage			C25	
Heage			C44 & 45	
Holloway			C42	
Holme Valley			C15	
Holymoorside			C32 & 33	
Houndkirk Moor	A1			
Kerridge	A7			Q8 & 3.69
Magnesian limestone	A13		C47	
Mickley			C28 & 29	
Milldale			C26	
Monyash			C36 & 37	
New Mills	A17	B1 & 2	C7 & 8	
Old Bramton			C34 & 35	
Penistone			C16	
Pott Shrigley		B14	C 9 & 10	
Press				Q35 & 3.71
Reeve Edge	A5 & 6			Q18 & 3.70
Roaches			C1 & 2	
Rowarth			C11 & 12	
Slatepit Dale				Q26 & 3.70
Soil Hill Yorkshire	A4			
Stanton Moor			C38 & 39	
Sutton Lane				Q39 & 3.71
Tansley			C40 & 41	
Teggs Nose		B7	C5 & 6	Q7 & 3.69
Thornseats Delf				Q33 & 3.71
Tideswell	A18			
Tintwistle			C13 & 14	
Top Eccles Farm				Q14 & 3.70
Wirksworth	A19 & 20			

9.2.4 Ideally the pattern of reducing courses should be conserved although there is a limit to what can be achieved without wholesale renewal of the slates. The length of exposed slate margins should be recorded before dismantling a roof. If the larger slate lengths can be obtained to make up losses due to delamination then the diminishing coursing will usually work out to a close approximation of the original. It is important to realise that in random slating the head lap is not constant and must be increased at changes of length to ensure adequate driving rain resistance. This influences the length of the exposed margin of the slates but it must take priority over the need to conserve the appearance of the roof.

9.2.5 Thickness. This characteristic is very important because it is the edges which give the authentic stone roof its bulky appearance. Its visual effect is influenced by the way in which the edges are dressed and the angle at which the edges spall off. One disadvantage of turning reclaimed slates is that the edges will be bevelled the wrong way. This not only spoils the appearance but tends to hold water rather than shed it. The argument for turning slates is that often they have settled into the roof becoming curved. When replacing them they have to be positioned with the concave face downwards to avoid the tails kicking up.

9.2.6 Surface texture and grain size. Surface texture may vary between completely flat and featureless to rippled and twisted. Besides the obvious effect grain size on the appearance of the surface this characteristic will also affect the build up of surface deposits. Further if the slate has an open structure it will also tend to absorb and hold more water making it easier for lichens and other vegetation to establish.

9.2.7 Colour and visible minerals. Colour can be more significant than surface texture for the smoothest and flattest slates. When newly laid the colour of slates is very evident but diminishes as dirt, soot or lichen growths build up. For this reason and because pigmenting minerals may be leached out the colour of most old roofs is quite different to the rock from which they are made. Some minerals such as mica will give the surface of new slate a very distinctive appearance but this may alter with time. Little is known about how the colour and surface of stone slates alter with time and it may be that the appearance of many old roofs which are soot coloured may be a thing of the past.

9.2.8 Annex B shows some aspects of the process of re-roofing.

Photo No	Subject
B1	Deterioration & peg failure
B2	Stacked for inspection of the heads
B3	Stone ridges
B4	Delamination of the head
B5	Eaves and 1st course stacked for refixing
B6	Finished re-roof
B7	Trimming the softened head of a slate
B8	Slates stacked by length
B9	Re-roofing completed
B10	Use of a gauging rod.
B11	Control of head lap & use of backers
B12	Positioning the head to control lap
B13	Imitation slates
B14	Effect of turning slates

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Maps

Topological

Reprint of first edition OS map No 27 Buxton and Stockport

Ordnance Survey	Touring Map & Guide: Peak District	1" :1 mile.
Ordnance Survey	Outdoor Leisure 1. The Peak District: Dark peak	1:25 000
Ordnance Survey	Outdoor Leisure 24. The Peak District: White peak	1:25 000
Ordnance Survey	Landranger 119 Buxton, Matlock and Dovedale	1:50 000
Ordnance Survey	Landranger 110 Sheffield and Huddersfield	1:50 000

Geological

Geological Survey	Sheet 85 Manchester	D	1930	1" series
Geological Survey	Sheet 85 Manchester	S	1930	1" series
Geological Survey	Sheet 86 Glossop	S	1913	1" series
Geological Survey	Sheet 86 Glossop	S&D	1981	1:50 000
Geological Survey	Sheet 87 Barnsley	S&D	1951	1" series
Geological Survey	Sheet 98 Stockport	D	1962	1" series
Geological Survey	Sheet 98 Stockport	S	1962	1" series
Geological Survey	Sheet 99 Chapel en le Frith	S	1987	1:50 000
Geological Survey	Sheet 100 Sheffield	S&D	1974	1:50 000
Geological Survey	Sheet 110 Macclesfield	D	1906	1" series
Geological Survey	Sheet 110 Macclesfield	D	1968	1:50 000
Geological Survey	Sheet 111 Buxton	S	1978	1:50 000
Geological Survey	Sheet 112 Cheterfield	S&D	1971	1" series
Geological Survey	Sheet 124 Ashbourne	S&D	1983	1:50 000
Geological Survey	Sheet 125 Derby	S&D	1972	1:50 000

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Other sources of information

Publications by the Peak Park Joint Planning Board

- Conservation areas in the National Park -
- An Introduction
- Environmental grants
- Grants for your property
- What is a Conservation Area
- Conservation Area or Village Scheme?
- Repair and Maintenance of Old Buildings
-

Annex 1

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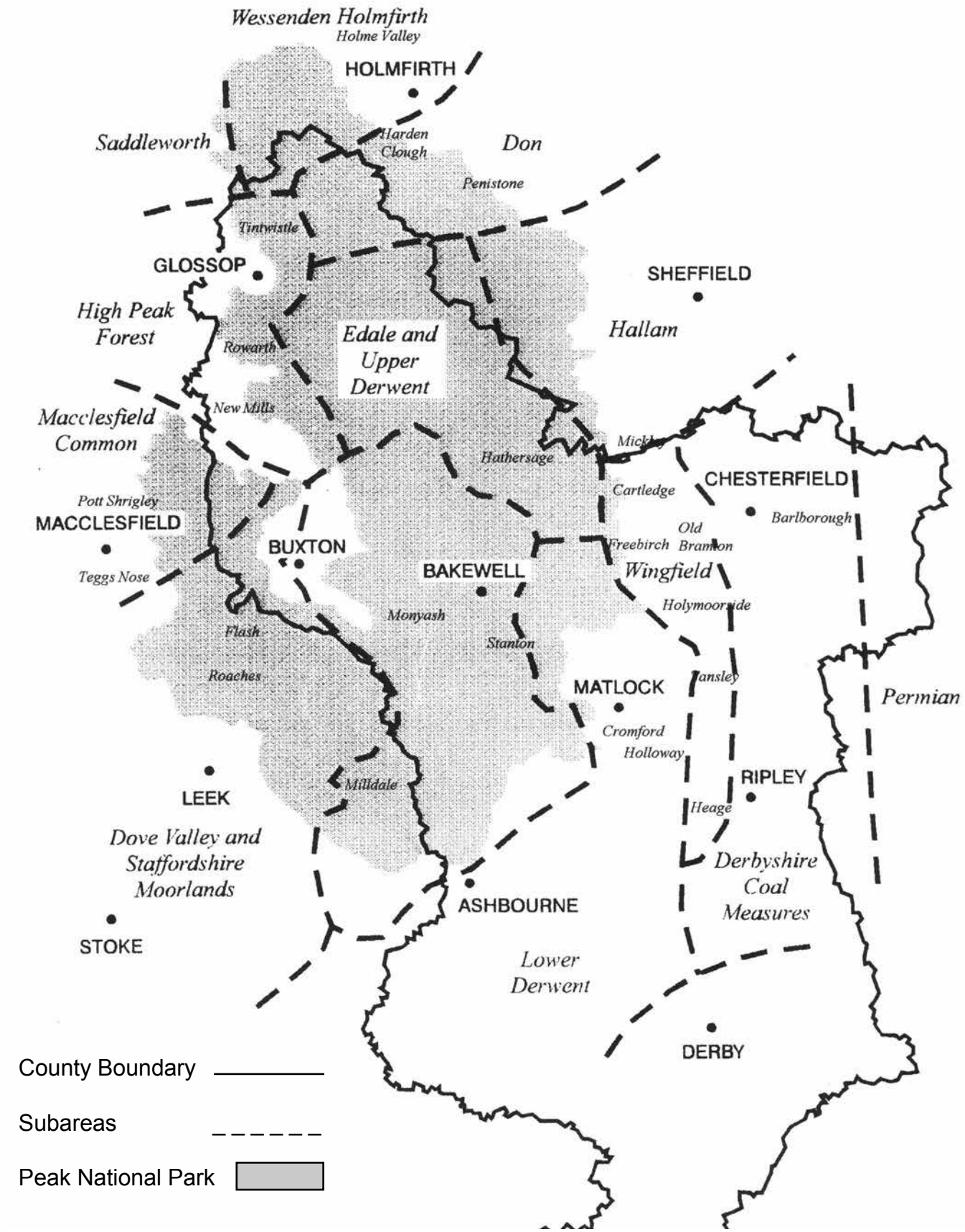
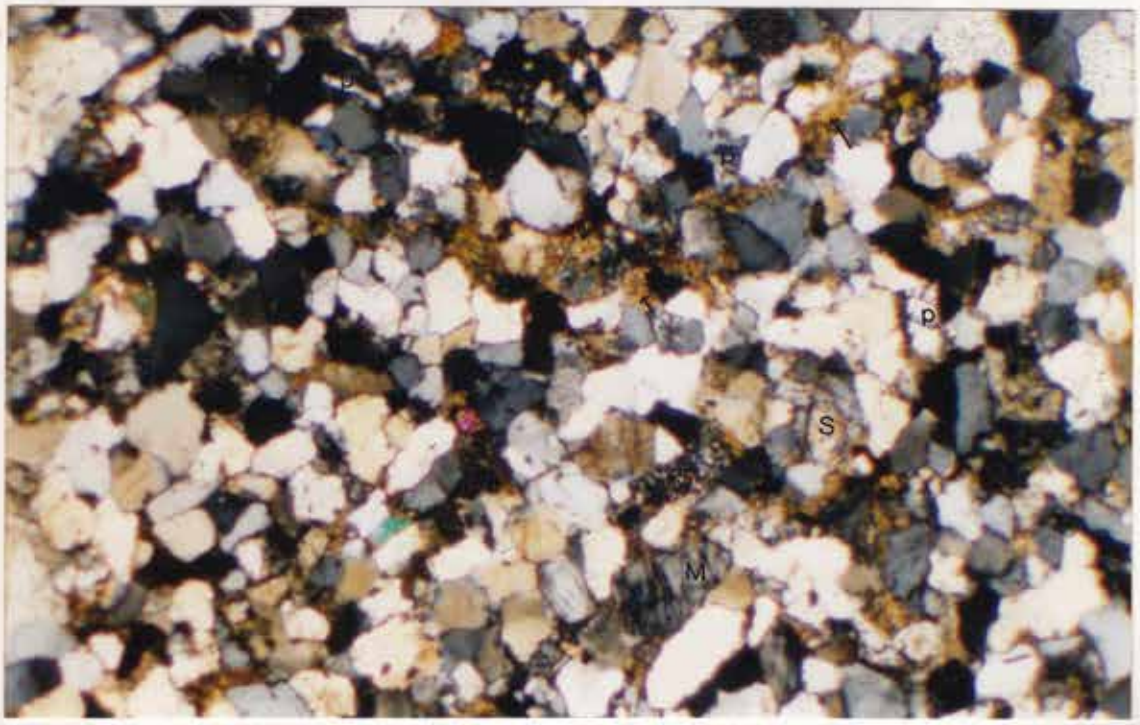
Annex 2 Map of the study region showing the subareas



