Historic England

The Maintenance and Repair of Traditional Farm Buildings

A Guide to Good Practice

Summary

Traditional farmsteads and farm buildings make an important contribution to the remarkably varied character of England's landscape. They are fundamental to its sense of place and are as important to the character of the countryside as the pattern of fields and boundaries associated with them. Together they help to create local identity and local distinctiveness. They also provide tangible evidence of local history and forgotten skills. Retaining such buildings matters because their history tells us of past practices, technology, innovation and achievements.

However, changing agricultural practices and economic pressures mean that many traditional farm buildings have lost their original purpose and become vulnerable to neglect and decay. Even those that remain in active agricultural use still need regular maintenance and periodic repairs to keep them in good order.

This guidance provides practical advice to farmers, land managers and others involved with the maintenance and repair of traditional farm buildings. It also explains how work of this kind can be considered in a wider context of sustainable management to ensure these buildings have an economic value and a future.

The guidance is primarily directed to buildings in active farming or related uses, but it is also relevant for those that have an uncertain future or need urgent works to prevent further deterioration of their structure and fabric.

This guidance has been prepared by David Pickles and Jeremy Lake.

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Further research and advice on traditional farm buildings is available at:
www.HistoricEngland.org.uk/farmbuildings

Front cover
A thatched barn in Norfolk in need of repair.

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Introduction

Historic England's advice

Historic farmsteads and their buildings are heritage assets which, through continued maintenance, conservation and reuse, make a fundamental contribution to the richly varied character of the English countryside and to its economies and communities. Most traditional farm buildings date from the 19th century, rarely before. Only a very small proportion, usually older and more architecturally significant buildings, are protected through listing. The vast majority form part of farmsteads that include other traditional buildings.

Structural changes in the farming industry have required farmers to construct new buildings that reduce labour costs and conform to animal welfare regulations. As a result, many traditional farm buildings are largely redundant for modern agricultural purposes.

In future years the pace of change will accelerate further in response to the restructuring and diversification of farm businesses and the increasing demand for living and working in rural landscapes. Maintaining, and where appropriate reusing, farm buildings which no longer have a viable agricultural use is a sustainable option, bearing in mind that they:

- Make an essential contribution to England's remarkably varied landscape character and local distinctiveness, telling us about how the land was settled and how our ancestors farmed and lived, thought and built
- Represent an historical investment in materials and energy that can be sustained through conservation and careful re-use

A

B

Images A and B
Redundancy and dereliction is fuelled by economic pressures and changing agricultural practices.

- Provide a potentially important economic asset for farm businesses or, through adaptive re-use where they have become redundant, a high-quality environment for new rural businesses including home-based working

- Are irreplaceable repositories of local crafts, skills and techniques, in harmony with their surroundings and using traditional materials, often closely related to the local geology, that are sometimes not available or too expensive for new building projects

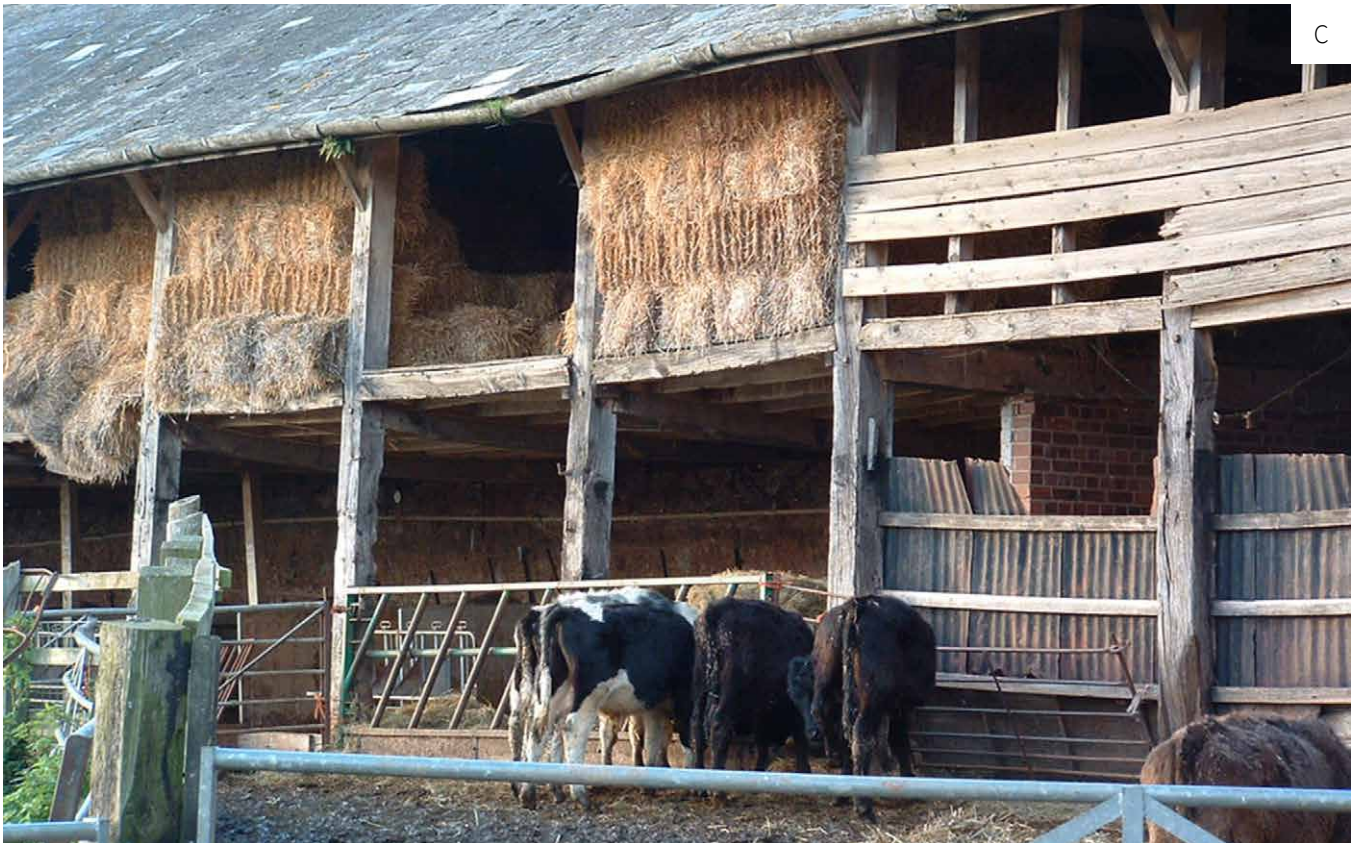
- May provide important wildlife habitats

Informing and managing change

When planning a programme of maintenance and repair the first aim should be to make sure that financial investment is relative and appropriate to the benefits that the buildings can provide. It is also important to consider how the building or buildings are used now and how they might be used in the future.

These drivers for change include varying patterns of redundancy and dereliction; farm income; the broader social and economic character of rural areas; the flow of traditional farm buildings into the property market and the relative demands for economic and residential adaptation. They are also likely to have greatly varying effects on the historic character of farm buildings and how they relate to the landscapes around them. These are introduced in Section 1 of this guidance.

The assessment framework included in Section 2 is designed to help place maintenance and repair work in this wider context and to inform options for prolonging the life of farm buildings.



C

Image C
The resources for maintenance and repair of farm buildings are very limited for most owners.

Option	Key issues to consider
Collapse and/or loss – through continued dereliction or demolition and salvage.	Dereliction and loss has for centuries followed functional redundancy. Isolated buildings, without access, in deteriorating condition or lacking the capacity to accept alternative uses, are those most at risk. A key issue to consider is the impact of any loss, particularly cumulative loss, on the character of the landscape and how it is appreciated.
Maintain – through investment and the use of traditional or non-traditional materials. **Repair** – as features in the landscape or as significant historic buildings, with minimal or no alteration.	Can maintenance and repair be funded through continued use, including the minor adaptation of working farm buildings? Additional factors to consider for heritage assets are the sources, cost and supply of traditional building materials, techniques and skills. Grants for maintenance of agricultural buildings are available through the Countryside Stewardship scheme.
Adapt – to new agricultural or non-agricultural uses. **Replace** – new building to support continued on-farm operations, non-agricultural business accommodation, or to reduce pressure on buildings too sensitive for adaptation.	Investment through adaptive reuse and development can be the best way to secure a future for most farm buildings. As well as funding their maintenance and repair it enhances the contribution of their farmsteads to local character and as habitats for wildlife. Getting the design right is critical for such sensitive sites; key issues to consider are the impacts on and opportunities for: ■ Setting, boundaries and curtilage –through improvement of access, provision of car parking and gardens and the development of prominent viewpoints and elevations ■ Historic buildings – depending on their form, scale and building materials, the demand for new window and door openings and the sub-division or amalgamation of spaces ■ Habitats for wildlife

1 Introducing Traditional Farmsteads

1.1 Traditional farmsteads and their buildings

This guidance makes a simple distinction between traditional farm buildings, nearly all of which predate 1940, and the prefabricated modern structures that are critical to the modern farming industry. Most traditional buildings date from the 19th century, rarely before, and in most areas few were built after the 1880s. They will often display evidence of successive episodes of change. A small number continued to be built for individual farmers, estates and county council smallholdings into the 1930s.

Traditional farmsteads comprise the farmhouse and some or all of the working farm buildings. Some farms also having isolated field barns or out-farms. The term 'traditional' relates to the materials of which they are built and the associated craft skills handed down from generation to generation. It excludes modern methods of construction using industrialised factory-produced concrete blocks, sheet roofing and plastic products more commonly employed since the 1950s.

