



The Conversion of Traditional Farm Buildings: A guide to good practice



ENGLISH HERITAGE

Traditional farm buildings are among the most ubiquitous of historic building types in the countryside. They are not only fundamental to its sense of place and local distinctiveness, but also represent a major economic asset in terms of their capacity to accommodate new uses. The restructuring of farming and other economic and demographic changes in the countryside provide both threats and opportunities in terms of retaining the historic interest of this building stock and its contribution to the wider landscape.

English Heritage and the Countryside Agency* have developed a policy on the traditional farm building stock, set out in our joint statement **Living Buildings in a Living Landscape**, available at www.helm.org.uk. This explores options for the future use of traditional farm buildings, ranging from their repair or adaptation to encourage continued use in agriculture, to their conversion to wholly new functions. It emphasises the need to have regard to the historic and landscape significance of traditional farm buildings when taking decisions about their future use, and to ensure that, where conversion to a new use is agreed to be an appropriate option, design and implementation are carried out to a high standard.

This guidance provides more detailed advice by English Heritage on good practice in conversion projects for owners, designers, local authority conservation officers and others involved in projects of this type. An appendix is included which provides a decision-making framework to help inform options for sustainable reuse.

Further research and advice on traditional farm buildings is available at the Historic Environment Local Management website www.helm.org.uk/ruraldevelopment

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1 Dereliction is a significant and increasing problem facing the traditional farm building stock: derelict barn, Cheshire. © Jen Deadman

2 In the Yorkshire Dales, field barns such as these in Swaledale make up a fundamental component of landscape. © Jen Deadman

3 Farmsteads such as this timber-framed and brick group in Arden need to be understood and appreciated as a whole. © Peter Gaskell

4 Traditional buildings remain an important asset for farm businesses: this 18th-century barn is now in use as a farm shop (Low Sizergh Barn, Kendal, Cumbria). © English Heritage



INTRODUCTION

Historic farmsteads and their buildings make a fundamental contribution to the richly varied character of the English countryside. They illustrate the long history of farming and settlement in the landscape and exemplify the crafts and skills associated with local building materials and techniques.

The best option for retaining the overall historic and landscape integrity of traditional farming landscapes is, wherever possible, to keep buildings in active agricultural use or related low-key usage. Increasingly however, this is not possible. Where a local authority is satisfied that a traditional farm building* no longer has a viable mainstream or low-key agricultural use, it may be prepared to grant permission for conversion to a new use.

Reuse is inherently sustainable. These buildings represent a historical investment in materials and energy, and contribute to environmentally benign and sustainable rural development. The concept of reuse is not a new one. Farm buildings have often been adapted over a long period to accommodate developing farming practices and technologies. Some have a greater capacity to accommodate change or a new use than others, and a small number are such historically or architecturally significant elements of our heritage that they should be conserved with minimal or no intervention.

The purpose of the present guidance is to act as an aid to understanding traditional farm buildings to help inform change, as well as to provide practical technical and design advice so that farm buildings *capable of conversion* can be repaired and adapted for new uses in a sensitive way, while preserving their character, significance and landscape setting for the enjoyment of this and future generations. If uses and buildings are paired sensitively and if changes are planned so as to preserve the buildings, their features of interest and their setting, then these buildings can go on to tell the story of our past and present.

* 'Traditional' is a term often used to describe farm buildings pre-dating 1940, after which modern building materials and revolutions in farming technology and farmstead planning marked a sharp divide with previous practice.

THE CHARACTER OF TRADITIONAL FARM BUILDINGS AND THEIR CONTEXT

UNDERSTANDING FARM BUILDINGS

Farmsteads and their buildings were typically designed to serve one or more purposes, which are clearly expressed in their siting, scale, arrangement and features. When significant changes to a building are envisaged it is important to come to an early understanding of its landscape setting, character and significance, including the value of its constituent parts. This will help to establish the degree to which the building as a whole is capable of absorbing change without substantial and lasting damage to its character and interest.

A small proportion of buildings – whether protected through listing, unlisted but set within designated landscapes or simply unlisted buildings – will not be capable of adaptive reuse, because their scale precludes this and/or they are of such intrinsic importance that new use cannot be absorbed without serious compromise to their fabric or the wider landscape setting. If adaptive reuse is the most sustainable option it will help to determine which elements of the building are most worthy of retention, and which may be lost with little or no detriment – sometimes indeed with beneficial effect. Such understanding will also help to inform pre-application discussions for the various consents that may be required (some of the key issues for consideration are set out in the Appendix).

Farmsteads and their buildings must be understood in terms of the function or functions they were intended to house. Their scale and form are directly related to the historic land use of the area, which is also reflected in the wider landscape (see sections on farmstead character and types of farm building below). Buildings may in addition need to be understood as reflections of a particular vernacular building tradition or as expressions of a wider architectural or landscape design embracing a whole farmstead or perhaps an entire estate.

Documents such as estate surveys and sale particulars can sometimes identify the function of individual buildings at different periods in their history. Historic

RESPONDING TO THE CHALLENGE

English Heritage believes that traditional farm buildings are more at risk from pressures on the countryside than any other type of historic building. A better understanding of this building stock is essential if the response to this challenge is to be effective.

It has been recognised that the evidence base for historic farmsteads is poorly developed and co-ordinated at a local level. To address this problem English Heritage, the Countryside Agency and the University of Gloucestershire recently published *Historic Farm Buildings: Constructing the Evidence Base* (Gaskell and Owen 2005), the first national survey of the state of the traditional farm building resource, which examines current pressures on, and policy towards, historic farm buildings.