Annex 3 Photographs and microphotographs of stone slates

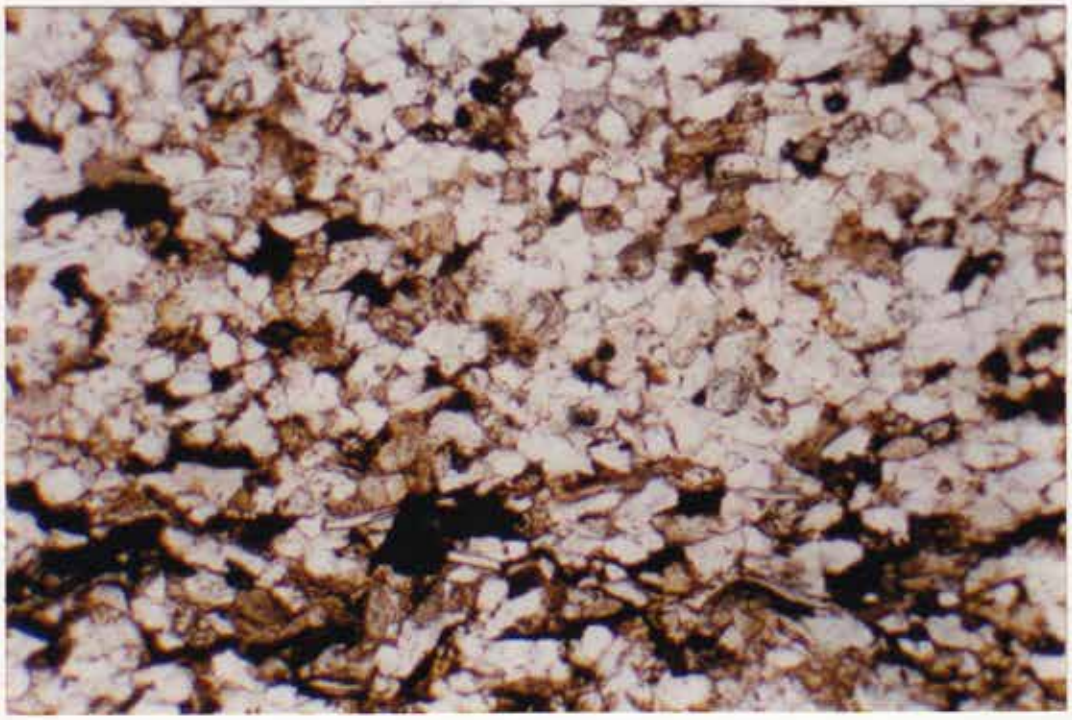
These photographs are taken from the associated geplogical report.
Consequently the numbering is not consecutive

Q1. Hand specimen, primary current lineation from top right to bottom left with finely spaced parting planes. This specimen is highly unsuitable for roofing, given the inherent weaknesses along micaceous, finely spaced partings.



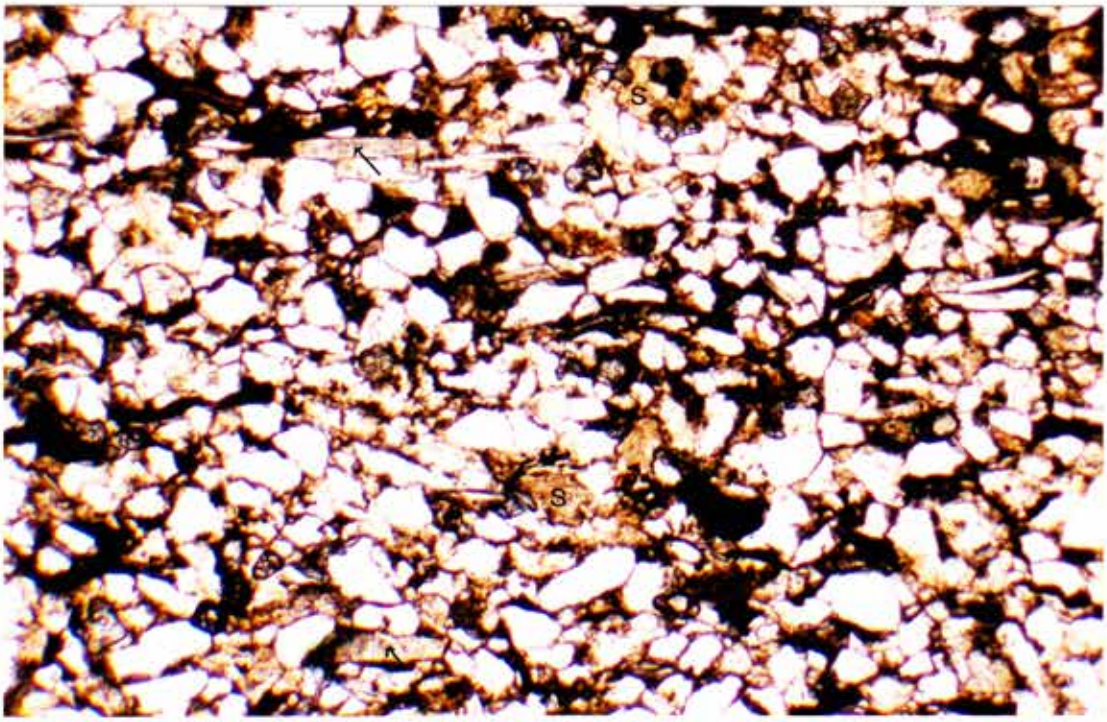
Q1. Petrographic section in cross-polarised light (XPL) of a fine-grained sandstone with abundant secondary syntaxial quartz overgrowths. Plagioclase (P) and alkali feldspars (microcline M) are common. Partially sericitised potassium feldspars are noted (S). A brightly coloured (pink) zircon is apparent in the centre of the plate. Matrix (arrowed) is dominated here by sericite/illite derived from both a primary sedimentary source and from feldspar corrosion. Horizontal field of view 3 mm.

Q4. Hand specimen with primary current lineation present but not apparent. Finely spaced parting planes make this specimen highly unsuitable for roofing, given the inherent weaknesses along such micaceous planes.



Q4. Petrographic section in plane-polarised light (PPL) of a very-fine to fine-grained sandstone. The clay matrix of illite/sericite appears brown and dusty. Feldspar grains, many of them breaking down to a clay mineralogy, also appear brown and dusty, but their grain shape is usually pronounced. Toward the base of the plate a lamina with abundant micas is present. Muscovites appear white and clear. Biotites are bent and altered (now opaque). Alteration is typically concentrated along laminae surfaces, where severe compaction is also apparent (bent micas). Critical weaknesses are imparted along these planes and are likely to split during weathering. Horizontal field of view 3 mm.

Q7. Hand specimen showing weathered patches.

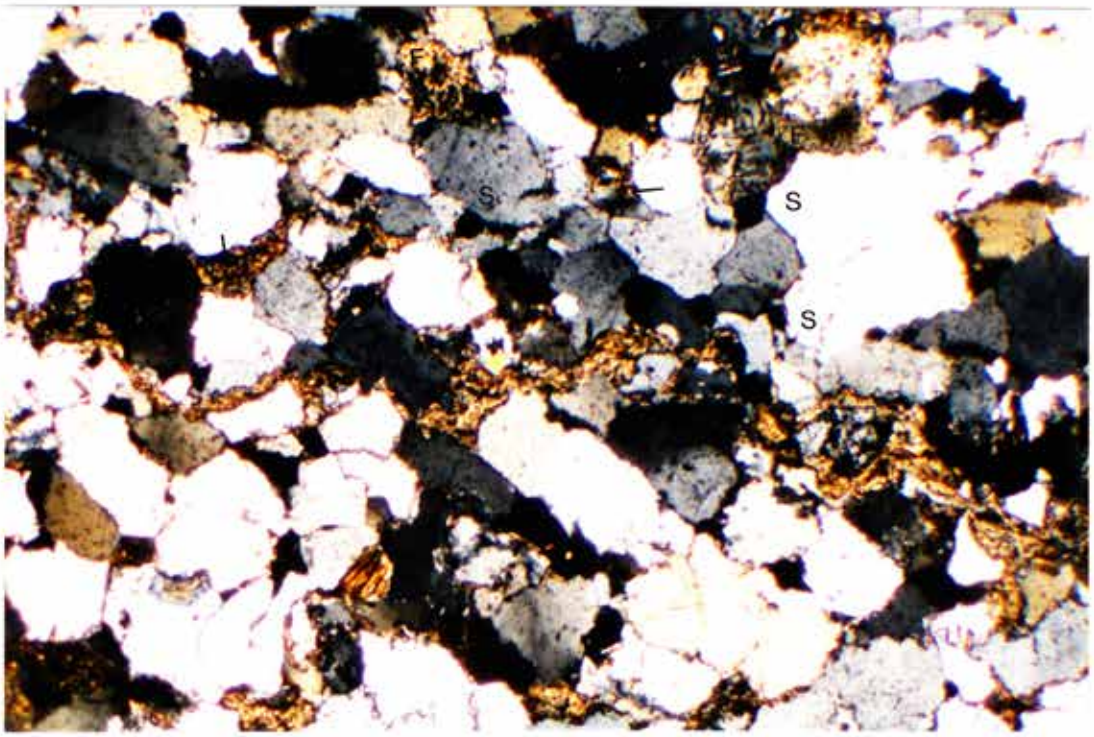


Q7. Petrographic section in plane-polarised light (PPL) of a fine sandstone. Prolate grains pick out a fabric running right to left, including two well-shaped prolate potassium feldspar grains (arrowed). Illite/sericite matrix is dusty, orange-brown. Some feldspar grains undergoing alteration (partial sericitisation) also show this texture (S). Opaques are dark brown or black and represent altered biotites compacted between grains. Horizontal field of view 3 mm.