The historic character of these farmsteads reflects how they developed in response to the following requirements:

- Access to and from farmland, communal land, other settlements and markets
- A farmhouse either attached to the working buildings (commonly found in upland areas) positioned to one side of them or detached with its own driveways and gardens (as often seen in larger and high-status farmsteads of the 18th and 19th centuries)
- Cottages for farm workers or rooms for live-in farm labourers – usually in the attic or back wing of the house. Seasonal workers were often housed in the lofts of farm buildings
- Specialist buildings or ranges of structures for storing and processing crops, sheltering animals and their fodder, storing carts and implements, making dairy products and in rare cases other non-agricultural products
- Yards for stacking harvested corn and hay, sorting and containing livestock, storing their manure, milking cattle, as well as other spaces used as gardens or orchards

1.2 Farmsteads and their settings

Traditional farmsteads and their buildings are an integral part of the rural landscape and reflect how it has developed over centuries. There are major distinctions, rooted in the medieval period and earlier, between those areas dominated by villages with few isolated farmsteads, often dating from the enclosure of the open fields around them, and those dominated by hamlets and isolated farmsteads around which farmland was interspersed with blocks of individual and communal fields, rough land and extensive areas of woodland.

1.3 Farmstead layouts

Large arable farms required more space for stacking, storing and processing corn, for storing carts, and

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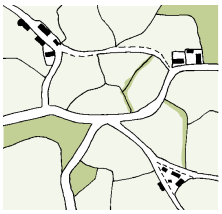
Images 1 and 2
1 Drebley in the Yorkshire Dales is typical of many hamlets in the uplands of northern England, which often developed into clusters of farms and hamlets as their surrounding fields and pastures were enclosed on a piecemeal basis.

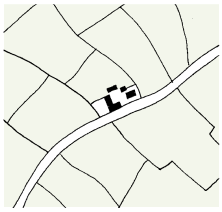
2 A farmstead in the Howardian Hills set amongst fields that date from the enclosure of open pastures and farmland after 1750.

Image 3
Isolated farmsteads sited among small-scale and irregular fields cleared from woodland and heaths, as here in Worcestershire.



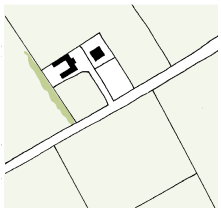
Ancient irregular enclosure

Ancient irregular enclosure is 17th century or earlier in date, and may relate to the creation of farmland from woodland (sometimes termed assarting) and areas of rough grazing in and around the heath, mosses and upland moor. Ancient enclosure is strongly associated with dispersed settlement, around which farmland was interspersed with blocks of strip fields, rough land and extensive areas of woodland.



Piecemeal or gradual enclosure

This results from a long process – starting in the 13th century – of farm amalgamation and the exchange of land between farmers, and often the resiting of farmsteads away from settlements. Boundaries may retain the curved form of the strips into which the medieval open fields around villages and other settlements were subdivided. The development of large farms has often resulted in the removal and sometimes the straightening of boundaries to create larger-scale fields.



Regular or planned enclosure

This usually results from a later process of formal agreement between the late 17th and 19th centuries, often driven by estates and in some cases by parliamentary act. Planned enclosure landscapes display a great variety in the scale of their fields and the density and size of their farmsteads. Sinuous roads may respond to the boundaries of earlier fields or tracks, whereas some areas were completely re-planned with straight roads.

housing the horses that pulled ploughs and other vehicles and machinery, than farmsteads which specialised in the rearing of cattle and dairying.

Most farms adopted a courtyard plan in which buildings were arranged around one or more yards. The largest developed in arable areas, around yards in which cattle trod down straw from barns into manure, and the smallest in stock-rearing and dairying areas where the yards simply served as areas to move cattle and store their manure.

Linear farmsteads, where the house and working buildings are attached in-line, are concentrated in upland and wood pasture districts. Dispersed plans, where working buildings are scattered along a route-way or clustered in a single working area, are concentrated in upland and wood pasture landscapes including areas close to common land for holding stock. Smallholdings are sometimes hard to distinguish from landless cottages if they had few or no working buildings.

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Image 4
A regular courtyard group in the North Pennines where buildings are carefully planned as linked ranges and often result from a single phase of building.

Image 5
Linear plans where houses and working buildings are attached in-line. These are now most common in northern and western pastoral areas. This shows a longhouse on Dartmoor.

Field barns and out-farms are set within the fields away from the main farmstead. They saved on transporting the harvested crop (hay or corn crops) to the farmstead, and enabled manure from the cattle housed in them to be carted back out to the distant fields.

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Images 6-8

6 A medieval farmstead in the South Downs with barns and other buildings that have developed around several yards.

7 A loose courtyard complex, with detached working building and the house facing into its own garden, dating from the 16th century in the lowlands of Herefordshire.

8 Farmsteads within and on the edge of settlements can be appreciated in relationship to other historic buildings and distinctive patterns of enclosure as here in a Leicestershire Vales village.

1.4 Farm buildings

The scale, range and form of working buildings reflect their requirements for internal space, lighting and fittings. Some, such as dovecotes and threshing barns buildings, were detached and highly specialised whilst others combined two or more functions in individual rooms or inter-linked ranges. Minor buildings, such as cart-sheds and pigsties, also provide important evidence of how a farmstead has been planned or evolved over time.

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Images 9-11: The Barn for threshing was the most important building on the farm and usually the largest. Threshing barns are unlit ventilated buildings that were used exclusively for threshing and storing the harvested crop. Combination barns incorporated animal housing, granaries, root stores and feed preparation as well as the essential storage and processing of crops. From the late 18th century equipment for threshing and the preparation of feed for livestock was powered by horse mills, waterwheels or steam, all of which were usually housed in attached buildings of their own. By the mid-19th century traditional barns had been replaced in some areas by 'mixing barns' – multi-functional ranges for storing and processing grain and feed with the aid of portable steam engines.

The most distinctive feature of the traditional flail-threshing barn is a threshing floor with opposing doors for winnowing. The floor will be of timber, or less commonly stone, running across the width of the building. A threshing floor will often have heavier boards than the adjacent storage floor and there may be steps from one to the other. Entrance doors were typically large and paired so that a varied draught could be arranged. The winnowing (rear) door might be relatively small and corn holes (small-boarded chambers) may survive close to the threshing floor. Slots at the side of the barn doorways were designed to hold boards at floor level.

Some barns were only built for storage and feed preparation. These will have no threshing floor. Field barns are in-field cow-houses or shelters with lofted fodder storage.

12

Image 12: Hay-barns were constructed in areas where large numbers of cattle were housed over winter. Metal-framed 'Dutch' barns (originally termed 'French' barns) date from the 1880s.

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Image 13: Out-farms are multi-purpose buildings used for animal housing and crop or fodder storage. They are sometimes contained within an enclosure, and always sited away from the main farmstead. Their distinguishing feature is that no farmhouse existed with the facility.

14

Image 14: Cider barns are usually older farm buildings that were re-used for cider making from the 19th century onwards; examples designed specifically for cider processing tend to be rare. Even if the original cider press or 'horse gin' has been removed, its former presence can sometimes be confirmed from marks on the walls or floor. Another indication is the inclusion of a mezzanine or part upper floor for storing apples.

15

Image 15: Granaries were very important facilities for storing grain. Their age and size can be an indication of a farm's wealth and the amount of grain that it produced. They can either be detached structures or incorporated in the upper floor of a working building such as a cart-shed or stable The latter can often be recognised from their external stairs, sometimes with a step up behind the entrance door. Other evidence can include various methods for keeping vermin and thieves from the stored grain, such as staddle stones, iron tongues in boarded flooring, plastered ceilings and fillets around walls, locks to doors, and gaps or steps at the entrance.

16

Image 16: Oast-houses and hop-kilns are confined almost exclusively to England's two main hop-growing areas in the South East and around Hereford and Worcester.

Malt houses have a wider distribution but are very rare. They are associated with brewing which was an ancillary part of the livelihood of some farms.

Mills for grinding grain into flour are found on some farmsteads, but they are also very rare.

17

Image 17: Cartsheds are most commonly 19th-century buildings but earlier examples are sometimes found on larger farms where machinery needed to be sheltered separately from the main barn. Sometimes they include overhead granaries and their entrances can either be in the side or end, depending on the region. Waggon houses, designed to shelter a loaded waggon overnight, are much larger than simple cartsheds and were normally open at both ends, although some have now been closed off at one end.


18

Image 18: Dairy cow housing varies regionally more than any other housing type. The majority of cow houses built before the mid-19th century were lofted to provide hay storage and are typified by hardened stone or brick floors. The standings for the animals may be along the building or across it depending on the region and period of construction, typically with a step up to the standings and partitions that meet a manger in front. Today, however, these are often concreted over. Removing concrete will usually destroy historic details such as cobbling, partition lines and drainage routes. Cow house doors needed to be wide enough for the cattle to come in and out without damaging their hips. To make dung-cleaning easier ventilated doors typically opened outwards and had gaps beneath them for drainage. Loose yards and shelter sheds generally have earth or chalk floors and little else besides mangers and ladders to lofts, where these existed. A noticeable type in South West England is the two-storeyed linhay, with an open or part-boarded upper floor facing the yard.