This evidence has informed the development of the joint English Heritage and Countryside Agency statement *Living Buildings in a Living Landscape: Finding a Future for Traditional Farm Buildings* (EH product code 51215). This statement is supported by a series of eight web-based documents that relate the character and development of historic farmsteads in each government region to a national framework (www.helm.org.uk/ruraldevelopment).

Guidance has also been published for owners and managers of traditional farm buildings to encourage better maintenance and care of their buildings. *Farming the Historic Landscape: Caring for Farm Buildings* (EH product code 50911) is part of a wider set of publications designed to offer advice on the historic environment to farmers and other land managers.

maps provide a quick and generally reliable aid to dating buildings approximately, though large-scale maps from before the mid-19th century are relatively scarce. But in most cases looking carefully at the buildings themselves will yield a greater range of information much more quickly.

Careful inspection will also reveal how in many cases buildings have altered over time, often in response to important developments in agricultural practice or the shifting emphases of agricultural regions, and sometimes their function has changed altogether. Successive layers of alteration can make the original and subsequent uses of a building harder to identify. In these cases a forensic approach is generally helpful, examining a building for indications that some features are original elements of the fabric, while others are alterations. Where a building exhibits a particularly complex pattern of development it may be advisable to call on the services of a historic buildings specialist.

HISTORIC LANDSCAPE CHARACTERISATION

New approaches towards the understanding and management of landscape character, now brigaded under the heading of characterisation, have developed into multi-disciplinary tools for describing and mapping the whole rural environment, focusing on what gives each area its own particular sense of place, its sensitivity to change and its links to community values and needs. The appearance in 2005 of the new Agri-Environment Schemes, which fund farmers for the delivery of environmental benefits (historic as well as natural), has further driven the need for land management and the targeting of grant aid (including farm buildings) to be based on sound knowledge and an integrated understanding of the environmental, social and economic characteristics within an area. The 159 Joint Character Areas are being increasingly used as the framework for the delivery of advice and the targeting of resources for many aspects of the rural environment, most notably through the Agri-Environment Schemes, and this has been extended by local authorities to cover Landscape Character Assessments at a finer scale. They each result from the mapping of a combination of factors such as land cover, geology, soils, topography and settlement and field patterns (www.countryside.gov.uk/lar/landscape).

Historic Landscape Characterisation (HLC) is using the techniques of Geographical Information Systems (GIS) mapping to map change and time-depth in the present landscape, through the analysis and identification of field patterns and other features, and the identification of distinct landscape types, such as ancient woodland, and ancient or parliamentary enclosure (www.english-heritage.org.uk/characterisation).

LANDSCAPE AND HISTORIC CONTEXT

Patterns of land use reflect cultural factors, climatic conditions and the physical structure of the landscape. The distribution of farmsteads and their dates of foundation are intimately linked to historical field and settlement patterns in the landscape. Nucleated villages, concentrated in a central band running from Northumberland into Somerset and Dorset, were associated with extensive communally farmed townfields (open fields). These were subject to amalgamation and enclosure by tenants and landlords at varying rates from the 14th century onwards. New farmsteads were often created within the new enclosures. In areas of dispersed settlement, characteristic of western and parts of eastern and south-eastern England, farmsteads are either isolated or grouped in hamlets and surrounded by originally smaller townfields associated with more ancient patterns

of enclosure and more extensive areas of common pasture. Between the two extremes are areas that contain both nucleated and dispersed settlement to varying degrees.

Agricultural development in England can be divided into the following major periods.

Before 1750

Economic boom in the 12th and 13th centuries, including the development of large farms on monastic and secular estates, was followed by contraction of settlement and the leasing out of estates after the famines and plagues of the 14th century. From the 15th century there was a general increase in agricultural incomes and productivity and the emergence – particularly from 1660 – of increasingly market-based and specialised regional economies. Substantially complete farm buildings of this period are rare: typically only the farmhouse and barn survive, although in upland areas there are many late 17th- and 18th-century farmsteads with farm buildings attached to their farmhouse.

1750-1880

The vast majority of building stock dates from this period, particularly from the mid 19th century. Increased agricultural productivity, encouraged by rising grain prices and the demands of an increasingly urban population, was enabled by the expansion of the cultivated area (especially from the 1790s to 1815), the continued reorganisation and enlargement of holdings, and the final phase of the enclosure, concentrated in the Midlands and the uplands of northern England. Substantial improvements in animal husbandry were made with the development of improved breeds and better housing for cattle. This improved the quality and efficient redistribution of farmyard manure, so increasing agricultural productivity. The high-input/high-output systems of the 'High Farming' years of the 1840s to 1870s were based on the availability of imported artificial fertilisers, manures and feeds.

1880-1940

There was little fresh investment because of the long farming depression in this period, notable exceptions being some estates and continuing developments in dairying areas. Hygiene regulations in the inter-war period resulted in new forms of cow house and dairy, with concrete floors and stalls and metal roofs and fittings, replacing earlier forms of housing. Intensive rearing of pigs and poultry required new buildings.