Q8. Hand specimen. note abundant micas on pronounced parting surface.

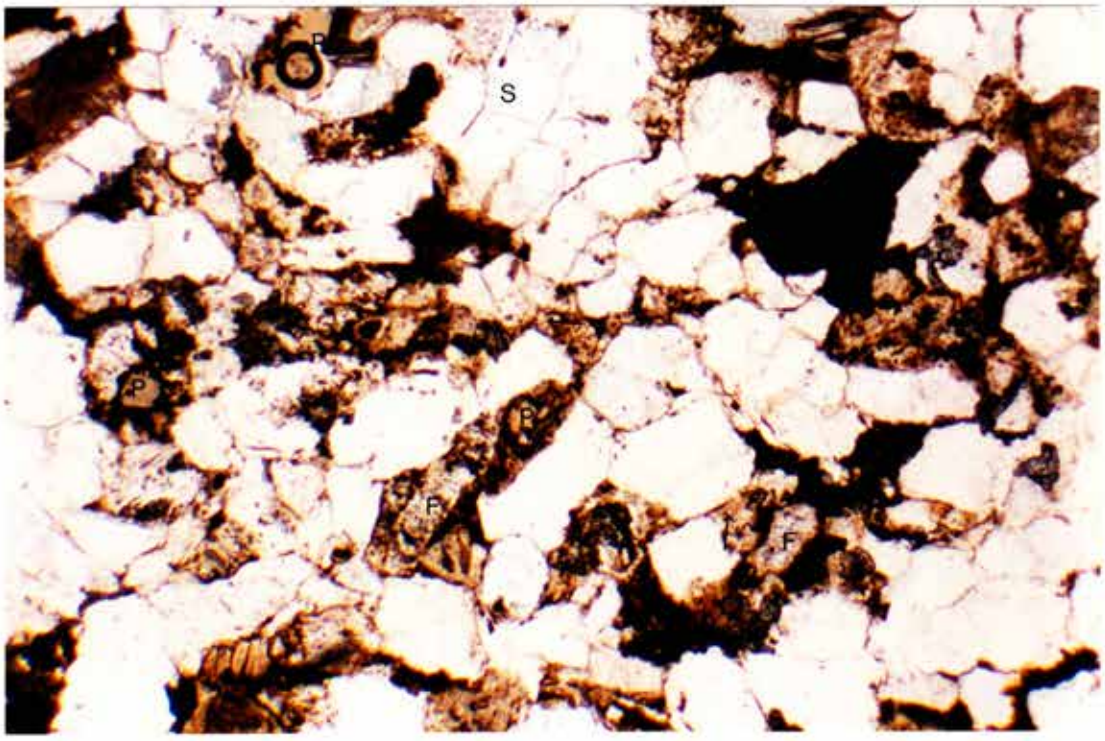
Q8. Petrographic section (PPL) of a fine sandstone with abundant syntaxial overgrowths (S). Calcium carbonate appears as a brown pore-filling cement in high relief (C). Plagioclase feldspars show a dusty-brown texture as a result of alteration (P) and biotites appear near-opaque also due to alteration (B). Horizontal field of view 3 mm. Although syntaxial cements will impart a certain strength to the rock, this sample also has numerous parting planes (micaceous laminae) and may prove to be an unsuitable rock as a tilestone.

Q9. Hand specimen with a regular, flat surface. This sample has thickly spaced parting-planes, possibly representing a cross-bed foreset and would provide good material for roofing.



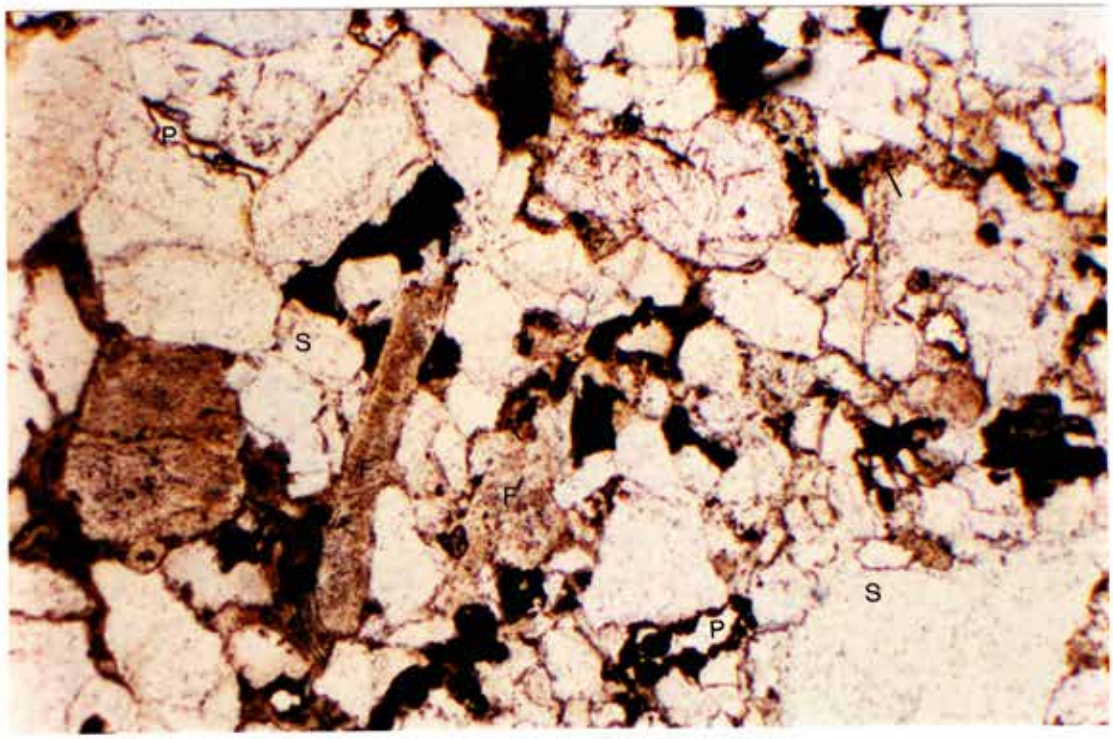
Q9. Petrographic section (XPL) of a fine-grained sandstone, showing a prominent illite/sericite filled parting. Syntaxial overgrowths are common (S), microcline is present. Several feldspar grains entirely altered to illite/sericite (F) suggest this is the predominant source for the illite/sericite clay matrix (arrowed). Porosity is represented by black voids. Horizontal field of view 3 mm.

Q10. Hand specimen with irregular grain-surface, a slightly irregular, continuous bedding (large-scale) surface and thickly separated partings.



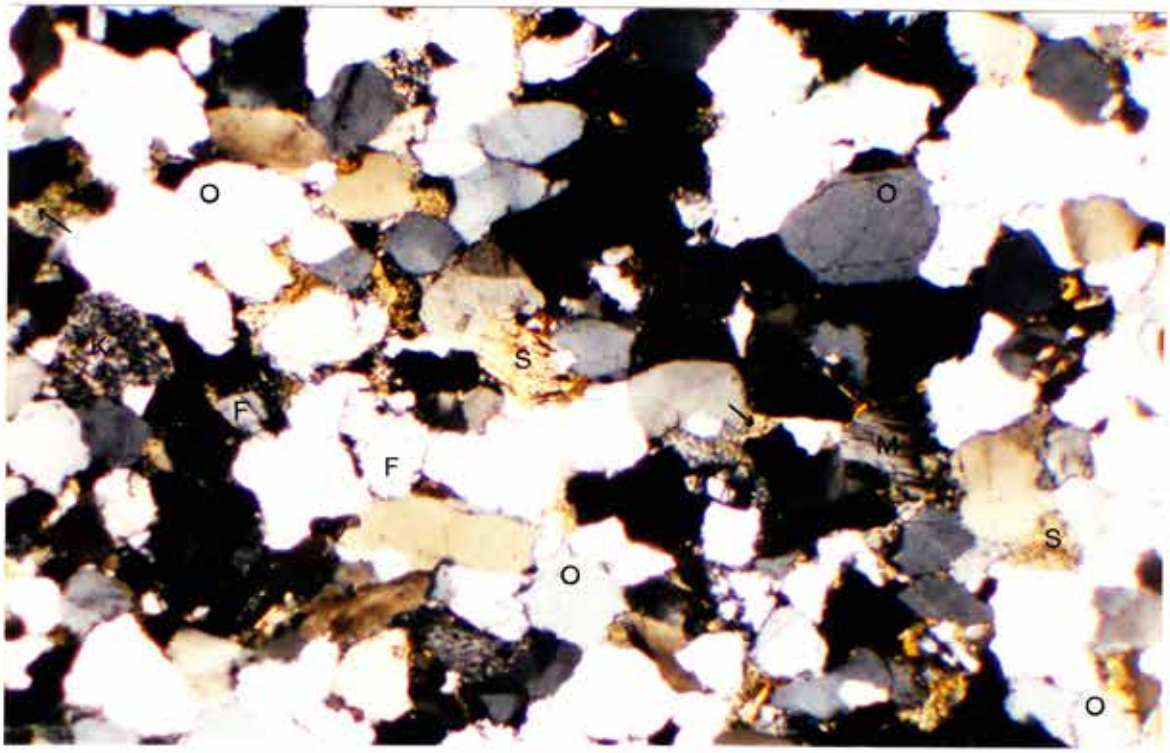
Q10. Petrographic section (PPL) of a fine-medium grained sandstone with abundant secondary syntaxial overgrowths of quartz (S) and some porosity (P). Altered feldspars (F) are common and some have become incorporated into the matrix (arrowed). A large opaque grain is toward the bottom left of the plate, whilst other (black) opaques are probably the product of compacted, bent and altered biotites (B). This sample with an abundant secondary quartz cement and lacking sedimentary partings may provide good suitability for roofing. Horizontal field of view 3 mm.

Q14. Hand specimen.