19

Image 19: Pig housing may take the form of enclosed piggeries or individual pigsties. The more common pigsties are identifiable by their small pens and yards. In areas without open yards, pigsties might be attached to or incorporated within other buildings. These are characterised by the presence of feed hatches that can be accessed from the outside.


20

Image 20: Dairies may be attached to and part of the dwelling house. Rare examples will still have stone or slate shelves and stone or brick floors with good drainage. Less commonly, a channel will allow a through-flow of cooling water. Examples within model farms may also feature decorative tiling and even elements of gothic or *ferme ornée* design.


21

Image 21: Fowl houses are much less common than pig houses because hens and geese were often encouraged to shelter in buildings designed for other purposes. Geese houses may feature low entrance openings and 'nests' within the interior wall faces. Hen houses can be small buildings offering sound refuge from predators. Occasionally they are found above pig housing since it was thought that foxes did not enjoy the proximity of pigs.

22

Image 22: Stabling was second only to the barn in status because of the importance of horses to the farm. The quality of construction and levels of ornamentation may reflect this importance, alongside horses' needs for good light and ventilation. Many stables were lofted for hay storage and evidence of hay 'drops' in the floor above may still exist. Internal plastering to walls and ceilings was typical. Floors were always of stone or brick pavers and only later concreted. Partitions could be of industrially manufactured iron or joinery-quality timberwork. The positions of mangers and hayracks on the walls can sometimes still be detected.

23

Image 23: Dedicated sheep housing is rare compared with unroofed sheepfolds and is generally confined to the most remote parts of the northern uplands. Hogg houses (for young adult female sheep) and shearing sheds are the main forms, and are concentrated in the least accessible parts of the uplands. Open fronted single-storey sheds, typically low in height, are also found in upland areas and other parts of England where large numbers of sheep were kept.

24

Image 24: Dovecotes are among the most easily recognised and attractive of farm buildings. Freestanding examples date back as far as the medieval period, becoming more common as early legal restrictions on dovecote ownership began to relax. However, not all dovecotes are dedicated freestanding structures. By the 19th century, many farms provided accommodation for pigeons in the form of nest holes with perching ledges on the external faces of barn and stable walls.

1.5 Materials

Historic farmsteads reflect not only England's huge diversity in geology and building traditions but also the wealth of their owners, estate policy, access to transport links and the management of local timber and other resources. This has led to great contrasts in the way in which walls and roofs were constructed, the evidence for which often survives better in working buildings than in their farmhouses.

Most early farm buildings were made from local materials, such as earth, stone, brick, thatch, slate and tiles. From the late-18th century building materials began to be imported onto the farm from further afield via the new network of canals and railways. The 19th century also saw the introduction of a range of standardised architectural elements, such as part-glazed and ventilated windows and the use of cast and wrought iron for columns. However, prefabricated construction in industrial materials did not become widespread until after the 1950s.

Awareness of regional variations in the use of materials and construction methods is fundamental to achieving a successful repair. For instance:

- The type of stone determined the way builders dressed and laid the material
- Buildings constructed of locally dug earth mixed with water, straw and cow dung were often limewashed or lime-plastered inside and out to protect the vulnerable earth core
- Colour-wash applied to plaster over timber may be locally distinctive
- Timber construction can display local and regional patterns of framing
- Bricks may be imported or fired from local clays; they can also display variations in decorative treatment and bonding
- Constructional details such as masonry bonding styles, plastering, jointing types and structural layout all differed between regions

A fundamental characteristic of traditional construction is its permeability and flexibility. Permeability enables some traditional building materials to absorb moisture and release it again as conditions change without causing long-term damage to the building itself.

Until the mid-19th century, masonry buildings (except those of dry stone) were pointed with lime based mortars. The high degree of permeability of lime mortars and plasters, coupled with ventilation through roofs, doors and windows, allowed buildings to accommodate moisture and dry out through evaporation. Timber-frame construction also relied on masonry bases and permeable infill panels. Earth buildings perform in a similar way.

Some lime mortars contained impurities that made them gain strength more quickly, but others did not. Builders might add materials such as brick dust to the mortar to replicate these impurities. The stronger naturally hydraulic limes, which have the ability to set when wet or under water, were sometimes used below ground and in other permanently damp places.

Internal plaster was often made of earthen mortar (particularly before the 19th century) or was based on locally dug aggregates and lime (which was generally of low strength). Cement began to supplant lime as the main binder in mortars at around the time of the First World War. After the Second World War cemented concrete block-work laid on substantial foundations with damp-proof courses rapidly replaced traditional walling materials for farm buildings.

25

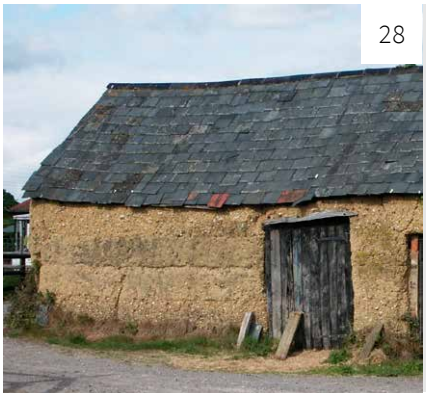
Image 25: Stone dominates the stock of farm buildings in many parts of the country, its use sometimes reflecting the status of the farm and its owner. Because each kind of stone has its own special properties, masons learnt to shape and bond the material in locally distinctive styles.

26

Image 26: Flint was used as a building material in chalk areas of eastern and southern England that lacked a better local form of building stone. Brick lacing courses provided extra strength and stability and brick dressings were used to form quoins and openings.

27

Image 27: Brick has a long tradition as a building material. It was first used in eastern England in the 14th century but did not come into general use until the late 18th and 19th centuries and generally not in areas with good supplies of stone. Mass production and the growth of the canals and railways allowed bricks to be transported widely, even into areas where timber framing had been the main form of construction.



28

Image 28: Earth (subsoil) is an ancient building material. It was used in mass wall construction, for example in the 'cob' buildings of southern and South West England, the 'clay dabbins' of Cumbria and the 'mud' buildings of the East Midlands. In East Anglia, it was made into large bricks, of 'clay lumps', which were mortared together with earth mortar. It could also be used in composite construction, such as the 'mud-and-stud' technique used in Lincolnshire, in which a timber framework is completely encased in earthen daub.

29

Image 29: Timber-frame buildings are now concentrated in western England, from Lancashire to Gloucestershire and Wiltshire, and parts of East Anglia and southern England. Different traditions of carpentry developed either side of the limestone belt. The walls were either infilled with wattle and daub, bricks or stone or clad in boards. The earliest cleft or hand sawn boards are often of elm or oak. During repair, careful inspection of interior faces for grooves, holes or slots can reveal the method and type of earlier infill work.

30

Image 30: Slate for roofing could traditionally be obtained only from parts of Wales, the Lake District, the West Country, Leicestershire, and the Isle of Man. From the late-18th century onwards Lake District and Welsh slate was carried far and wide as a result of improved canal, coastal shipping and rail networks. Slate was also used to clad the walls of some farm buildings, most notably in Cornwall, West Devon, and Cumbria.

31

Image 31: Stone slates, usually of limestone or sandstone, were used for the roofs of high-status buildings from medieval times. Despite improved transportation from the later 18th century it was always more restricted in its distribution on account of the great weight of the individual slates. Today the best examples are encountered throughout the Pennines, part of the Kent and Sussex Weald, and across the limestone belt that runs from the Isles of Purbeck and Portland in Dorset up through Bath, Oxford, Lincolnshire and on to Whitby.

32

Image 32: Clay tiles have been produced wherever suitable clays are found – essentially southern England, east of Somerset and the whole eastern side of the country as far as the Scottish border. Many domestic tile patterns came from the Low Countries and some found their way onto farm buildings. In the South East hanging clay tiles were also used as a form of wall cladding. Improved transport systems allowed the widespread introduction of pantiles in the 19th-century – instantly recognisable from their distinctive 'S'-curve profile. These are concentrated in Somerset, parts of Dorset and in the north east from the Vale of Pickering to Northumberland.

33

Image 33: Thatch was historically the most widespread material for roofing farm buildings, although its method of application varied from region to region and according to the available raw material. Long straw and combed wheat reed (also called Devon reed) were the most common, but heather and water reed were also used in areas where they grew naturally.

Many thatched farm buildings had their roofs replaced with tiles or slate during the 19th century, and in the early 20th century many others were saved from terminal decay by the application of cheap and easily maintained corrugated-iron sheeting.

1.6 Doors, windows and fittings

The doors and windows of traditional farm buildings show considerable variation, depending on a combination of functional need and local tradition. Some cow-house doors, for example, have no frame and open outwards to allow cleaning out. Features of this kind need to be respected if the character of a building is to be maintained. Replacement with different types of doors and frames can significantly reduce the historic significance and visual interest of a building.

The internal features of historic farm buildings are also of importance for assessing the original use. They should not be removed until a survey has been undertaken, even if only to a basic level. Without such a record, important evidence will be lost.

Partitions within cow houses and stables are the most noticeable and may be part of the original construction. Less obvious but important features include hanging hooks, cupboards, window treatment, door types, and fixing details. The different ways in which doors are hung can be a very useful guide to the dating of buildings.

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Image 34
An inscription on a timber post giving the building date of the barn.

Images 35 and 36
35 Evidence of a manger shown in the arrangement of floor stones.

36 Pintle door hinges no longer in use.

Image 37
Cow stalls.