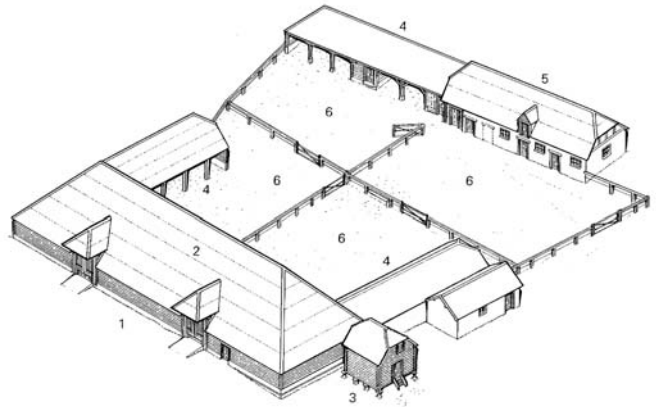
5 This reconstruction (not to scale) shows the flow of processes in the arable cycle from the stackyard (1), through the barn (2) to the granary (3), shelter shed (4), stable (5) and yard (6). © English Heritage (RCHME)

6 This drawing (not to scale) shows an upland linear farmstead which has a small barn (2) in the centre of the range as well as a stable (1) and a byre (3). The hemmel (4) may have been used for cattle or sheep. There is a detached hay barn/implement store (5). © English Heritage (RCHME)

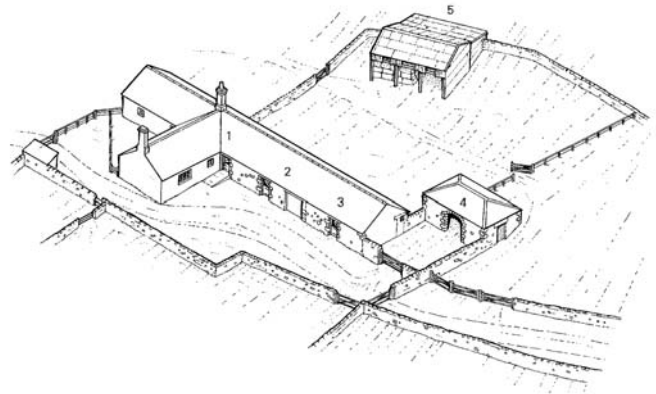
7 The flow of processes in a Cornish farmstead is shown here (not to scale). The buildings are grouped around a large yard. The proximity between the farmhouse and the pigsties and calf house is evident in this farmstead.

(1) stackyard; (2) chall barn; (3) granary; (4) shippons ;(5) farmyard and midden; (6) calf house; (7) pigsties; (8) house and dairy. © English Heritage (RCHME)

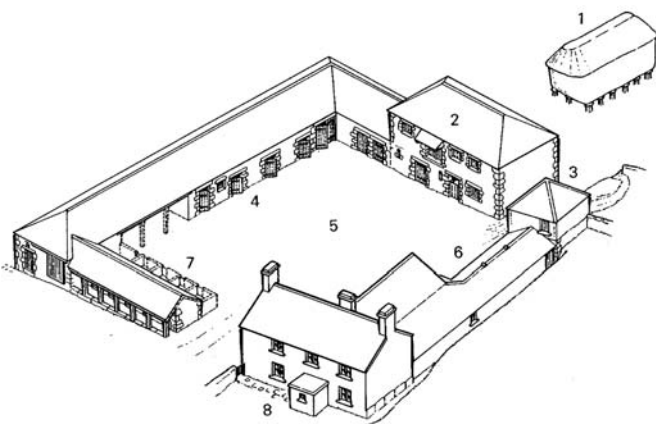
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1940 to the present

The Second World War witnessed a 60 per cent rise in productivity, a growth in livestock numbers, increasing scientific and government control and guidance, more specialised systems of management and the conversion to arable of permanent pasture. The Agriculture Act of 1947 heralded the intensification and increased specialisation of farming accompanied by the development of government and industry research and guidance. Government grants assisting with the capital cost of new building under the Farm Improvement Scheme (introduced in 1957) met increasing requirements for machinery, the environmental control of livestock and on-farm production, particularly of milk.

FARMSTEAD CHARACTER

The function of the farmstead was to provide shelter for farming families and the management and accommodation of livestock, the housing and processing of crops, and the storage of vehicles, implements and fodder. These functions were located in either specialist or combination structures or ranges. In many areas of the country, farmsteads did not mature into their present-day forms until after the 1790s, and especially in the years of the 1840s to 1870s, when agricultural productivity was boosted by good manure from livestock increasingly wintered in yards or buildings.

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8 Massed oast houses at Whitbread Hop Farm, Paddock Wood, Kent. © English Heritage

11 A fine early 16th-century barn in Suffolk with stables at one end. © Mike Williams/ English Heritage

9 A field barn in the Yorkshire dales which has recently been repaired. © English Heritage

12 A reconstruction of flail threshing viewed through a typical cart door entrance with porch canopy and threshold. © English Heritage (RCHME)

10 An 18th-century granary in West Sussex with staddle stones and tarred weatherboarding. © Daniel Eugenio LRPS Images of England

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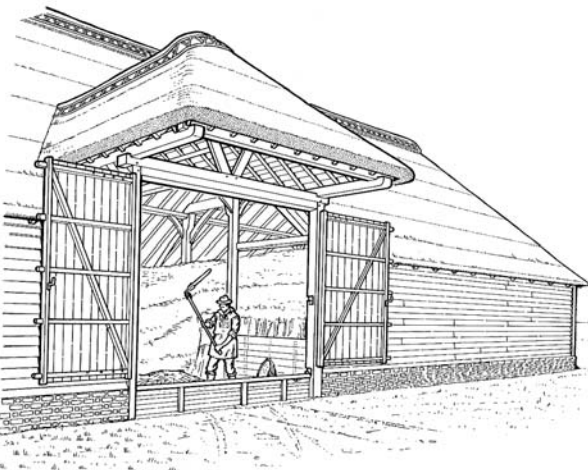


The scale and form of farmstead plan types are subject to much variation and are closely related to farm size and status, terrain and land use – specifically in the way in which they served farms of either mixed, arable or pastoral types. It was far more common for the houses on farms in northern and parts of western England to be attached to the farm buildings. By contrast, even small farms in the South-East and East Anglia were characterised by detached houses and separate buildings, often loosely arranged around the sides of a yard.