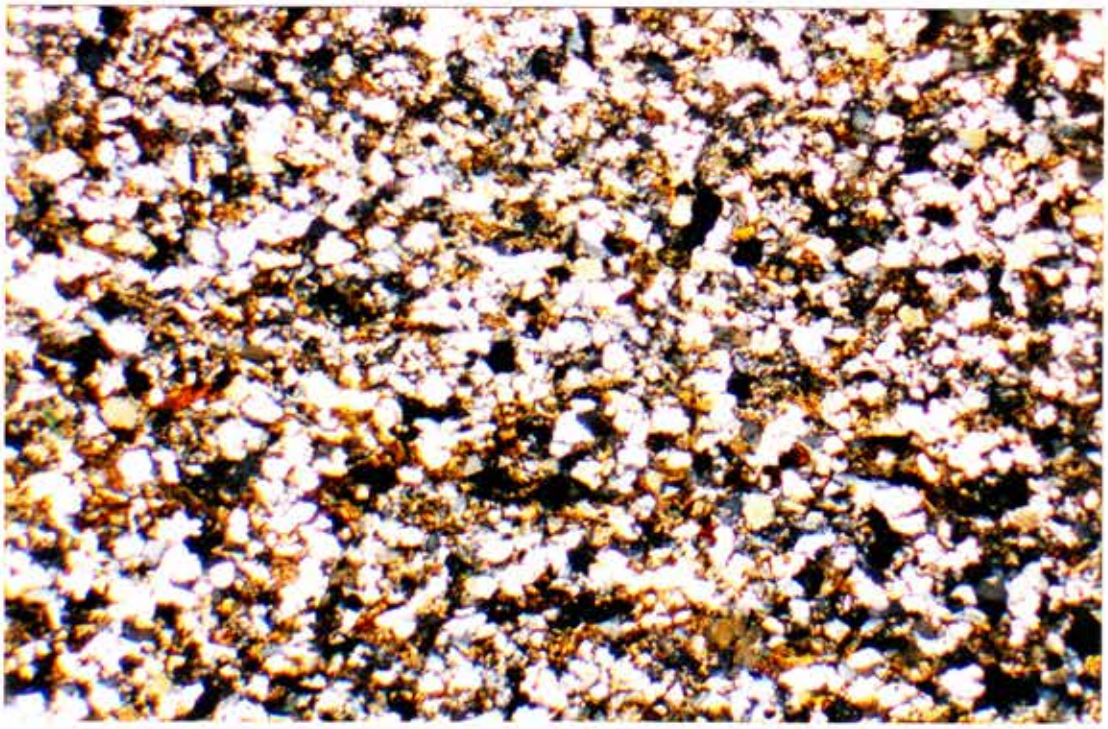
Q14. Petrographic section (PPL) showing a coarse-grained sandstone grading (to the right) to a medium-grained sandstone. Syntaxial overgrowths are common (S). Angular opaque masses appear to represent altered siderite cement. Other finer opaque grains are pore-lining around porosity (P). Feldspars are well shaped (F) and a clay matrix of illite/sericite is pore filling (arrowed). A pleochroic tourmaline grain is top centre of the plate (T). Horizontal field of view 3 mm.

Q18. Hand specimen with flat to slightly irregular surface. Beds are continuous with thickly spaced parting planes. This sample, probably a cross-bed foreset, would provide good material for roofing.



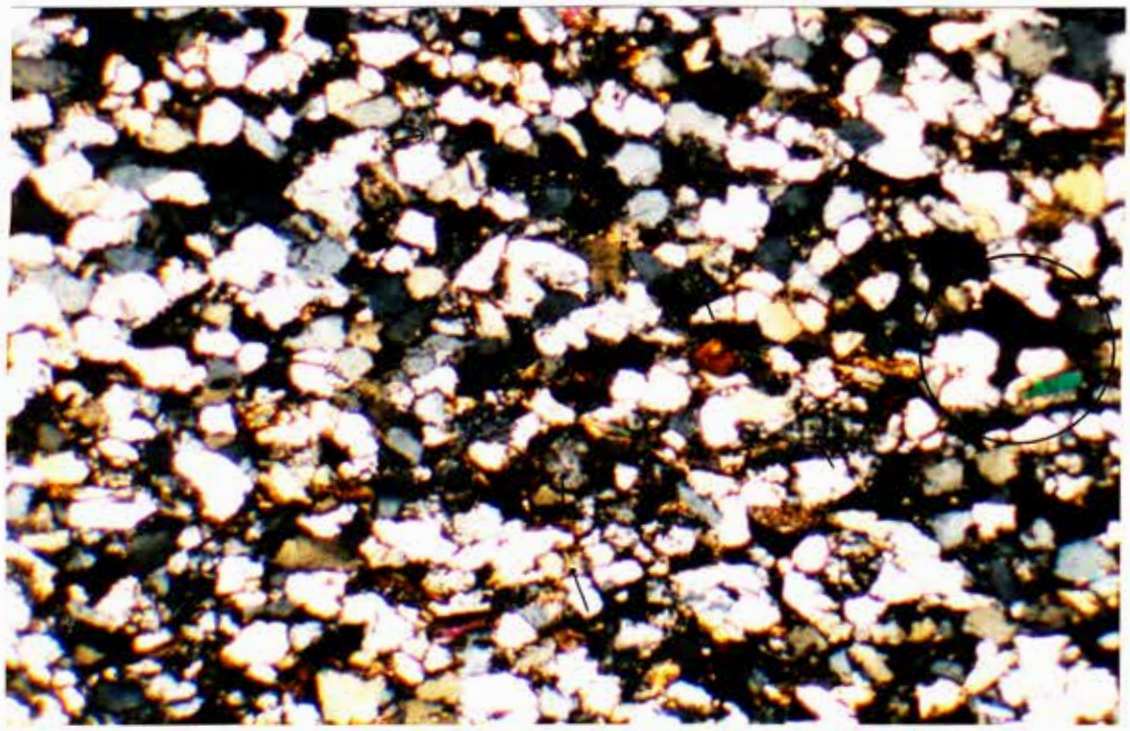
Q18. Petrographic section (XPL) of fine- and medium-grained sandstone with abundant syntaxial quartz overgrowths (O). Note microstylolitic contacts. Note also a kaolinite pseudomorph after feldspar (K), sericite/illite pseudomorphs after feldspar grains (S), sericite/illite matrix (arrowed), microcline (M) and other fresh feldspars (F). Horizontal field of view 3 mm.

Q19. Hand specimen. Note chisel marks where attempt has been made to smooth irregularities formed by trough cross-lamination. The sample has a low tendancy toward splitting due to lack of mica, however, preparation/dressing required on the rock surface makes this specimen-type unsuitable for roofing.



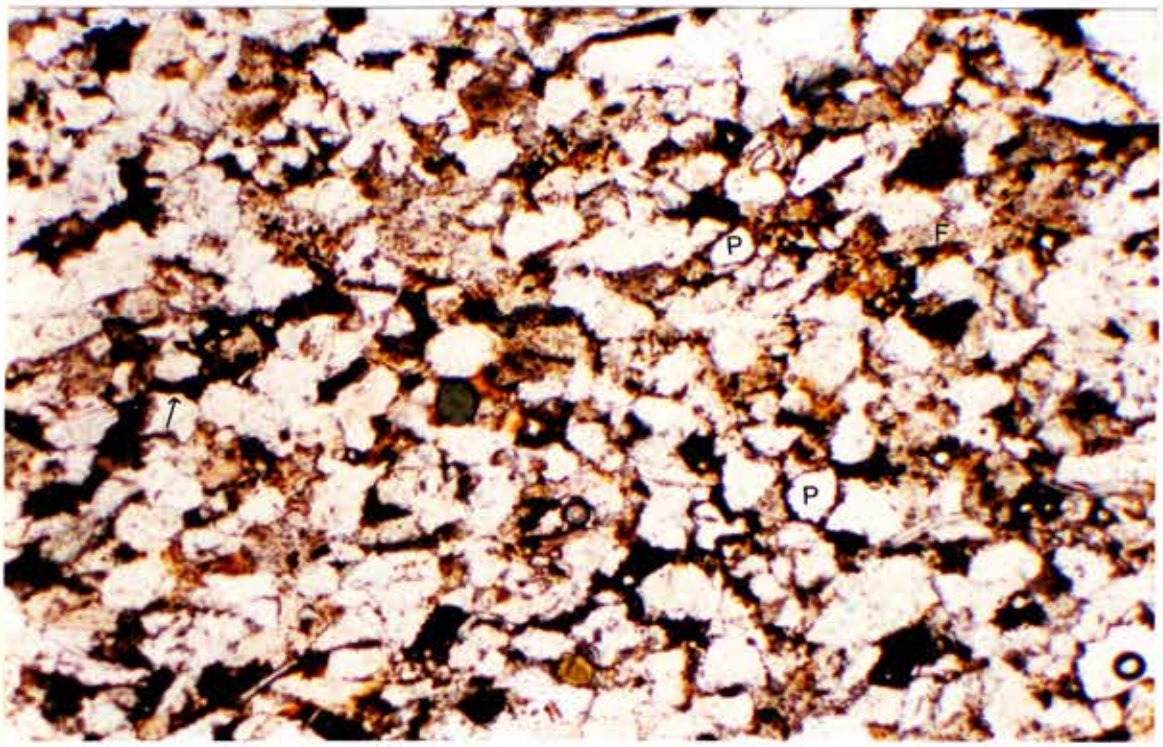
Q19. Petrographic section (XPL) of a coarse silt to very fine-grained sandstone. Abundant iron oxide matrix is apparent, (coloured orange in the plate), with illite/sericite clays masked by the iron oxide. The majority of black areas represent porosity. Horizontal field of view 3 mm.

Q23. Hand specimen.



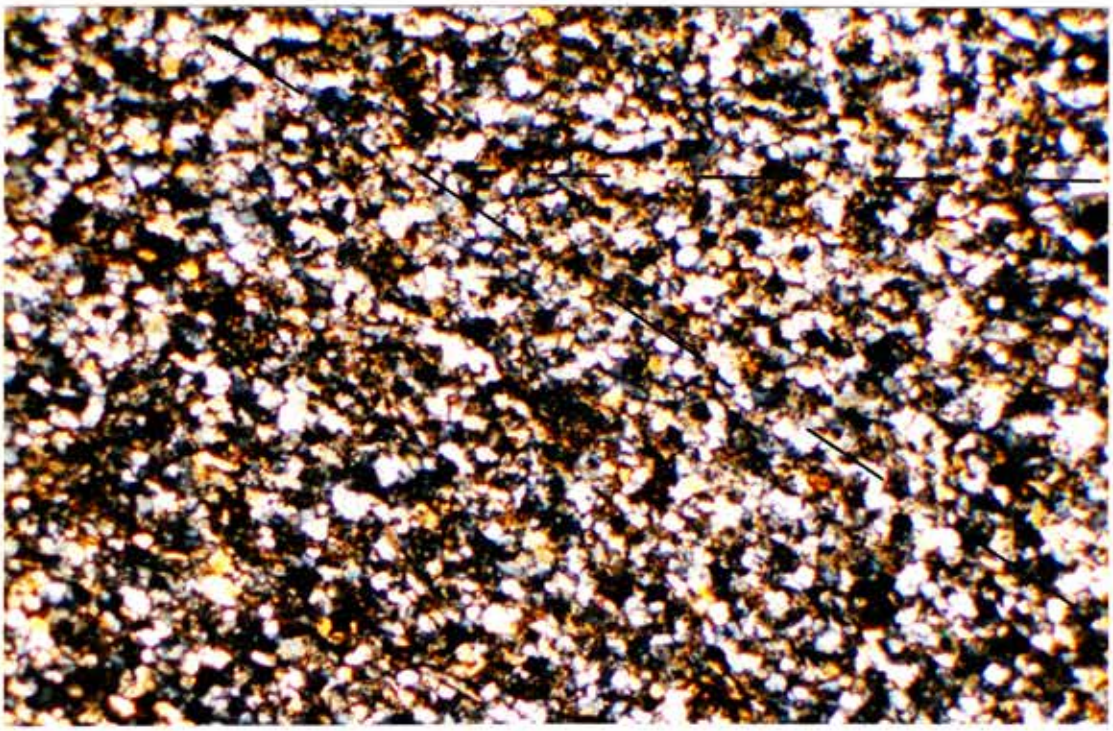
Q23. Petrographic section (XPL) of a fine-grained sandstone, with common syntaxial quartz overgrowths. Microcline and plagioclase feldspars, pore-filling kaolinite and sericite/illite clays are present (all arrowed). Iron opaque grains are common within the sample. These show up black in the section, the majority of which are compacted around other grains (circled). Horizontal field of view 3 mm.