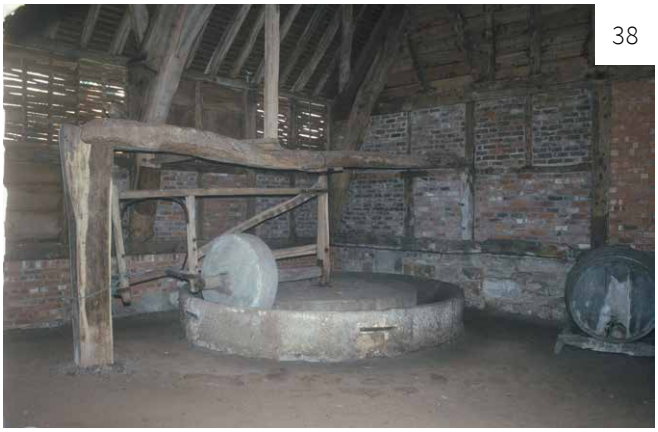

Image 38
Cider pound machinery.

Granaries were either plastered and/or boarded for grain bins and may contain evidence such as tongued flooring, wall-to-floor junction fillets and steps or gaps at their entrances. Corn holes and timber bins for storing grain are other historic features that are not always easy for the non-specialist to understand.

Various forms of carpenters' marks can tell much about the original construction of the building but are often overlooked. They can explain the sequence in which the frames and trusses of the building were assembled. The style of the marks may also demonstrate whether the timber was locally sourced or imported from the continent of Europe or North America.

As work places, farm buildings naturally acquire the usual wear and tear resulting from constant use. Other evidence takes the form of deliberately incised markings, often on timbers or walls. Amongst the most intriguing are secret ritual and religious marks made for the protection of the building or workers within it. These are found in all parts of England but are particularly common in East Anglia, which also has the most complicated examples. Tally marks and general graffiti, often in pencil, are usually associated with those who worked in the building. If unrecognised or ignored, information of this kind can all too easily be lost when material is removed from buildings.

2 Planning the Maintenance and Repair of Farm Buildings

2.1 Using an assessment framework

The assessment framework outlined in this section is designed to help place maintenance and repair work within the wider context of the farmstead and its landscape setting. It considers the available options for prolonging the life of farm buildings from basic ongoing maintenance where possible through to repair as part of adaptive reuse.

Evaluating these options needs to be informed by an understanding of how individual buildings contribute to the historic character and significance of a whole site in its setting. This can then be used to identify the constraints and opportunities for change and any associated siting and design issues. It is based on considering:

- The landscape setting – its boundaries and the potential that it offers as a habitat for wildlife and to enhance landscape character
- The whole site – its form and scale, and where buildings are situated relative to historic and modern spaces, route-ways and the surrounding landscape
- The extent of historic change to the whole site and its landscape context, including where traditional buildings and farmyards have been lost or redeveloped – this can inform opportunities to retain and reveal the significance of historic buildings and spaces, reinstate lost features and buildings or develop parts of the site
- The architectural patterning – the building styles, materials and details which are important for maintaining or enhancing the character of the farmstead, including the siting and design of any new buildings

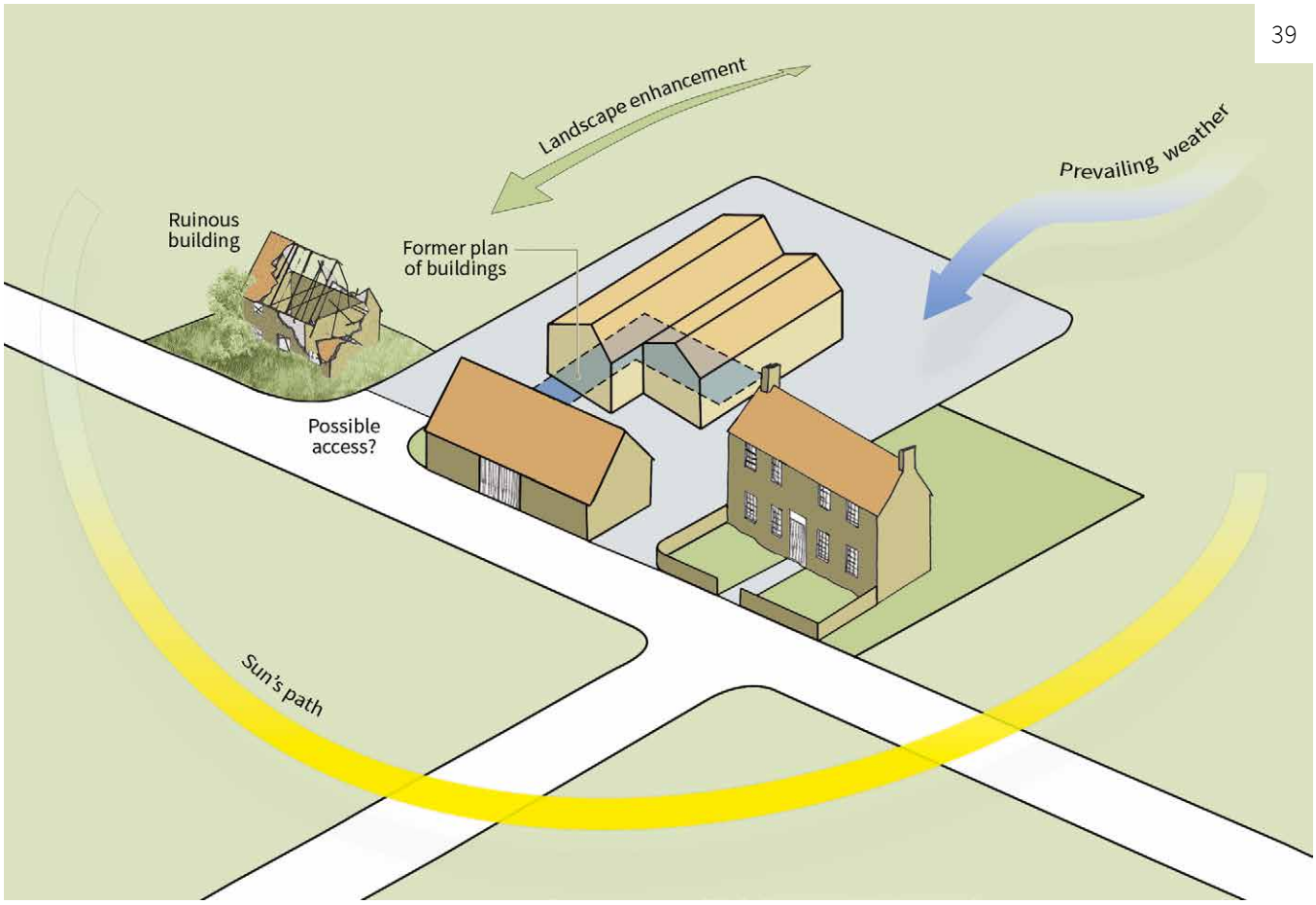

Image 39
Looking at the whole site will help when considering the opportunities for change that can enhance the distinctive qualities of a farmstead and its landscape setting.

2.2 An informed approach to maintenance and repair

Farm buildings respond well to straightforward repairs using simple materials and building skills compatible with their existing construction. Once they are allowed to develop serious defects the costs of repair can become so high that their continued maintenance becomes difficult to justify and the options for future use much more limited. If buildings are not kept weather-tight, they quickly begin a long gradual decline into dereliction.

Before embarking on a programme of maintenance and repairs an initial assessment of a building or group of structures might cover their:

- Ownership
- Significance and local distinctiveness
- Current use
- Physical condition
- Adaptability to new uses

A more detailed assessment might involve professional advice about condition and repair costs, alongside an options appraisal of the building's potential short- and long-term uses. More detail on the assessment framework can be found in the Historic England publication *Farmstead Assessment Framework: Informing sustainable development and the conservation of traditional farmsteads* (2015).

Ownership and tenancy issues

How a building is owned – whether by an individual, a company, a charity or a public utility – can be a major factor in determining the options for sustainable management. Large estates often have a degree of flexibility in the use of their buildings that is not available to an individual owner. In the case of leased buildings the owner should note that the repair costs may need to be apportioned between landlord and tenant. Buildings in very poor condition might also have to be taken out of any tenancy agreement.

Significance and local distinctiveness

Significant traditional farmsteads make a positive contribution to local distinctiveness through their varied scales and layouts, use of materials and the way that they relate to the surrounding form and patterning of landscape and settlement. They will have one or more of the following attributes:

- Groups of historic structures that contribute to the landscapes and settlements within which they developed

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Images 40-42
Significant traditional farmsteads make a positive contribution to local distinctiveness through their varied scales and layouts, use of materials and the way they relate to the surrounding form and patterning of landscape and settlement.

- Groups of historic structures that allow the individual buildings to be appreciated in relation to one another and to the yards and other open spaces of the farmstead
- Historic buildings that have undergone minimal change or that are important examples of estate or industrial architecture
- Locally distinctive building materials
- Formal designation as heritage assets – in other words they are listed, scheduled or lie within a conservation area

The National Heritage List for England provides details of listed buildings and other designated heritage assets.

If the building or the area in which it stands is subject to one or more kinds of statutory designation its repair may require special consent in addition to planning permission. It may be helpful to begin by asking three questions:

- Is the building or farmstead protected in its own right or within the curtilage of another listed building or scheduled monument?

General maintenance and repair work to listed buildings will not usually require listed building consent providing there is a like-for-like use of materials and no major loss of historic fabric. However, local planning authorities may require a consent application for larger programmes of work, such as re-roofing or structural repair involving extensive replacement of material, if these are likely to alter the character and significance of the building.