Farmstead plan types can be divided into four categories:

- *Linear plans*, where houses and farm buildings are attached, were ideally suited to small farms (usually stock rearing and dairying), especially in northern pastoral areas with little corn and longer winters, where there was an obvious advantage in having cattle and their fodder (primarily hay) in one enclosed building. They display a wide range in scale, from the large farmstead of independent Pennine yeoman-farmers to the smallholdings of minor farmers.
- *Dispersed plans* comprise clusters and unplanned groupings of separate buildings, sometimes intermixed with those of other farms. They are more widespread, and range from those of hamlets where the buildings of different owners can be intermixed, to large-scale individual farmsteads. Some can be large scale and high status.
- *Loose courtyard plans*, where the buildings are built around a yard with or without scatters of other farm buildings close by, became most strongly associated with large and/or arable farms.

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- *Regular courtyard plans*, where the various functions were carefully placed in relation to one another in order to minimise the waste of labour, and where the manure could be conserved, were built – at first on large estates – from the later 18th century.

TYPES OF FARM BUILDING AND THEIR CHARACTER

Buildings, or parts of buildings, specialised in either crop storage and processing (barns, hay barns, cider houses, oast houses and farm maltings, granaries) or the accommodation of animals (cow houses and shelter sheds, ox houses, stables, pigsties) and birds (dovecotes and poultry houses). They all display significant variation both over time and regionally, and are closely related to the overall plan of the farmstead.

Barns are often the oldest and largest buildings to be found on farms. The harvested corn crop needed to be kept dry in well ventilated conditions. In England the grain was beaten from the crop by flails and then separated from the husks by winnowing, both operations taking place on a threshing floor sited between opposed doors. The form and plan of *threshing barns* remained comparatively unaltered between the 12th and early 19th centuries: they typically had blank exteriors, with provision for ventilation to the storage bays and doors opening into the threshing floor. Such barns could vary in scale from small in dairying or stock-rearing areas to very large in arable areas where farms were typically much larger. The doors were either large enough to drive a loaded wagon through or can be small and flanked by openings into which the crop was pitched. Smaller doors were sometimes provided to allow for the sorting of sheep and other stock in the spring and summer.

Combination barns accommodated – at one or both ends or in a split-level structure – additional functions such as the housing of cattle, horses, grain, farm carts and implements. They are found throughout England, especially in areas of pastoral farming.

Split-level *mixing barns* developed from the later 18th century as a result of the widespread introduction of machinery for processing corn and fodder. Threshing machines were most commonly powered by horses accommodated in a projecting wheelhouse, these being particularly common in the North-East and

South-West. Water power and rarely wind power was also used, and by the 1830s steam power was introduced in areas such as Northumberland with easy access to coal supplies. The introduction of the portable steam engine and threshing machine in the 1850s heralded the end of the traditional barn as a storage and processing building.

Barn interiors are generally open and plain, but inspection may reveal evidence for reused timbers, former floors, partitions, doors and windows. The latter may indicate that a present open space may have been a multifunctional building. Conversely, many barns were converted into cow houses and fodder processing and storage buildings after the 1880s. Eighteenth-century alterations such as the expansion of barn space by taking down divisions, extending the building, adding porches or building an entirely new barn are all changes which are part of the farm's history. Threshing floors, often of wood and sometimes of stone flags, brick or earth, are now very uncommon. Horse-engines, as found in wheelhouses, and original threshing or winnowing machines are exceptionally rare.

Field barns were built in areas where farmsteads and fields were sited at a long distance from each other, and where holdings were intermixed. They can be simply threshing barns, or - increasingly from the 18th century in upland areas - incorporate or specialise in the housing of cattle and sheep and their fodder (usually hay or roots). Outfarms, typically with shelter sheds for cattle flanking the barn and yard, were built in some areas from the late 18th century.

Detached *hay barns* or *Dutch barns* are usually open sided with roofs supported on high brick, stone, timber or iron piers. The gable wall may be brick but perforated by ventilation slits or honeycomb brickwork. Most examples date from the late 19th century.

After the barn, the **stable** is often the oldest building on the farmstead. The value of horses as draught animals meant that stables were well built and often placed near the house and given a certain level of architectural and decorative treatment. Stables needed to be well ventilated and provided with plenty of light for grooming and harnessing. Free-standing stables began to be built from the 16th century. They are normally two-storey buildings with a hayloft above. The floors were cobbled, and later of brick, with drainage channels laid across the floors. High-status examples could have plastered ceilings

to prevent dust falling through into the horses' eyes. Complete interiors – with stalls, mangers and feed racks – of the 19th century and earlier are rare.

Detached **granaries** are generally of 18th- and 19th-century date, any earlier examples being of great rarity. Grain needed to be kept in dry, secure and well ventilated conditions. Granaries were often built over stables and cart-sheds, and combined cart-shed/granary ranges are found from the 18th and even the late 17th centuries in parts of the south and east. Complete granary interiors, with plastered walls and wooden partitioning to grain bins, are very rare. **Cart-sheds** often face away from the farmyard and may be found close to the stables and roadways, giving direct access to the fields. They are characterised by being open fronted and sometimes open at each end.