Q24. Hand specimen showing curved surfaces of foresets of trough cross-lamination.



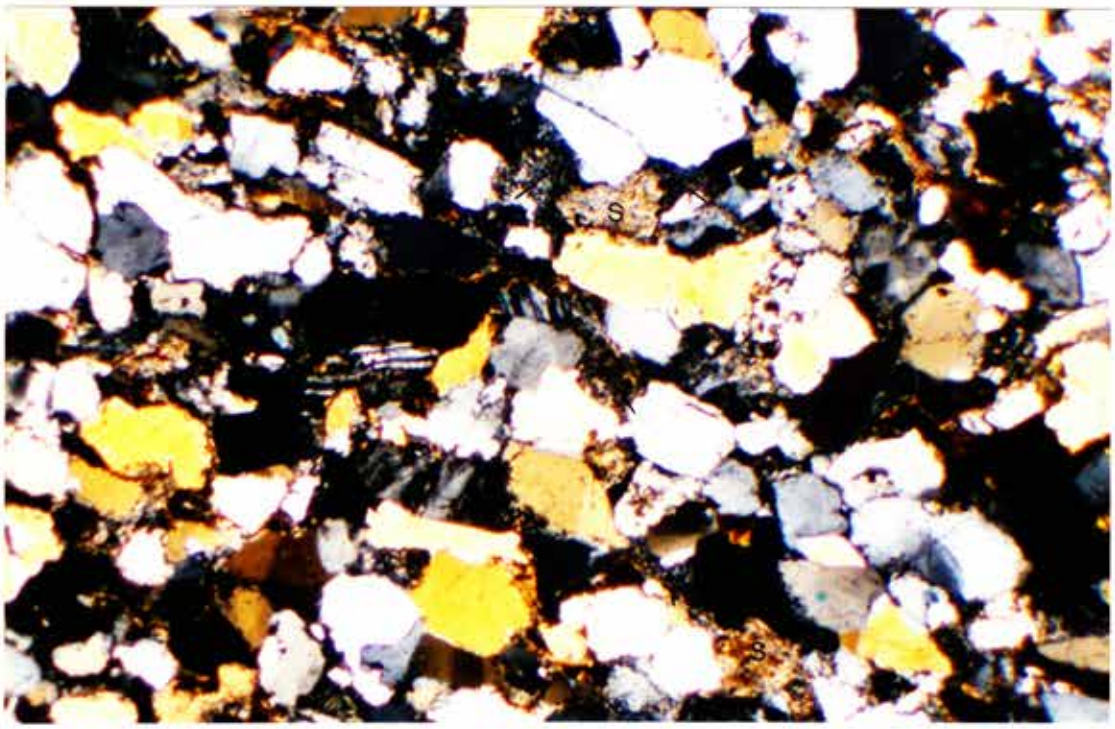
Q24. Petrographic section (PPL) of a fine-grained sandstone. A green (pleochroic) tourmaline grain is left of centre. Sericitised feldspar grains (F) and many pore-lining opaques (arrowed) are apparent. The larger opaques are bent and altered biotites. Bright areas on the plate represent porosity (P). Horizontal field of view 3 mm.

Q26. Hand specimen. Note abundant, irregular partings due to trough cross-lamination, making the material unsuitable for roofing.



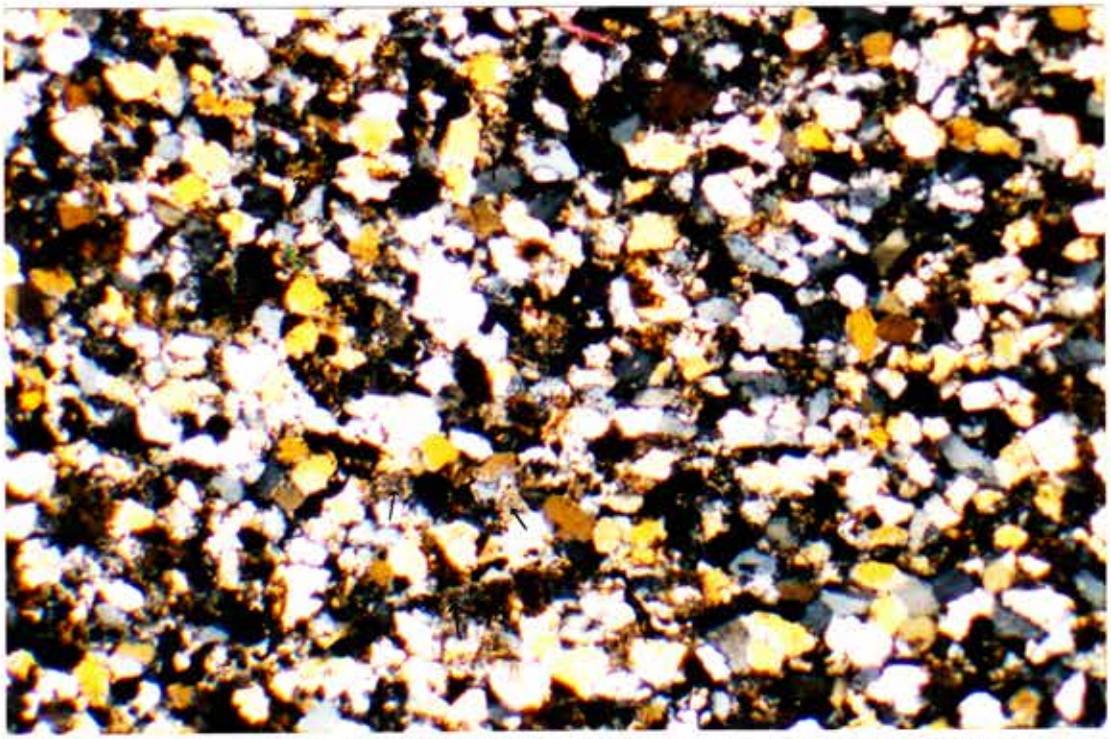
Q26. Petrographic section of a siltstone to very fine-grained sandstone. A clay matrix with abundant iron oxides is pervasive (30%). The section shows a ripple contact separating two fabrics with varying attitude (marked). A greater concentration of iron-rich matrix is noted on the ripple cross-lamina contact. Horizontal field of view 3 mm.

Q33. Hand specimen.



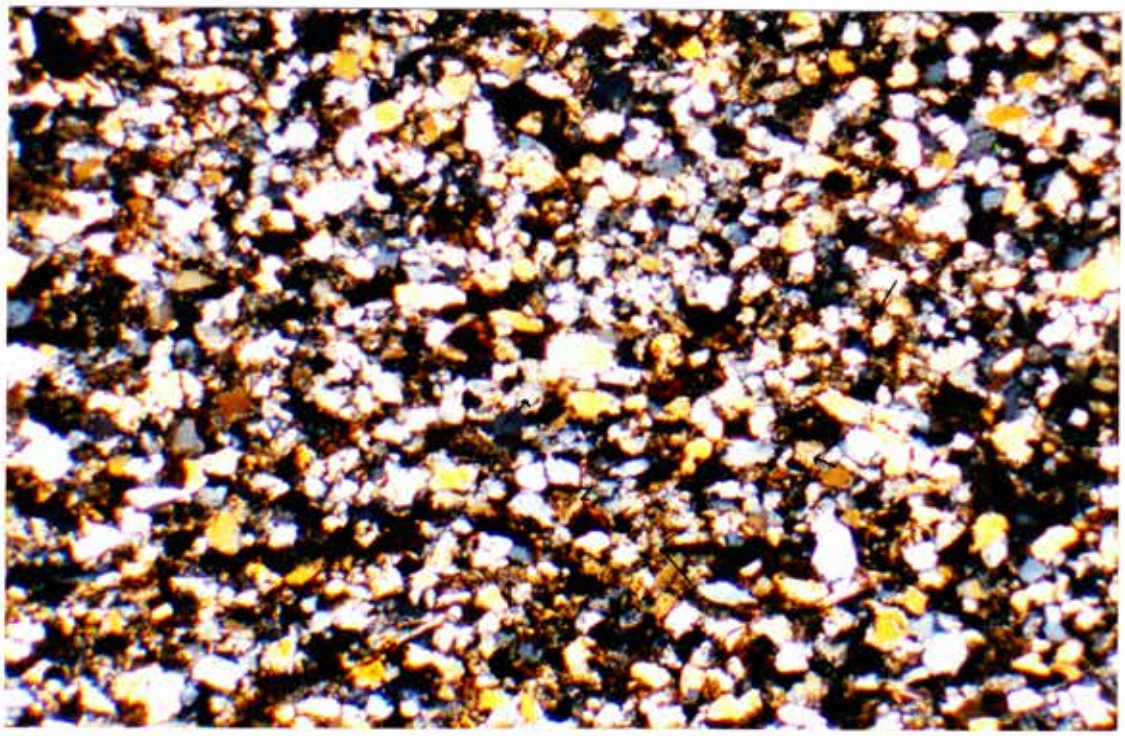
Q33. Petrographic section (XPL) of a fine-medium grained sandstone. Microcline, plagioclase feldspars and sericitised pseudomorphs of feldspar (S) are apparent. Syntaxial quartz overgrowths are common as is pore-filling kaolinite (arrowed). Horizontal field of view 3 mm.

Q35. Hand specimen showing irregular partings formed by trough cross-lamination. The sample has a low tendancy toward splitting due to lack of mica, however, preparation/dressing required on the rock surface makes this specimen-type unsuitable for roofing.