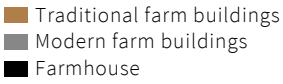
Scheduled monument consent is required for any work to a scheduled monument including repairs. An application should be submitted to the local Historic England office (see Section 5).

Farmsteads and buildings can contribute to local character if they have one or more of the following:

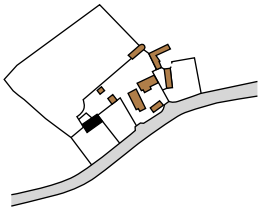
- Traditional farm buildings
- Their historic form as traditional farmsteads, where the historic farm buildings, houses and spaces relate to each other

The greater the survival of the historic form of the group and the detail of individual buildings, as identified here, the greater will be its significance as a traditional farmstead.

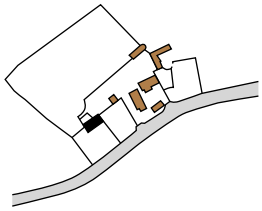
Historic maps of the early 1900s, verified by fieldwork, provide a useful benchmark to measure the degree of change to a farmstead.



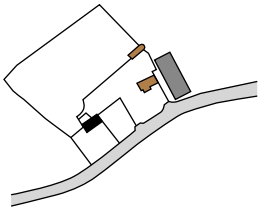
HIGH SURVIVAL → LOW SURVIVAL



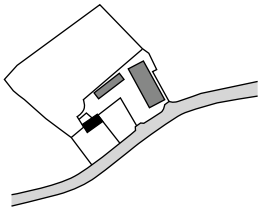
No change to the historic form with a high retention of buildings and internal/ external features.



Minor changes and/or loss to historic form.



Significant change, with over 50% loss of historic form, and few remaining buildings.



Major change, with all historic working buildings demolished, leaving only the farmhouse.

For unlisted buildings, repair work does not constitute 'development' and therefore will not usually require planning permission.

The local planning authority should be the first point of contact concerning the designated status of any farm building.

Listed buildings within curtilage

Some buildings and other structures not mentioned on the List entry may still be protected if they are within the curtilage of a listed building, were constructed before July 1948 and are or were ancillary to the listed building. If there is any doubt the local authority can be consulted or a formal revision to the List entry can be requested.

Changes to unlisted farm buildings may affect the setting of nearby listed farmhouses or other listed structures. In this case the local planning authority would need to establish whether planning permission would be required.

- Is the building or farmstead in a 'conservation area' or 'area of outstanding natural beauty'?

Conservation area designations allow local authorities greater controls over demolition and minor development, even if buildings are not individually listed. While these controls do not apply to maintenance and simple repair, they may affect proposed repair works that could significantly change the area's appearance.

- Is the building or farmstead located in a site designated for its nature conservation value or importance to bio-diversity?

Farmsteads and their buildings can also be important wildlife habitats, in particular for protected species such as owls and bats. Existing nesting areas and roosts should be disturbed as little as possible and there may also be opportunities to create new ones, both within the buildings and through planting around the site. Further advice can be obtained from Natural England.

Current use

The current and future uses of the building or farmstead will be a key element in an initial assessment. Can costs of maintenance and repairs be justified by agricultural use alone (which may be unlikely) or do other uses need to be considered?

Does the building have:

- Continuing valued agricultural use for the foreseable future?
- Marginal agricultural use, such as storage?
- No current agricultural use?

43

Image 43
Adaptive re-use may emerge as an option where maintenance and repair costs are uneconomic for continued agricultural use.

Image 44
Slipped slates requiring re-fixing at the verge, which is a particularly vulnerable area of roof.

Image 45
Bird and bee damage to decayed cob walling.

The condition of the building

Sometimes inherent defects in the original construction of a farm building lead to problems but more often they are the result of later changes.

Typical problems include:

- Inadequate foundations, which may have moved as a result of long-term structural loading overcoming the passive resistance of the sub-base
- Roof trusses which become stressed through overloading, particularly in older buildings. Typical signs are bowing of the principal rafters and purlins and support walls that lean outwards as they resist the spread from inadequate trusses
- Wall movement that may be the result of overloading from past or recent use, for example the storage of big bales or bulk grain against walls not designed as retaining structures

However, the most commonly encountered problems are those associated with neglect and a lack of regular maintenance. As a result, parts of the structure can become subject to prolonged wetting which in turn leads to decay and structural failures.

Although dry rot is one of the most damaging fungal infections affecting timber in buildings, it is almost unknown in traditional farm buildings. This is due to their high levels of ventilation and the infrequent use of timber as a flooring material at the ground floor. It also reflects the natural durability of many old timbers. It is important to avoid high levels of dampness in timbers and to maintain plenty of ventilation to prevent dry rot.

Image 46
Single Roman tiles showing early stages of spalling.

The chances of fungal infection taking hold will also increase if the fabric becomes saturated for long periods as a result of defects such as raised ground levels or defective rainwater down-pipes. Wet rot, if left unchecked, will ultimately result in very high repair costs and the loss of historic fabric.

Insect attack can seriously damage timber components and will lead to their failure if left unchecked. The sapwood of hardwoods, unseasoned softwood and timber infected by fungi are the most common targets for infestation by beetles.

Frost and salts are two other natural sources of damage to building materials. If moisture penetrates poorly maintained masonry joints subsequent frost action can cause the mortar to spall or crumble. Yet more water is then able to make its way into the core of the wall leading to erosion and instability and in extreme cases to collapse.

Problems can also arise because of poor earlier repairs or alterations, including:

- Unsuitable structural alterations
- Work that has compromised the 'breathability' of the structure, leading to excessive dampness and deterioration – for example, rendering or re-pointing walls with a strong cement mortar
- The use of heavy roofing materials such as concrete tiles that cause excessive loading to roof structures originally designed for a lighter material such as slate
- Foundation sub-bases affected by ground water that result in wall movement and cracking – excavation can influence ground water movement even when carried out some considerable distance from a building
- External ground levels that may have risen to such an extent that part of the structure is subject to prolonged wetting, which in turn gives rise to rot and decay

A comprehensive idea of repair works and associated costs will require a full professional survey. Section 5.4 provides details on a range of professionals who can advise on a project.

Urgent works and repair notices

Local authorities have powers to serve 'urgent works notices' and 'repairs notices' on the owners of listed buildings. These are served as last resort when a listed building has been allowed to deteriorate to such an extent that its future is at risk.

Urgent works notices are intended to secure urgent temporary measures. If a building is at long-term risk of deterioration a full repairs notice may be served which will specify all the work needed to repair the building.

Adaptability

When thinking about potential new uses for historic farm buildings it is important to consider not only their own characteristics but also their wider setting. Most schemes for adaptation and any associated new development (buildings, gardens, access and parking) are likely to have an impact at the building, farmstead and landscape level, which will need to be considered and positively addressed throughout the planning and design process.

We recommend an informed approach, in accordance with the principles set out in the National Planning Policy Framework, which:

- Is based on an understanding of the historic character and significance of the buildings, their contribution to the character and appearance of the local area and their potential for and sensitivity to change

- Uses this understanding to inform approaches to design, both traditional and contemporary, which reveals, enhances and retains their significance

- Considers the constraints and opportunities offered by whole sites, from buildings whose historic character and/or significance prevents any but the lightest form of adaptive reuse to the potential of new buildings which respect the historic layout and character of a site

47

Image 47
When considering potential new uses for historic farm buildings it is important to consider not only their characteristics but also their wider setting.

A closer investigation could look at:

- The opportunities or constraints offered by the plan form and the level of proposed change. For example, is the building part of a group that has significance that goes beyond its own historic character?

- Ease of access. Some farmsteads may only have a single, private point of access, which constrains the amount of traffic that can leave and enter the site. Others may stand alongside or sit astride a road or public path, or be at a junction of route-ways that provide public rights of way to the centre of the farmstead

- The capacity for change presented by the form and scale of the buildings, including the number and size of openings and the existing and historic sub-division of internal spaces. Buildings of varying sizes designed for different historic purposes – from smaller-scale traditional buildings to large post-1950 sheds – will clearly present different capacities for change

- The evidence for lost floors and partitions, historic features such as stalls, machinery, grain bins and floor surfaces, exposed carpentry including roof trusses and floors, historical graffiti and marks of lost features

- Viewpoints towards the farmstead, which may be prominent or screened by landform, vegetation or other buildings

- Access to services

Heritage at Risk

Historic England maintains a national register of Grade I and II* listed buildings which are at risk from neglect and decay. Local authorities also hold their own separate registers of Grade II listed 'buildings at risk'. These may also include unlisted historic buildings, especially those that are within designated conservation areas or that make an important contribution to the overall rural or urban landscape.

Historic England's main role in securing the future of listed buildings is to provide practical advice, guidance and resources to owners, local authorities and developers.

For more information on Heritage at Risk see our website pages.

2.3 Considering the options

Having carried out an initial assessment which carefully considers the historical interest and sensitivity of a farm building, its condition and its use, the next step is to examine the options for its future maintenance and repair alongside funding available.

These options might include:

- Continued basic maintenance – for buildings in a reasonable state of repair with low-intensity agricultural or related uses such as storage
- Emergency repairs/holding repairs – for buildings in very poor condition that are close to collapse or significant further deterioration if no action is taken
- Short term repairs – minimal repairs to extend the life of the building whose future may be uncertain
- Full repair – for significant buildings that continue to be in agricultural use, have the potential for adaptive reuse or are located in designated landscapes
- Do nothing – for buildings of no significance with little potential for adaptive reuse and where repair for agricultural use is not economic

In the case of buildings that no longer serve an economic agricultural function, sympathetic adaptation to new uses will often be an acceptable alternative means of conserving their character while simultaneously recouping the costs of repair and future maintenance. The related Historic England publication *Adapting Traditional Farm Buildings: Best practice guidelines for adaptive reuse* (2017) provides further guidance.