Cattle housing was well documented in the medieval period. *Longhouses*, where the family and animals used the same entry and the cattle were stalled at the lower end, survive in parts of the north and west of England and are usually the only evidence for cattle housing before the 17th century. Any evidence for cattle housing before the late 18th century is exceptionally rare.

Cow houses, either free-standing or situated beneath or at one end of the threshing and storage area in a combination barn, were typically built for dairy cattle. The earliest examples – of the 18th century or earlier – survive in the South-West (particularly Devon), parts of the Shropshire and Cheshire plain, the Welsh borders, parts of Suffolk, the Pennines and Cumbria. Very few cow-house interiors of the 19th century or earlier have survived unaltered because hygiene regulations for the production of milk have resulted in new floors, windows and stall arrangements being inserted.

Shelter sheds, open-fronted structures facing onto cattle yards, mostly date from the late 18th century. The folding of stock in strawed-down *yards* and feeding them with root crops became more general in the 19th century, together with the subdivision of yards into smaller areas and the construction of *loose boxes* (identified by multiple doorways to small individual cubicles) and other distinctive building types, including bullpens, associated with more intensive fattening and management.

The most significant examples of *covered yards* – developed to house cattle and conserve their manure – are on the most expensively designed planned and model farms of the 1850s to 1870s. It became increasingly common from the 1880s to roof over former open yards with timber or metal-framed superstructures.

Purpose-built **dairies** where milk products were made and stored, as opposed to examples integrated into the planning of the farmhouse (often in a rear wing or out-shut), are very rare. From the late 18th century, and particularly on gentry and aristocratic estates, dairies could be highly ornamental, with tile work depicting rural scenes.

Pigs were undoubtedly kept on most farms, and particularly on dairying establishments where there would have been whey to feed them on. However, little evidence for **pigsties** survives as pigs were often left to run in yards among the cattle.

Dovecotes were built to house pigeons, which provided variety to the diets of high-status households and a rich source of manure. Examples survive from the medieval period. They are traditionally relatively tall shelters lined internally with nesting boxes and sometimes with a fixed 'potence' ladder. Dove holes are often found incorporated into the gable walls or under the eaves of farm buildings.

Root and fodder stores were usually located close to where the cattle were stalled. On smaller farmsteads the root store may be a separate building and often forms part of a combination building. Some areas of the country developed a specialisation in the production of particular crops such as hops or fruit. In some cases these crops required the construction of particular buildings that are regionally characteristic, such as the oast houses or hop kilns of the South-East and West Midlands (especially Herefordshire and Worcestershire) and the cider houses of parts of the West Midlands and the South-West. Small kilns for drying corn (in the wetter northern uplands) and malt for brewing are extremely rare.

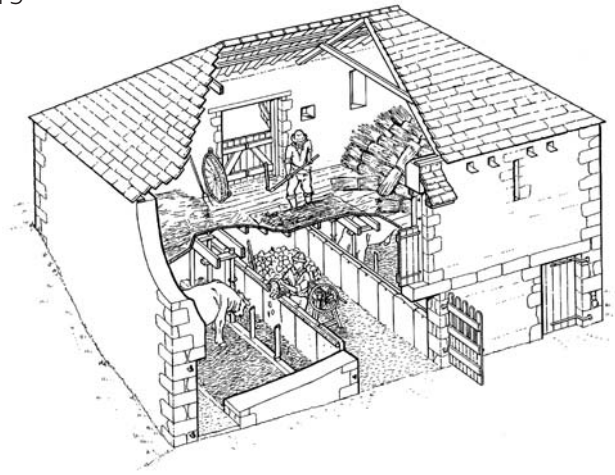
Other, smaller, buildings are also found in farmsteads, including boil houses for animal feed, smithies or dog kennels incorporated beneath granary steps.

13 A Cornish chall barn: chall barns vary in size but conform in their chief characteristics, having a first-floor barn over ground-floor shippons. Many were built into a hillside to permit easy access to the barn. © English Heritage (RCHME)

14 A dovecote at Athelhampton, Dorset, displaying a rich variety of materials. © Bob Edwards

15 A typical threshing barn on the Sussex Downs constructed of flint and brick. © English Heritage

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MATERIALS

Most traditional farm buildings are comparatively simple functional structures built from locally available materials with a minimum of decoration. England displays a huge diversity in geology, with a greater variety in small areas than anywhere else in Europe. This has contributed to great contrasts and variety in traditional walling and roofing materials and forms of construction.

Long-rooted traditions, such as earth walling in Devon and the Solway Plain and timber framing, survived much longer on working farm buildings than farmhouses. Climate and patterns of land use and ownership have also affected the availability of timber, and together with cultural factors have influenced the appearance of distinct traditions in timber framing and the framing of roof trusses for mass-walled buildings. The survival of thatch – predominantly wheat straw and water reed – is now mainly concentrated in southern England and East Anglia.

Buildings in stone and brick, roofed with tile or slate, increasingly replaced buildings in clay, timber and thatch from the later 18th century. The arrival of first canals and then railways allowed the easier transportation of building materials. Metal roofs were used from the 1850s for covered yards and other buildings on expensive planned farmsteads, but did not come into general use – mainly for covered yards – until the end of the 19th century. Prefabricated buildings in iron were manufactured and exported from the 1840s, the most well known on the farmstead being the Dutch barn, popular from the 1880s.