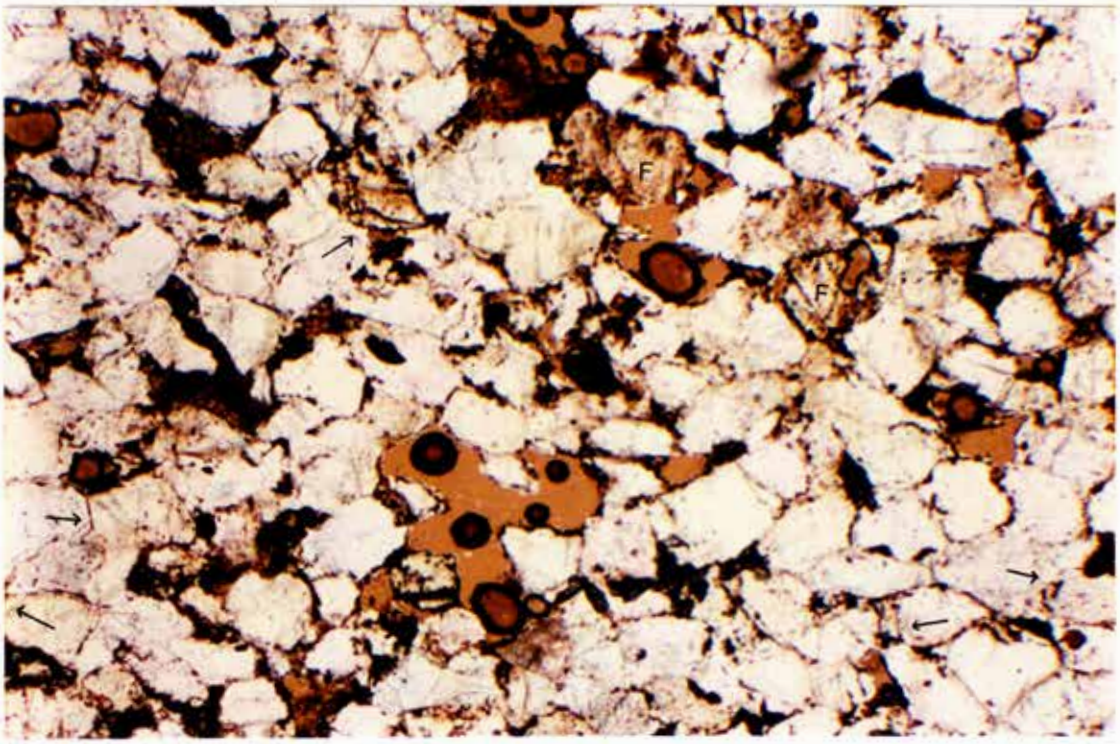
Q35. Petrographic section (XPL) of a very fine-grained sandstone with a high feldspar content and abundant syntaxial quartz overgrowths. Large proportion of the sample comprises feldspars and fine-grained lithic fragments breaking down to form matrix. Matrix comprises iron oxide rich illite/sericite clay, derived from alteration of lithic fragments and feldspars (arrowed). Opaque grains, black in section, are also common. Horizontal field of view 3 mm.

Q39. Hand specimen showing irregular surface formed by trough cross-lamination.



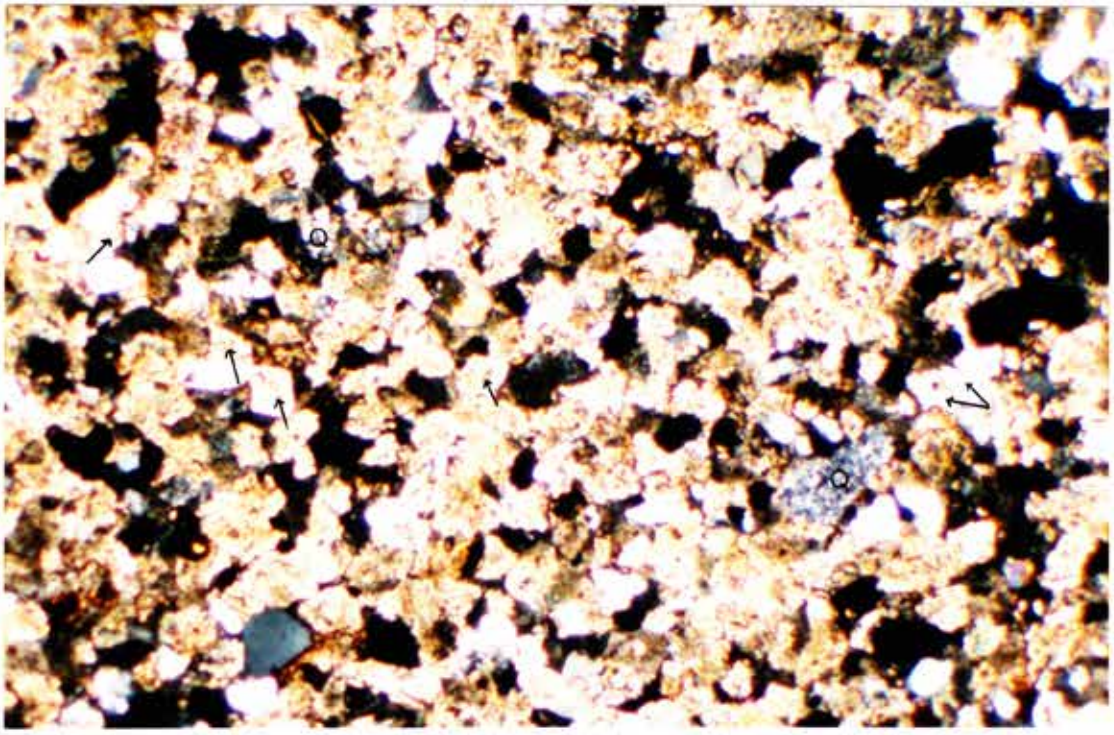
Q39. Petrographic section (XPL) of a very fine-grained sandstone with abundant zircons (high birefringent colours and high relief, marked 'Z'). The sample has a high feldspar content, the majority altered to clay minerals and often incorporated into the high percentage matrix (feldspar grains and clay matrix both arrowed). Horizontal field of view 3 mm.

MS1. Hand specimen of a tilestone. Note the zones resulting from differential weathering of the roofing material. See Figure 2.2 for further description.



MS1. Petrographic section (PPL) of an extremely well sorted, upper-fine sandstone with high porosity (brown areas with some bubbles). Straight crystal-boundaries result from syntaxial quartz cements (arrowed), which create strong bonds, making the rock type durable and suitable for tilestone. Potassium feldspars (F), kaolinite pore-filling matrix (K) and pore-filling iron oxide opaques (I) are noted. Horizontal field of view 3 mm.

MS2. Hand specimen of a tilestone with adhering lime to left of specimen. Note also zones of weathering (see Fig. 2.2 for further discussion).



MS2. Petrographic section (XPL) of a fine-grained dolostone with high porosity (black in the section). Dolomite rhombs are evident as is the secondary amorphous cement (both arrowed), interstitial to the dolomite crystals (probably calcite). Quartz proportions are approximately 10%, including schistose quartz grains (Q). Horizontal field of view 3 mm.

TEXTURAL AND COLOUR SAMPLES OF THE SPECIMENS

Q1. Fine-grained sandstone

Q4. Very fine to fine-grained sandstone

Q7. Fine-grained sandstone

Q8. Fine-grained sandstone

Q9. Fine- to medium-grained sandstone

Q10. Fine- to medium-grained sandstone

Q14. Coarse-grained sandstone

Q18. Fine- and medium-grained sandstone

Q19. Coarse siltstone to very fine sandstone

Q23. Fine-grained sandstone

Q24. Fine-grained sandstone

Q26. Siltstone

Q33. Fine- to medium- sandstone

Q35. Very fine to fine-grained sandstone

Q39. Very fine grained sandstone

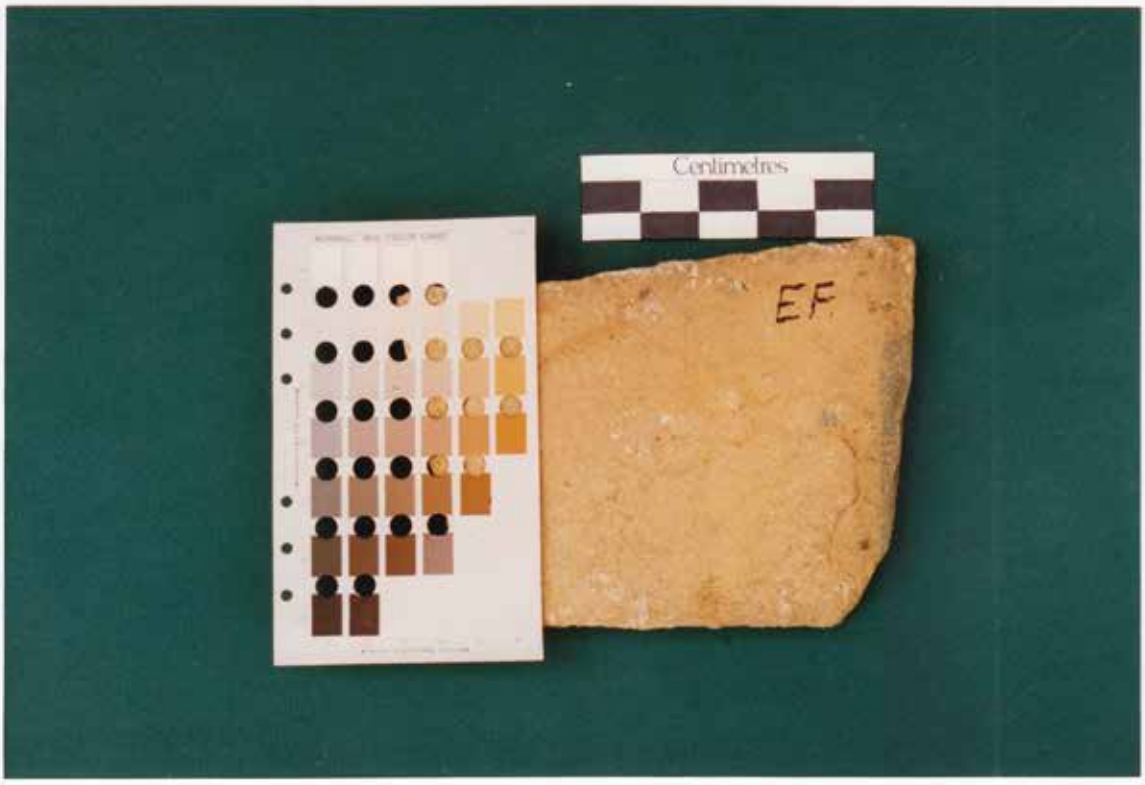
MS1. Upper fine-grained sandstone

MS2. Sandy, very fine dolostone

Scale is 1:1.

Annex A Photographs of stone slates with Munsell colour charts

Photograph A1. Houndkirk Moor Q152. Munsell colour 7.5 YR 6/6 reddish yellow
Grain size medium.