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. This may be because they are the wrong size, with difficult access, of a form that is not readily adaptable or are of such intrinsic importance that a new use cannot be absorbed without serious compromise to their fabric or the wider landscape setting.

If adaptive reuse is the most sustainable option the assessment 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.

Barns on the Bolton Abbey Estate

Bolton Abbey is a 12,000 hectare estate in North Yorkshire that includes large numbers of traditional farm buildings amongst its assets. Maintaining these buildings requires long-term planning and the careful prioritisation of financial resources. Investment has to be appropriate to the economic benefits that can be sustained from repair or adaptation for other uses. It also needs to contribute to the estate's overall objectives of creating employment in the community and enhancing the wider environment.

The estate therefore used an adapted version of the assessment framework developed by Historic England to identify the options for change and establish priorities for action. Assessment was based on a rapid survey of the character, significance and sensitivity to adaptive reuse of more than seventy field barns scattered across the estate. This showed that the potential for change depended not only on the type of barn but its location. As a result, the estate was able to identify preferred and secondary options for the long-term management of its traditional farm buildings. Since its completion in 2008 the survey has informed a number of successful applications for adaptive reuse as well as prompting a range of other solutions for reuse and maintenance.

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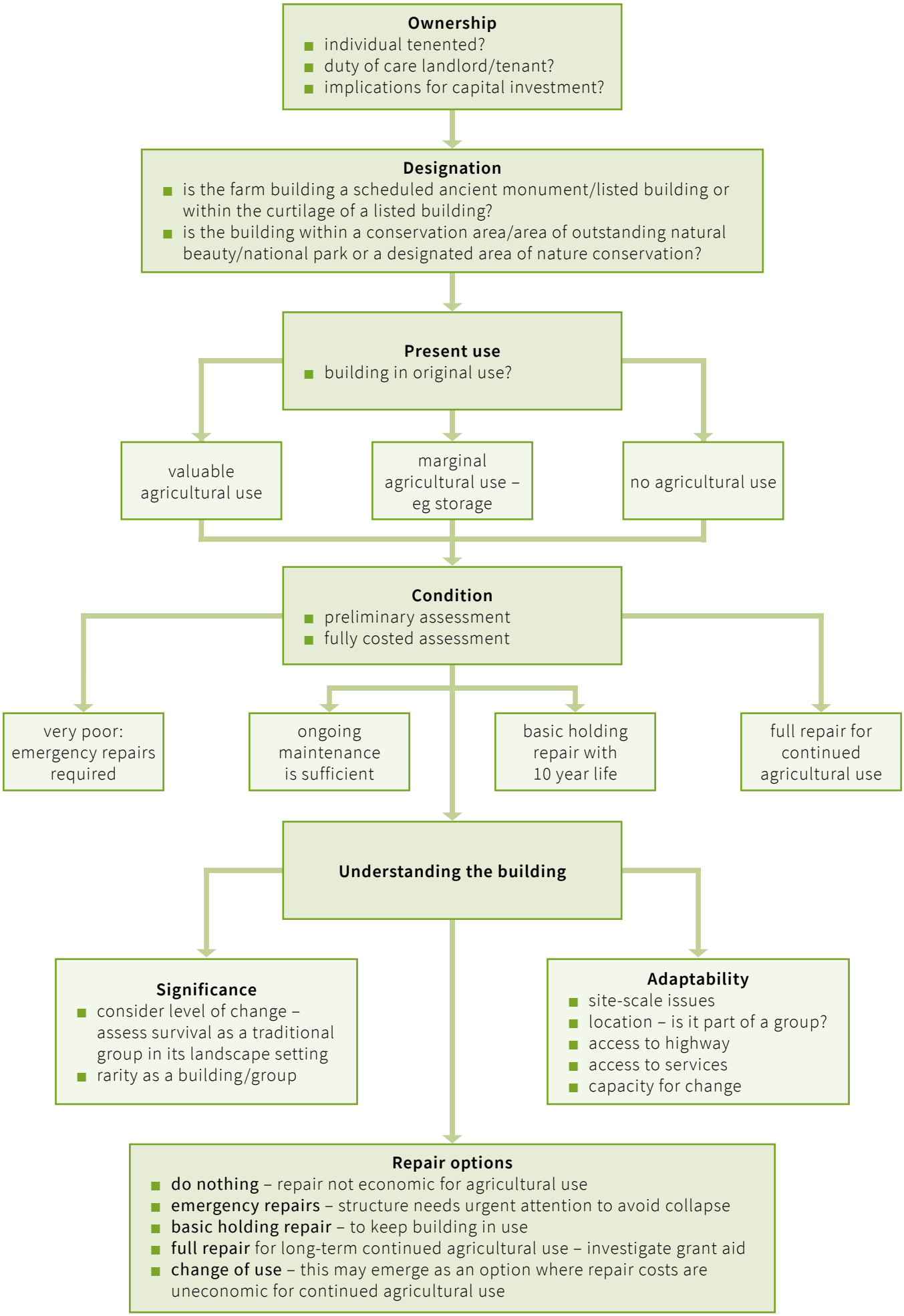
Ownership
individual tenented?
duty of care landlord/tenant?
implications for capital investment?
Designation
is the farm building a scheduled ancient monument/listed building or within the curtilage of a listed building?
is the building within a conservation area/area of outstanding natural beauty/national park or a designated area of nature conservation?
Present use
building in original use?
valuable agricultural use
marginal agricultural use – eg storage
no agricultural use
Condition
preliminary assessment
fully costed assessment
very poor: emergency repairs required
ongoing maintenance is sufficient
basic holding repair with 10 year life
full repair for continued agricultural use
Understanding the building
Significance
consider level of change – assess survival as a traditional group in its landscape setting
rarity as a building/group
Adaptability
site-scale issues
location – is it part of a group?
access to highway
access to services
capacity for change
Repair options
do nothing – repair not economic for agricultural use
emergency repairs – structure needs urgent attention to avoid collapse
basic holding repair – to keep building in use
full repair for long-term continued agricultural use – investigate grant aid
change of use – this may emerge as an option where repair costs are uneconomic for continued agricultural use

3 Maintaining Farm Buildings

3.1 The importance of basic maintenance

The best way to retain the value of a farm building is to keep it in good condition. This means carrying out the regular maintenance needed to keep it weatherproof. Damp penetration is the commonest cause of decay in buildings and is usually the result of simple problems such as defective guttering and downpipes that can be easily avoided with regular maintenance.

Maintenance differs from repair. Repair is work to put right significant decay or damage that has already occurred whereas maintenance is the continuous protective care of the building.

3.2 Planned maintenance

When carried out on a regular basis, maintenance prevents those predictable and often expensive types of failure that occur within the life of a building. The annual cleaning of gutters can be much cheaper than dealing with a discovery of rot in the feet of rafters or a wall-plate.

Planned maintenance means regular inspection, cleaning, testing and carrying out minor repairs. To make the task easier it is a good idea to work from a plan. Begin this by deciding how frequently each maintenance inspection or task is to be carried out. Most jobs will be annual but some may be needed after one-off events such as bad weather or accidental physical damage. An example of a maintenance schedule is included on page 30.

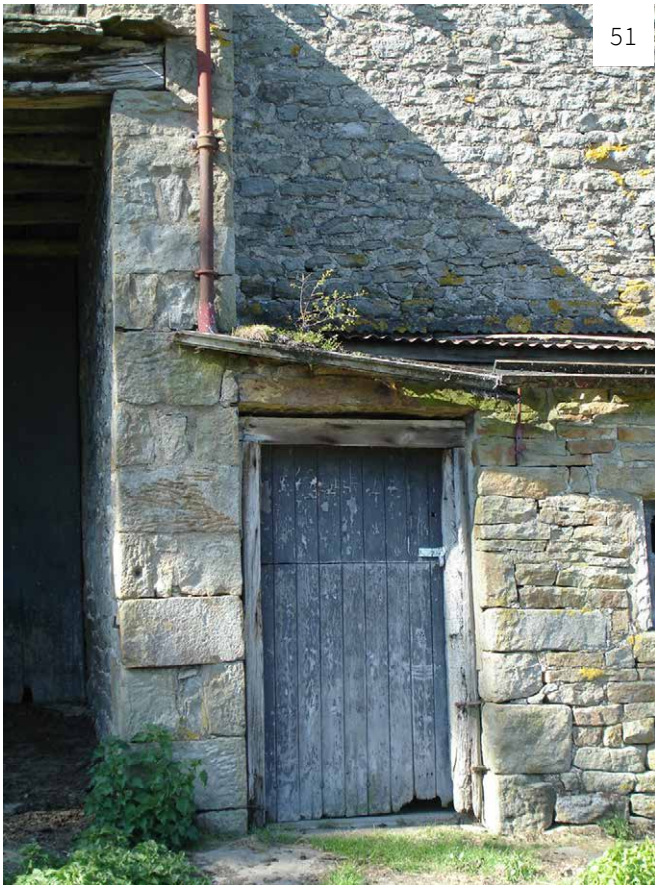

Image 51
Poor maintenance of gutters and downpipes can cause much unnecessary damage.