ADAPTING AND REPAIRING TRADITIONAL FARM BUILDINGS

GENERAL PRINCIPLES AND DESIGN ISSUES

GENERAL PRINCIPLES

- **Understanding character, significance and context:** this must inform the adaptation of any farmstead or building. It involves understanding the essential features of the building, its relationship to the wider landscape setting and its sensitivity to change. Only then should a designer start to address the issues associated with adapting the building for a new use. (The previous chapter outlined how this type of information can be gathered to inform the conversion work: this is further developed in the Appendix).
- **Understanding how the building is constructed and its condition:** a thorough understanding is also needed of how the building is constructed and the condition of its various elements. Survey drawings and a schedule of condition will need to be prepared to establish the extent and nature of the repairs required and the associated costs. (The local planning authority may require some form of recording to be carried out as part of any planning consent. Such work can help to inform options for reuse. See information on Recording on page 32.)
- **Respecting the architectural and historic interest of the building and its setting:** pairing uses and buildings sensitively. With any conversion or adaptation there is a balance to be struck between incorporating the practical requirements of a new use and protecting the special character and significance of the farm building and its setting. These potential conflicts require careful and thoughtful design and often innovative solutions need to be found. Users may have to accept that the building imposes constraints that require some degree of compromise if its character and significance is to be retained. For example, in some cases headroom may be restricted and daylight levels may be lower than those ideally desired.

- **Achieving high standards of design and craftsmanship:** matching the new use to the building, assessing the impact of changes and carrying out sensitive and appropriate repairs require the skill and knowledge of those qualified and experienced in conserving historic buildings.
- **Minimising loss of and intervention in significant historic fabric:** Usually the fabric of the building will embody its character and interest. Retention of as much historic fabric as possible is therefore a fundamental part of any good conversion, together with the use of appropriate materials and methods of repair.

DESIGN ISSUES

While there is widespread regional variation in the function, design and materials used for farm buildings, there are a number of design issues common to most farm building conversions.

- **Daylight:** Perhaps the most significant problem in any conversion is how to maximise daylight without compromising character. Light was not important for many farmstead functions such as storing hay or corn or the accommodation of cattle. These requirements changed as farm buildings developed (see previous section). The configuration and orientation of many farmsteads also resulted in many farm buildings being single aspect, with farmyards facing east and south to catch the sun. The challenge for the designer is how to introduce light while minimising alterations to the external envelope.
- **Subdivision:** the other difficult aspect of farm building conversion is how to incorporate various functions that require subdivision or compartmentation, particularly if a building is characterised and is significant for its open interior, impressive proportions and long sight lines. This is especially the case with threshing barns, including the upper floors of combination barns and loft areas.
- **Retaining features:** historic farm buildings invariably retain key features that provide evidence of their former use and contribute to their significance. These features may simply be a series of ventilation slits formed in the masonry structure, or vertically boarded doors to a cart door entrance. An informed approach to the retention of such features is vital to a successful conversion.

16, 17, 18 As much as possible about the way the building is constructed and its condition should be understood before significant works of repair/alteration are undertaken. Loss of historic fabric should be minimised and repairs should be carried out using appropriate materials. **16** © English Heritage **17** © English Heritage **18** © Spratley and Woodfield Architects

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- **Setting:** A good understanding of the building's relationship with its immediate surroundings and landscape character will help to ensure that the new works conserve the relationship with the landscape. This understanding can then inform detailed design decisions about spaces, curtilage, access, visual impact and enclosure, as well as details of materials, surfaces, boundary treatment and planting.
- **Incorporating services and adding insulation:** most new uses have some service requirement and will need to comply with Building Regulations for adequate levels of energy conservation. These need to be incorporated discreetly so as not to damage historic fabric or features of interest.

The end use does to some extent influence how well the building can be adapted to overcome these issues without losing character and significance. For instance, a commercial scheme may require less subdivision than a residential scheme, but equally such a new use can have a greater impact on the setting through the need to provide adequate car parking. A commercial use may also require good road access for service vehicles that could also have a significant impact on the setting.

The following sections describe ways these issues can be tackled without destroying the essential features that give the building or its setting interest. The guidance is not intended to be highly prescriptive, and many successful conversions may incorporate elements not listed here.



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19 External lintels take many different forms in farm buildings. They should be retained and repaired where necessary. © English Heritage

20 Masonry structures often show signs of movement at eaves level from thrusts of the roof structure. © English Heritage

21 In timber-framed structures damp problems are usually associated with ground levels being too high. © English Heritage

22 Consider the need for first-aid repairs where there is likely to be a significant gap before the commencement of the main conversion works. © Dennis Gilbert/VIEW

23 Longitudinal racking is a common problem with timber-framed structures. © English Heritage

24, 25 Cracks in masonry structures indicate some movement has occurred which could be the result of a number of different defects. © English Heritage



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THE TREATMENT OF THE EXTERNAL WALLING

Materials used for the construction of the main external walls were generally materials that were available locally. This was often the case well into the 19th century and even later, and was a response to the limitations of cost, transport and local construction skills.

All materials require their own appropriate repair techniques, and compatible materials should be used when these are needed for repair. Natural materials acquire a patina from weathering and such character can very easily be lost by overzealous replacement, rebuilding or cleaning.

The local planning authority should be consulted during the development of any scheme for the repair of a farm building structure especially if it is listed, or there is to be a change in appearance or a significant amount of replacement as opposed to repair. Detailed discussion may be required.



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COMMON STRUCTURAL ISSUES

Masonry and earth structures

Farm buildings constructed from masonry bonded with lime mortar generally have substantial walls often up to 600mm thick or more, but foundations are often minimal and quite shallow. Rubble walls would often have been coated in a lime render with a limewash finish renewed on a regular basis. Gradually as limewashing buildings ceased to be common practice the lime renders eroded and were never replaced. Reinstatement of missing lime renders can add a layer of protection to the building fabric.