Photograph A2. Eccles Fold Q172. Munsell colour 5YR 7/8 reddish yellow
Grain size medium

Photograph A3. Goyt's Clough Q1. Munsell colour 7.5 YR 6/4 light brown
Grain size fine

Photograph A4. Soil Hill Q61. Munsell colour 10YR 5/4 yellowish brown
Grain size medium

Photograph A5. Reeve Edge Q18. Munsell colour 2.5 YR 6/4 light reddish brown
Actual colour is darker than shown - more pink. Grain size fine to medium.

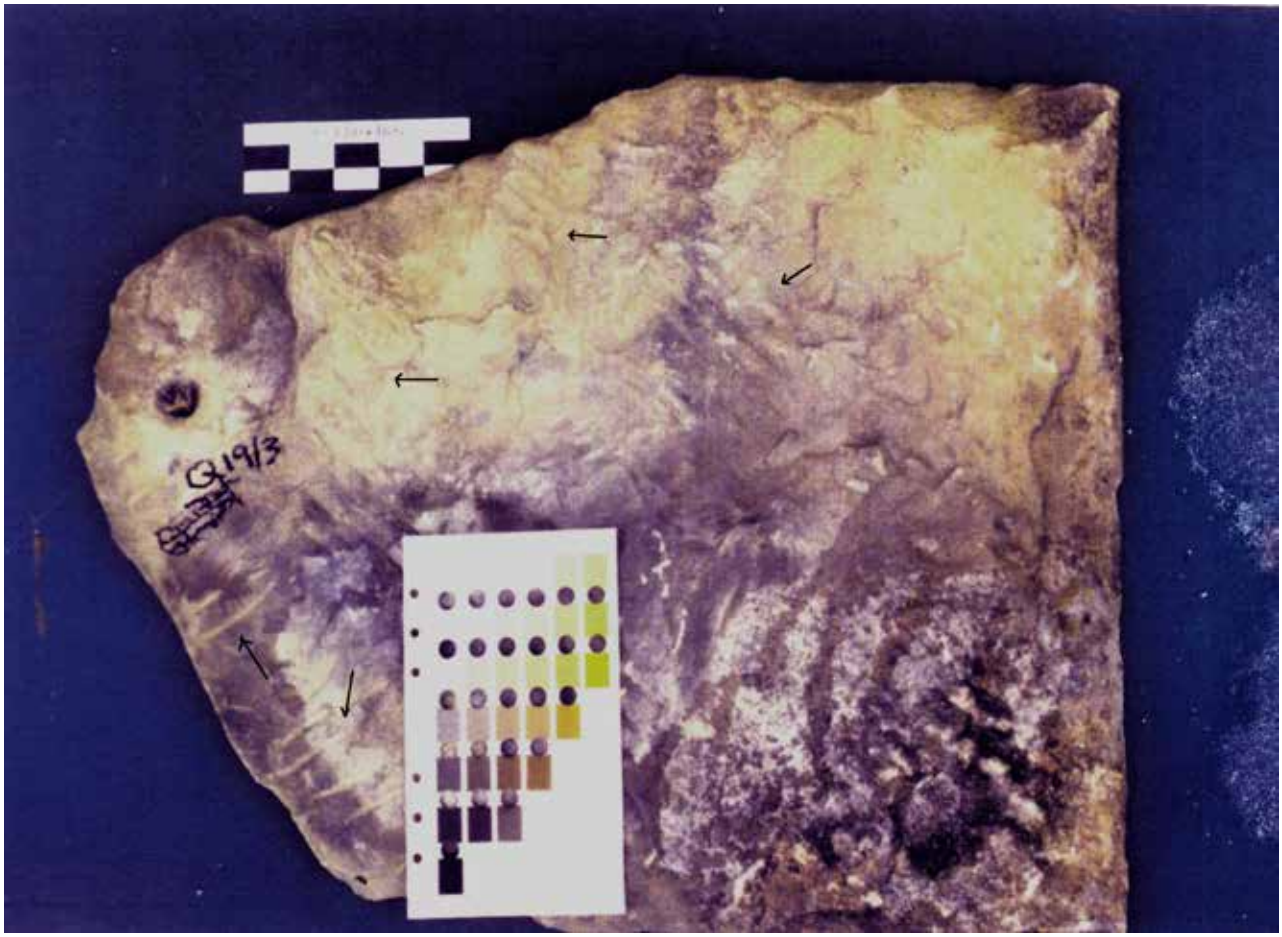
Photograph A6. Reeve Edge Q18. Munsell colour 5YR 6/8 reddish yellow
Grain size fine to medium

Photograph A7. Kerridge Q8. Munsell colour 2.5 Y 4/1 dark grey
Grain size fine

Photograph A8. Freebirch Q19. Munsell colour 2.5Y 6/3 yellowish brown
Grain size fine

Photograph A9. Eccles Hill Q62. Munsell colour 10 YR 5/4 yellowish brown. Grain size fine.

Photograph A10. Cast of worm holes Harden Clough Q53 Grain size fine.



Photograph A11. Toolmarks on Freebirch Q19. Munsell colour 2.5 Y 5/2 greyish brown Grain size fine

Photograph A12. Stepped bedding on Cracken Edge Q4 Grain size fine

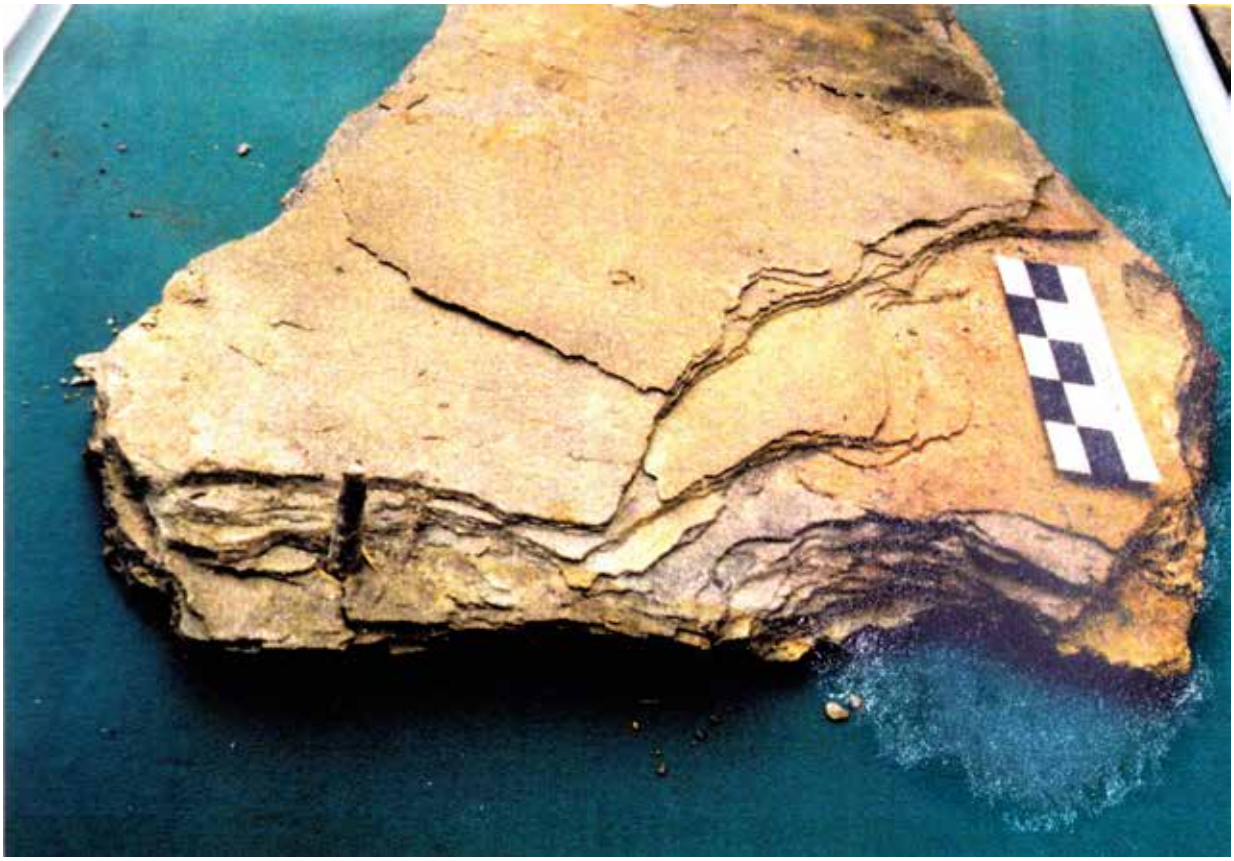
Photograph A13. Magnesian limestone Barlborough Hall

Photograph 14. Calcareous siltstone with grey lichen
Grain size fine

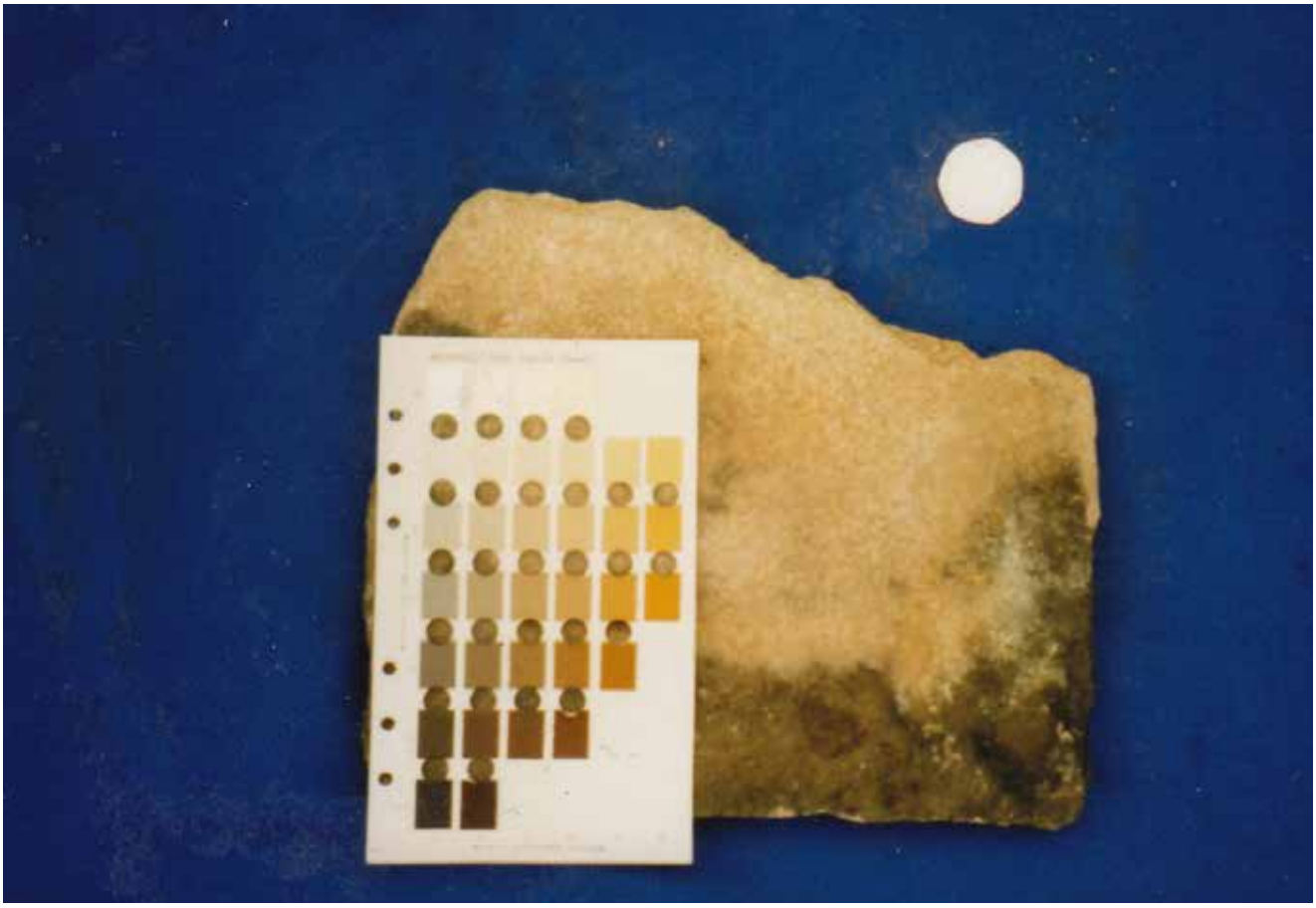
Photograph A15. Green and yellow algae and lichen on sandstone. Stanton