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Images 52-54

52 Ivy can penetrate walls that are already in a poor condition and create further damage.

53 Badly maintained roofs can lead to a rapid deterioration of the building fabric.

54 Evidence of frass (wood dust) can indicate beetle infestation which is generally restricted to the sapwood. An active infestation is usually only found where the timber is damp. Frass without dead beetles is not an infallible indicator of recent infestation.

External element	What to check for	How often
Roof Coverings		
Slate, tile, stone	Slipped, cracked and missing tiles or slates, moss growth, defective lead flashings, cracking to mortar fillets	Annually and after storms
Shingles	Curling, splitting, moss growth, fungal attack, bird damage	
Thatch	Ridges, moss growth, algae, bird damage, exposed fixings, uneven wear	
Sheeting	Rusting, holes, wind damage, lifting ridges, loose fixings	
Roof Structure	Racking, sagging, twisted frame members, cracking, open joints to trusses, wet or damp areas on timbers, wood frass	Annually
Timber frame	Bowing or leaning, rot, decayed joints, soft areas, defects to infill panels, soleplates, wood frass, masonry plinth condition	Annually
Walls		
Masonry	Leaning, cracking, defective mortar joints, dropped arches, loose or spalling masonry, plaster or render failure and hollowness, raised ground levels, erosion	Annually
Earth	Cracking, surface degradation, plaster failure and hollowness, rodent damage, long-term damp patches	
Openings	Dropped arches, failing lintels, dislodged quoins	
Timber Floors	Failing supports, broken and missing boards, dampness, inadequate ventilation to granary floors	Annually
Rainwater Goods	Defective paintwork, blockage to gutters, downpipes and drains, splits, leaking joints, broken or misaligned brackets, poor falls or backflow of water so that the water fails to discharge properly	Annually and after storms
Below Ground Drainage	Blockages or silting to gullies, leakage, quality of water supplies	Annually
External Joinery	Failing paintwork, open joints, rot to cills, casements and frames, defective putty, broken glass, failed hinges, rusting in metal frames	Annually
Vegetation	Invasive growth, particularly ivy colonising walls	Annually
Boundaries	Decay to copings of walls, dislodged mortar and masonry, raised ground levels to fences	Annually

Safety Precautions

Inspection and maintenance requires access to roofs and other potentially dangerous areas. Ideally, operations should not be undertaken alone. Always wear suitable protective clothing and make sure ladders are propped at a safe angle and secured on firm ground. Where access is particularly difficult, consider employing a professional.

4 Repairing Farm Buildings

4.1 Principles of repair

The purpose of repair is to stop the process of decay without damaging the historic, architectural, or archaeological significance of the farm building and its landscape context.

This generally means carrying out the minimum work necessary to put the building into a sound condition. The repair work should consider habitats for wildlife that the building and the site may provide.

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Images 55-57
55 Cement render has been applied over a cob and stone wall resulting in partial collapse as it is an incompatible material.

56 Cement rich pointing has damaged these soft bricks.

57 Modern materials such as steel ties can offer the optimum repair solution allowing significant historic fabric to be retained without dismantling parts of the roof.

Retain significant historic material

The replacement of historic fabric and features can undermine the historic significance of a building. Contractors who have the right building skills can usually repair decayed or failed components rather than having to replace them.

Minimise changes

Altering features that give the building its historic or architectural significance should be avoided. If architectural features have already been lost, there may be a case for reinstatement providing that there is good evidence for their former existence.

Use suitable methods and materials

A key feature of traditional farm buildings is the use of 'permeable' materials in their construction. Coupled with the good ventilation inherent in most traditional farm buildings, they allow moisture to escape without causing damage to the building fabric. Serious damage can result from the use of incompatible materials that restrict this ability of the building fabric to handle moisture.

Repair materials

Where necessary, new materials might be considered to replace existing materials but should be close matches for those being repaired. Where the cost of using matching materials could jeopardise the viability of a repair project it may be appropriate for the planning authority or grant-giving body to consider the sympathetic use of alternative materials.

Respect historic repairs or changes

Repairs or additions made in the past may be of historic interest and worth retaining.

Modern materials

Modern materials, such as stainless steel ties or resin repairs, can be the best solution if they allow more historic fabric to be retained than traditional repair methods. This can aid future interpretation of the building's history. They may also avoid the need to dismantle parts of the building.

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Images 58-60
Careful joinery repairs have allowed much of the historic fabric to be retained.

Avoid using material from other buildings

Using second-hand materials of unknown provenance encourages the practice of 'robbing out' material from existing buildings that may be of historic and architectural value.

Consider professional help

Independent professional advice may be needed before carrying out major repairs. The conservation and repair of traditional buildings often requires specialist skills if mistakes and unnecessary damage are to be avoided.

Wildlife and Countryside Act 1981 Conservation of Habitats and Species Regulations 2010

Re-roofing and repair works to the walls of farm buildings can disturb bats and other protected species. Because it is an offence to intentionally or recklessly disturb bats or their roosts, or to obstruct access to their roosts, a Natural England license may be needed before any work is begun. It is always best to assume that bats are present in a traditional building and you should seek advice from Natural England at an early stage of any planned work to a building.

4.2 Emergency and holding repairs

Emergency action is needed when the deterioration of a building or its significant features will soon reach the point when further decay or collapse would cause extensive damage, especially if this would mean that repair is no longer practically or financially viable. Holding repairs, on the other hand, can prevent the building deteriorating to such an extent that emergency action is needed.

Limiting holding repairs may be necessary due to a lack of funds or grant aid, a temporary shortage of expertise or suitable materials, or the need for more time to plan a full repair programme.

Holding repairs should be carried out in such a way that they do not:

- Preclude or hinder further work
- Use material which might damage existing fabric or accelerate decay
- Allow further decay
- Remove important historic fabric
- Postpone more comprehensive and effective temporary work

Assessing condition

A building professional experienced with older structures should carry out a careful survey to identify the most urgent needs for protection and repair. The two most common problems are structural movement and water penetration. There will often be more than one option for resolving each issue and a competent specialist is best equipped to find the optimum solution.

Structural problems

If part of the building has collapsed or is at risk of collapse, immediate attention will probably be required to avoid further serious damage. Depending on the cause of the collapse it may be necessary to relieve loadings on the structure by introducing temporary supports (shoring, scaffolding, tying and temporary construction) and removing the roof finishes or even the entire roof structure. External shoring and patent scaffolding can be an economical option, especially if the equipment is purchased and then re-sold following a full repair programme. Internal ties of steel rod or hawser can also be effective at restraining lateral movement, provided that the potentially dangerous aspects of such work have been properly assessed in advance. Structural problems should be monitored following temporary support or repair.

The use of materials such as concrete block-work as buttresses to temporarily support the existing structure might be justified so

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Images 61-63
61 Substantial timber buttressing preventing the collapse of a barn wall.

62 Climbing vegetation can create and conceal problems.

63 The outward leaning wall of this stone barn could collapse without adequate propping.

long as it does not accelerate decay and is reversible without causing further damage.

Decay to joints in timber frames may be stalled by carefully removing very soft material and filling the joint. Decayed post bases may be relieved of loading by the use of support props. These must be located securely and the frames may also require lateral restraint.

Roof spread is common in older farm buildings. Steel tie cables, rods, or timber members can restrain further movement when properly installed. It is important that fixings are securely embedded in sound timber or masonry.

Sets of roof trusses that appear to be leaning in one direction should be monitored. Where movement is active it is inadvisable to attempt to right the trusses because this will weaken the already stressed joints and the rafter purlin system. Further movement can be prevented, however, through the use of correctly located ties, or timber 'wind braces' fixed diagonally to rafters from the eaves to the truss peak.

Decayed or broken timber members may need to be supported, particularly those in roof trusses. Timber splints can be useful, although additional propping is often needed.

Water penetration

Replace missing and slipped slates or tiles to maintain a watertight roof. Individual slates can be held in place with copper tingles or stainless steel clips.

If the roof has lost a considerable number of slates or tiles, causing water damage, it may be sensible to strip the remainder for refitting at the full repair stage. A secure temporary roof such as galvanised steel sheeting or a reinforced tarpaulin would then be needed. Plastic sheet tarpaulins are only short-term measures because they can be difficult to tie down and are easily damaged by the weather.

Defective rainwater goods should be repaired or replaced unless alternative means of disposal can be set up.

Cracks and holes in the coatings to earth walls are potentially more damaging than those on masonry walls. Filling smaller cracks with a lime plaster mix is a good all-round option but larger openings should be filled with suitable mixes of earth, lime and chopped straw.

Health and safety

In law, a property owner has a duty to protect people from harm arising from the unsafe condition of a dangerous building, whether they are visiting it with or without your permission. Action may be taken against you if someone is injured by an unsafe building on your land.

Damage from trees and vegetation

Tree roots can cause serious harm to farm buildings, particularly in areas with clay soils. Overhanging trees can impede airflow and may increase the growth of moss and algae through constant shading and the retention of moisture.

Climbing plants can conceal serious problems and may exploit and worsen existing problems. Any proper roots may cause damage to walls in poor condition and shoots can dislodge roof coverings and block gutters. They should be removed from rainwater goods, window or doorframes, the eaves lines of roofs and in some circumstances from walls.


64


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Image 64
Tarpaulins can be used as a short term measure to protect roof timbers and keep buildings dry until new roof coverings can be put in place.

Image 65
Roofing felt held down with battens can provide a longer term solution for a temporary roof.