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Walls made of cob, earth mortars or walls with rubble cores are all highly vulnerable to water penetration. Water needs to be kept out of the top of the wall as well as the base, otherwise the wall core will decompose. Water should discharge away from the wall surface to avoid damage to the lighter elements of the wall core. Traditionally these types of wall stand off the ground on a base such as flint or stone and the roof has a good overhang at the eaves. If water penetrates the rubble core of a stone wall and then freezes, the resultant expansion will damage the outer faces of the wall. Erosion of the core material can also lead to the facing stones bulging or moving apart.

Cracks in masonry structures usually indicate some movement has occurred. The movement could be the result of a number of different defects: thrusts from the roof forcing walls outward, difficulties with the foundations which may be due to concentrations of groundwater from leaking gutters, downpipes or below-ground drainage problems, or the spread of tree roots. The problem may also be a result of decay in timber lintels or wall plates. Such defects need to be analysed and appropriately repaired. Climbing plants such as ivy can often conceal such defects and further weaken structures if left unattended.

Outward leaning walls are a common defect in farm buildings. Often this is due to the outward thrust of the roofs, and ties may be needed. Creeping deflection of the roof over a long period can have a similar effect. Purlins tend to sag and no longer support the rafters over their full span, resulting in thrusts on the wall plates. Similarly gable ends may be unstable through slenderness or lack of ties. Sagging purlins can also induce outward thrusts on gables. Buttresses have often been added to support such walls, but on poor ground they can subside and pull the wall further out.

With masonry buildings it is important to establish that the building is acting as a cohesive structure. There may be a variance between walls and a degree of uncertainty as to how the structure is bonded together. Random masonry and sometimes brick walls were constructed in a form that precluded cross-bonding of the two outer leaves. The core of a random or even a coursed stone wall is often loose and friable. With slow degradation often due to moisture the finer elements of the core migrate down and exert pressures on the exterior skin of the wall, resulting in delamination. Special care needs to be taken when

adapting or altering rubble wall construction for new openings, as the structure can easily become unstable and may require extensive rebuilding.

It is important also to see the structure in relation to external ground levels to establish whether the masonry is acting as a retaining wall or whether the 'earth cover' to the foundations has been eroded. The mass of random stone or other masonry can be more severely affected by these problems than a timber frame construction. Timber lintels were often used in masonry structures in the form of a series of boards to span wall thicknesses. These need to be checked for decay and stability.

Timber frame structures

It is probably easier to diagnose problems in the open structure of a timber frame building compared with a masonry structure. Close observation of the structure should tell you if something is awry.

A common problem with timber structures is longitudinal racking. This occurs when the whole structure leans in one direction because of the roof being inadequately tied or braced from one end to the other. There are very often problems around the sole-plates in that either the ground has been allowed to rise above the plate/dwarf-walls or totally inundate them. Barns that may have been used for stalling cattle could have sleeper walls that have been distorted or destroyed by many years of 'mucking out', aided and abetted by vermin.

Partition walling often provides support for inserted floors as well as providing lateral stability to the structure at the 'bay positions' along its length. Partitions, bracing and the tie beams to roof trusses often get abused in the reuse of agricultural buildings, cut through without thought as to what purpose they served in the structural integrity of the building. If braces are missing this evidence can be established from looking for their empty mortises on posts or plates and tie beams.

Joints that are to be repaired and timber that is to be replaced should be marked up on site so that the extent of repair/replacement proposed is clear to all.

Repairs should be executed using traditional carpentry with as much material retained *in situ* as possible. This may entail supporting the structure at tie level with the posts left hanging to facilitate repairs to post bases and plates offered up from the underside. Such methods are preferable to dismantling large parts of the structure.

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26 Ventilation holes in the gable end of this Cotswolds stone barn form a significant part of its character. © Peter King

29 Consider what existing joinery can be retained and repaired. © English Heritage

27 Some features are of a very high quality such as the detailing and surround to these ventilation holes in a Cambridgeshire barn. © English Heritage

30 Forms of construction can often be an important distinctive feature of farm buildings, as at this Norfolk farm partly constructed from unfired clay lump. © Mike Williams/English Heritage

28 Stone steps on the parapet gable of this Cumbrian barn are a distinctive roof feature. © English Heritage

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To carry out effective repairs to timber frames, infill panels sometimes have to be disturbed or removed. With brick infill panels original material should be replaced or kept *in situ* during the repair if at all possible. Stripping the whole building back to the timber frame should be avoided wherever possible as this can result in a very significant loss of historic fabric. Where weatherboarding has been used, try to retain as much of this as possible where sound. Replacement boarding should be matched to the existing.

It may well be worth considering temporary repairs if there is likely to be a significant time gap before the commencement of the works. Cheap and simple first-aid repairs can delay deterioration to historic fabric and reduce the extent of work in the long run. The information sheet *First Aid Repair to Traditional Farm Buildings* produced by the Society for the Protection of Ancient Buildings gives useful guidance.

DAMP IN EXTERNAL WALLS

Invariably farm buildings were constructed on the driest ground available to the builder. However, many years of poor maintenance can result in severe damp problems. Often these are due to either inadequate dispersal of water from the roof or external ground levels rising too high over a long period. Masonry structures can take a long time to dry out, even once the cause of damp has been remedied.