Photograph A16. Green and yellow algae and lichen on sandstone. Stanton

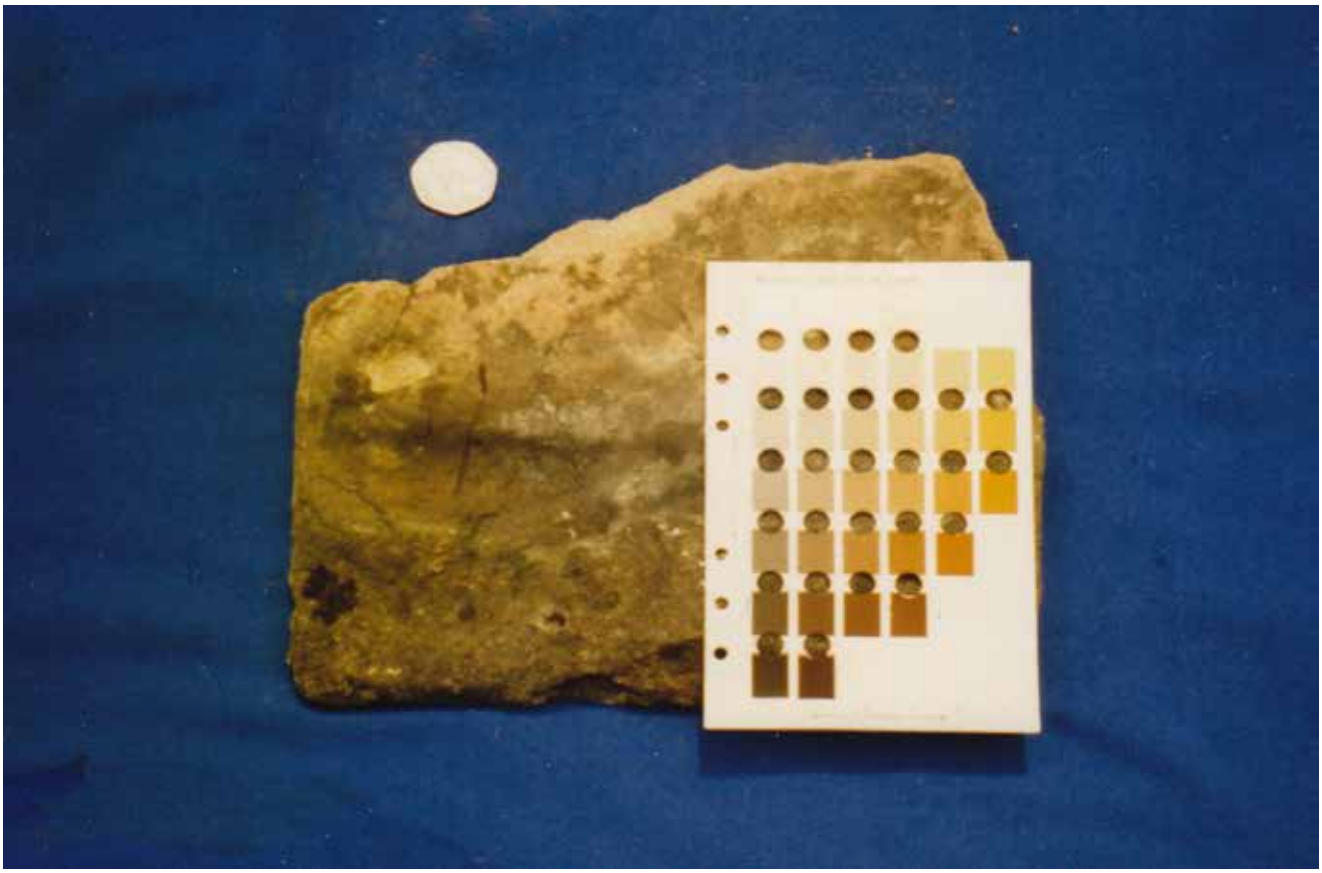
Photograph A17. Delamination on head of stones. Highlee Hall. New Mills.



Photograph A18. Delamination along mica layers

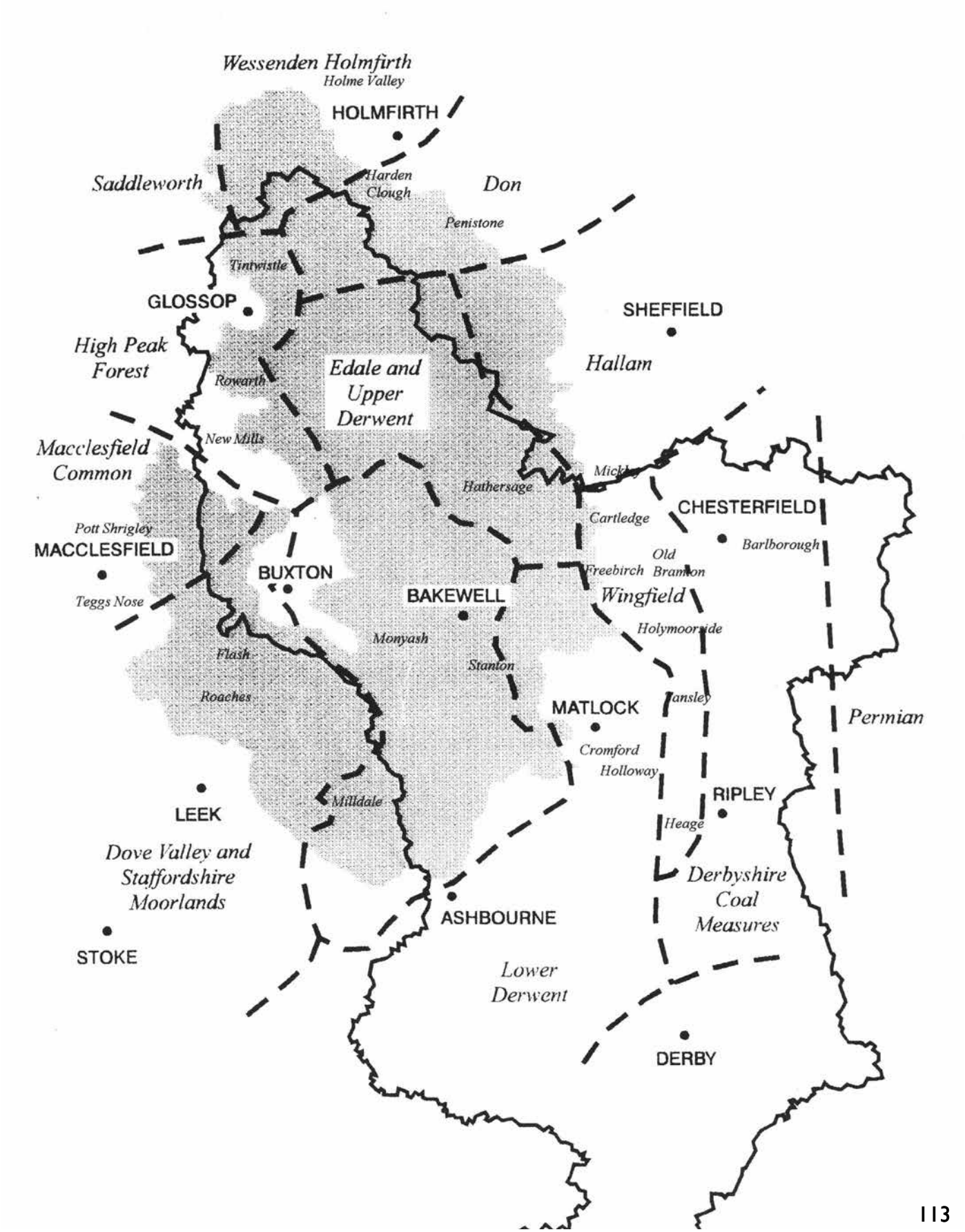


Photograph A19. Wirksworth underside. Munsell colour 5YR 5/3 reddish brown
Sample is pinker than the photograph indicates.



Photograph A20. Wirksworth top. Munsell colour 5YR 5/3 reddish brown
Sample is pinker than the photograph indicates.

Annex B Locations of the roofs in the photographs



Photograph B1 Deterioration after at least 100 years

Photograph B2

Photograph B3 Stone ridge

Photograph B4 Delamination at the head

Photograph B5 Trimming the softened head of a slate

Photograph B6 Slates stacked by length

Photograph B7

Photograph B8

Photograph B9 Roof renewal

Photograph B10 Use of gauging rod to ensure correct lap

Photograph B11 Positioning the slate head to control lap. Backer at centre

Photograph B12

Photograph B13

Fake slates

Photograph B14

Turned slates

Annex C Photographs of stone slate roofs

Roaches

Upper Holme Roaches

Flash

Teggs Nose

New Mills - High Lee Hall

Pott Shrigley

Rowarth

Tintwistle

Holme Valley

Near Penistone

Bradford

Bradford

Little Shepherd's Castle: Harden Clough

Harden Clough

Hathersage Moor: Fox House Inn

Milldale Mill

Cartledge Hall

Mickley near Dronfield

Freebirch

Holymoorside

Old Brampton

Monyash

Stanton

Tansley

Holloway

Cromford

Heage

Barlborough

Barlborough Hall

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