Traditionally farm buildings were built as 'breathable' structures with plenty of ventilation so that moisture was able to evaporate easily without detriment to the structure. Often hard cement-based materials have been used in modern times to stabilise a rubble wall structure

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or provide a new floor. Such changes can damage brick or stone because they inhibit the building's ability to 'breathe', resulting in damp being trapped in or even driven up external walls. The introduction of damp proofing by chemicals into the masonry walls of farm buildings is often unnecessary and usually ineffective. It is essential to first correctly diagnose the cause of any damp and wherever possible to solve the problem at its source. The SPAB technical leaflet *How to Deal with Damp* covers these issues in detail.

In timber-framed structures damp problems are usually associated with ground levels being too close to the sole-plates, together with poor maintenance and problems with rainwater disposal. Timber posts can sink, and decay can set into the bases.

RETAINING DISTINCTIVE FEATURES

The external walls of farm buildings often retain distinctive features that should be retained in any conversion. Perhaps most numerous are ventilation holes or slits which come in a wide range of forms – cruciform, vertical or diamond slits, diaper honeycomb patterns. These openings were left open and unglazed; some may have had simple wooden shutters. Such openings can be either blocked on the inside face or glazed deep in the aperture so that there is no change in appearance externally.

Farm buildings often incorporate numerous other features such as nesting holes for pigeons (often grouped in a regular pattern on an east-facing wall), owl holes and date stones. Buttresses may have been added at some stage to masonry structures to restrain outward leaning walls. Buildings such as granaries, which used an upper floor, often incorporate stone steps. The retention of these types of feature is vital and should not pose a significant problem in any type of conversion.

The ground floors for farm buildings may retain brick, thick clay tile or stone paving, sometimes with drainage channels. Every effort should be made to retain these types of floor feature even if the floor is to be upgraded thermally.

OPENINGS

The historic pattern of openings is a direct product of the function of the building over time, and its present mass and character. It has been noted that ventilation was a more important consideration in determining the external form of most farm buildings than light. Consequently farm buildings are characterised by few external openings. But those that do exist form a fundamental element of a farm building's character and give legibility to the original form and function of the building. There should always be a presumption in favour of maximising the use of these existing openings without changing their size, and limiting the formation of new ones. Where new openings are added or new windows inserted within existing door openings, great care needs to be given to their placing and design.

If a new opening is to be inserted the correct proportions and detailing are a crucial aspect of the design. In many cases it is probably best to follow existing patterns on the building or other similar farm buildings. New openings can be expressed as modern interventions without resorting to making them appear 'historic'. This, however, requires some skill on behalf of the designer. With any new opening in a masonry structure the design of the lintel and sill need some careful consideration.

The large doors common to the threshing bays of barns, which are invariably the focal point of the building, pose a particular challenge in conversion schemes. The problem is one of scale and the reflection of a large area of glazing. Crucially important are the retention and repair of the cart doors, if they still survive, which can be retained in their open position. Often threshing barns have large porches, and their door surrounds may preserve key details such as the retaining slots for the 'leap'-planking that kept grain within the threshing area while being beaten from the crop. The design of new screens should have a simple framed vertical emphasis and be recessed as far as possible. Alternatively this bay can be left unconverted, with an ancillary use such as storage or garaging accessed externally. This allows the large doors and the space behind, which may still retain its original floor finish, to be left unaltered.

31 This existing gable opening has been retained and simply glazed deep in the reveal. © *English Heritage*

32 This residential conversion of an unlisted farm building near Durham has retained all the existing openings. Some have been changed from doorways to windows, but the door lintels and sills have been retained. © *Jen Deadman*

33 This stock-building in the Dartmoor National Park, now in residential use, has made sensitive use of existing openings. © *Philip White*

34 A variety of window sizes rather than a series of regular openings can work well with the plain, rather austere elevations of many farm buildings, as at this unlisted farm building in Northamptonshire. © *English Heritage*

35 The ventilation slits have been slightly widened in this office conversion near Witney in Oxfordshire, but the overall character has been maintained. © *Peter King*

36 These carefully designed new openings with simple robust dark frames have been deeply recessed in the masonry for minimal impact. © *Huw Thomas*

37, 40 Timber louvres and shutters can help to minimise the impact of new openings on the exterior; particularly in weatherboarded structures. **37** © *Nigel Hetherington Circus Architects* **40** © *Jonathan Moore/ Architecture plb*

38 Small new openings can add significantly to light levels with minimal change to the exterior. © *Geoff Pyle*

39 The use of large timber sections with a vertical emphasis can help to reduce the impact of glazing within the cart door opening. Large timber sections can also have an affinity with the structure of the building. © *Philip Bier/VIEW*

41 Long horizontal glazed openings have been incorporated in weatherboarding for minimal disturbance on the elevation. © *Nigel Hetherington Circus Architects*



42 This cart door entrance has been carefully designed with a mixture of solid and void. © *Van der Steen Hall Architects*

43 Threshing doors should be retained where these still exist. Their retention helps to reduce the impact of a new glazed screen. © *Bob Edwards*

44 A new cart door entrance which has been designed with closely spaced vertical timbers gives the impression of more solid than void when seen obliquely. © *English Heritage*

45 This cart door entrance has been infilled with a modern steel frame and panels of glass and timber which create an interesting juxtaposition of solid and void. © *English Heritage*

46 This L-shaped run of Grade II listed shippens in the Peak District National Park has been converted into two houses. The spaces behind the cart door entrances have been excluded from the consents. © *John Sewell*

47 A wicket entrance has been incorporated into fully boarded doors within the cart door entrance. © *English Heritage*

48, 49 Openings high in gable walls of framed structures can be an effective way of introducing light without significantly altering the character of the building's external appearance. **48** © *Huw Thomas*

49 © *Rolf Richardson Images of England*

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