66

Image 66
Without a weatherproof covering this roof structure will rapidly decay.

67

Image 67
If a building is in a dangerous condition warning notices should be displayed.

Ivy requires particular attention as its roots can sometimes penetrate the structure of a building, although it is important to distinguish between 'proper' roots, which increase in size, and 'aerial rootlets' which are only used to cling onto the climbing surface and do not get larger over time. If removal is considered necessary, it should be carried out in one operation and with great care – wall collapses caused by heavy-handed removal of climbing plants are not uncommon.

Cutting through the main stems of woody plants, such as Poplar and Willow, growing at the base of a wall and leaving them to wither is inadvisable because it can encourage the severed sections to form new penetrating root systems of their own. Climbing plants cannot regenerate from root material alone but any remaining stem material may need to be treated with a chemical herbicide. Once the ivy (or any other woody plant) has been removed it may also be necessary to repair any damage its roots may have caused to the stability and integrity of the wall. In particular, it may be necessary to fill the voids that will form once the dead roots have rotted away.

68

Image 68
A cracked lower truss member needs propping to avoid potential collapse.

4.3 Repairs to solid-walled buildings

Structural problems

Any sign of structural failure or cracking in walling is evidence of excessive movement. A variety of factors can bring this about:

- Differential settlement due to ground movement
- Moisture getting into and being retained in the structure
- Timber decay
- Inadequacies in the original construction
- Rotation through loading from roofs and floors

Ground movement may be due to heave or subsidence (particularly in clays soils), drainage problems, tree roots or even heavy farmyard traffic.

69

Image 69
It is important to use compatible materials for repairs. Here a cob wall has been repaired using bricks and cement mortar which as a result is close to collapse.

Water entering the wall can, over a long period, weaken mortar causing the core to settle, which can in turn dislodge masonry. It can also encourage fungal growth and insect attack in timber, ultimately leading to structural failure.

Long-term loading from roof structures and overloading of upper floors can cause support walls to rotate and lean outwards. Many stone walls consist of two skins of masonry with a rubble infill. Degradation from imposed loads and weathering can cause these skins to separate, typically leading to the collapse of the outer skin.

Many cross-walls are not tied to the main walls and this creates instability over time. Brick walls were often poorly bonded and previously inserted iron ties may have subsequently corroded. Before re-building, advice should be taken from a structural engineer as many walls bulge or bow while remaining stable. Others can be stabilised by the use of steel tie rods with connections back to sound structure.

When faced with cracking to walls the first task is to establish whether the movement is active. Monitoring over months rather than weeks with patent tell-tales or glass bedded across a crack is an established method, but periodic measurement across marked points can also be useful.

If the tell-tales indicate that movement has ceased, an experienced contractor may consider it acceptable to stitch across cracks with compatible masonry; they will also advise on any benefit to be gained from the use of additional reinforcement such as helical tie bars or full-width tie rods. Each circumstance will warrant analysis to find the most acceptable solution.

Specialist structural advice is invariably fundamental to finding workable and effective solutions to movement issues. Poorly designed props or shores may be dangerous as they can fail suddenly, leaving an even more expensive problem to be resolved.

Image 70
Badly maintained pointing has allowed water to enter the wall core resulting in partial collapse.

Image 71
Repairs underway to a stone and cob wall using lime mortar and new blocks of cob.

Brick

Bricks required for repairs need to be compatible with the existing work in colour, composition and strength. Reclaimed bricks can be useful where the original type is no longer manufactured but the source should be checked to avoid the use of stolen or otherwise 'robbed out' material from listed and other historically important buildings.

Bricks need to be inspected in order to pick out damaged examples. Sound bricks usually have a slight ring when tapped together. Well-burnt examples will also be of roughly equal weight. Bricks that are sooted or distorted might be discarded.

Localised repair causes much less disruption, loss of original fabric and expense compared to rebuilding. Providing the bricks used for repair match in terms of strength and permeability, and the right mortar is used, any slight visual differences will tone down over time.

Chalk and flint

Chalk and flint construction has much in common with other kinds of stone building but in other respects it more closely resembles earth-built walling. Like the latter, it is built up from harder or more durable base courses that provide protection from damp and rain splashing at the base of the wall. The relative softness of chalk and the higher quantities of mortar in flint walling mean that overhangs to wall heads are important, just as they are with earth walling. To provide extra structural strength, layers of flint are often alternated with courses of brick.

Rebuilding and re-pointing flint walls are best undertaken by suitably experienced practitioners. All too commonly, flint walls are re-pointed with cement mortar, which is also smeared over large parts of the stones themselves. Walls repaired in this way may look sound but will decay more quickly and cause more damage than if the flints are bedded in traditional mortar.

Earth wall construction

Cob, clob, clay lump, mud, clay dabbins, chalk mud, rammed earth and wychert are all regional terms applied to localised forms of earth walling. Earth can also be used to make un-fired blocks, known as clay lump (adobe) that are laid in clay-based or lime mortars. All earthen construction is vulnerable to water penetration, particularly where wall faces are exposed to severe weather. In such circumstances walls were generally plastered with lime, which needs to be well maintained whenever it survives.

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Images 72-74
72 Structural cracks need investigation to ascertain the cause of the problem.

73 The brickwork to a granary being supported to allow for repairs to the timber sole plate.

74 Soft stone which has spalled due to cement-rich pointing now repointed with a lime mortar.

While exposure to the elements can be a serious source of damage, there are many earth-walled structures, especially in the wetter West Country, that have survived all their lives without being plastered because of their good design. The West Country phrase ‘a dry hat and boots’ describes the need of earth structures. It is important that wall-heads are kept dry by adequate overhangs and sound roof coverings. Base courses usually take the form of stone plinths. Nevertheless, attention to their maintenance is fundamental to a dry building.

Typical problems in earth-walled structures include damage from birds, masonry bees and rats, vertical cracking and water damage, particularly in association with defective plasters and cement renders. While bird activity generally damages only wall surfaces, infestations by rats and mice can eventually lead to complete collapse because of the way in which their burrows create a destabilising honeycomb structure.

Cracking can be due to a number of factors, which means that a specialist in earth-wall construction should be consulted before repairs are carried out. Bonding old earth to new can be difficult, though earth-wall specialists are able to achieve sound repairs in mass walling. A primary aid to bonding is the use of ties in the form of dowels or tile slips inserted into old material. Larger cracks can be prepared and stitched across with mass earth or earth blocks bonded in a clay or clay and lime mortar.

Earth blocks are also useful for rebuilding quoins because they are of similar strength to the original work – a repair that is too strong will always be in danger of breaking away from the original work.

4.4 Repairs to timber-framed buildings

Timber frames

Traditional timber-frame construction in England is primarily of oak. Apart from natural aging due to weathering, most timber-frame problems result from excessive moisture getting into joints leading to rot and ultimately structural failure of components.

The use of cement-based fillings to joints and coatings to panels can both result in accelerated timber decay. This is aggravated by fungal and insect attack because the impervious work is unable to release moisture quickly.

Insect attack is usually historic and the use of chemicals is rarely necessary. It is also unusual for the attack to be serious enough to result in structural failure of a component. Improved ventilation and the eradication of dampness are the best ways of avoiding such problems. Inspections should aim to locate any active infestation.

Distortion and movement are common in timber frames and contribute much of a building's character. It occurs because moisture and temperature changes are greater in timber frames than in earth or masonry walls. Like roof trusses, the various members and associated joints constantly absorb and distribute the stresses and strains of imposed loadings. Different types of joint were designed for different purposes; mortice-and-tenon joints are more efficient in compression than in tension; simple half-lap joints are poor at bending.

Distortion may also be the historic response to loading of timbers that were green (fresh) when erected. Once settled into position frames can regain acceptable stability. A distorted frame should not be forced into square without professional advice because this can cause damaging stress to the joints. The condition of joints is a major determinant of the stability of an existing timber-framed structure. Any suspect areas should be monitored for movement by using tell-tales or periodic measurements. Excessive distortion may be an indication of more significant structural problems.

The success of repairs depends on understanding how the structural frame functions, how it developed and its condition before repairs are undertaken. Only when an analysis of this kind has been completed is it possible to take informed decisions about repair, including whether or not to dismantle a frame. While dismantling may be the simplest way to repair joints and members, it should be a last resort because the operation risks a greater loss of historic fabric than in-situ repair.

Infill panels

Wattle-and-daub infill is generally resilient to impact but can become loose once cracked. Lime-washing is a highly effective way of sealing minor cracking; its permeability also makes it the best means of protecting wattle and daub from the elements. Limewash should be applied to a wetted surface to avoid suction and be protected if rapid drying is likely. A minimum of three coats are recommended.

Cracking around and within the panel face can be repaired with a dry daub or a fine lime-plaster mix depending on the size of gaps. Minor repairs are relatively simple as long as the wattle and daub remains soundly in place. Similar problems with panels of brick-nogging can be dealt with in this way.

The ingress of water, salt contamination, frame movement and poor repairs can all cause severe cracking, crumbling and bulging to panels. Loose material can be removed and re-made as a daub mix,providing it is not salt contaminated, and damaged wattle can be repaired by the insertion of new sticks.

Daub can incorporate various materials including subsoil, lime putty, cow dung, chopped straw and sharp sand. For repairs, barley straw chopped to a maximum length of 150mm is a better and softer alternative to wheat straw. Mixing must be thorough and a pug mill is best for this. Mixing must be thorough and the daub mix will need to be trodden beaten and chopped for about half an hour.

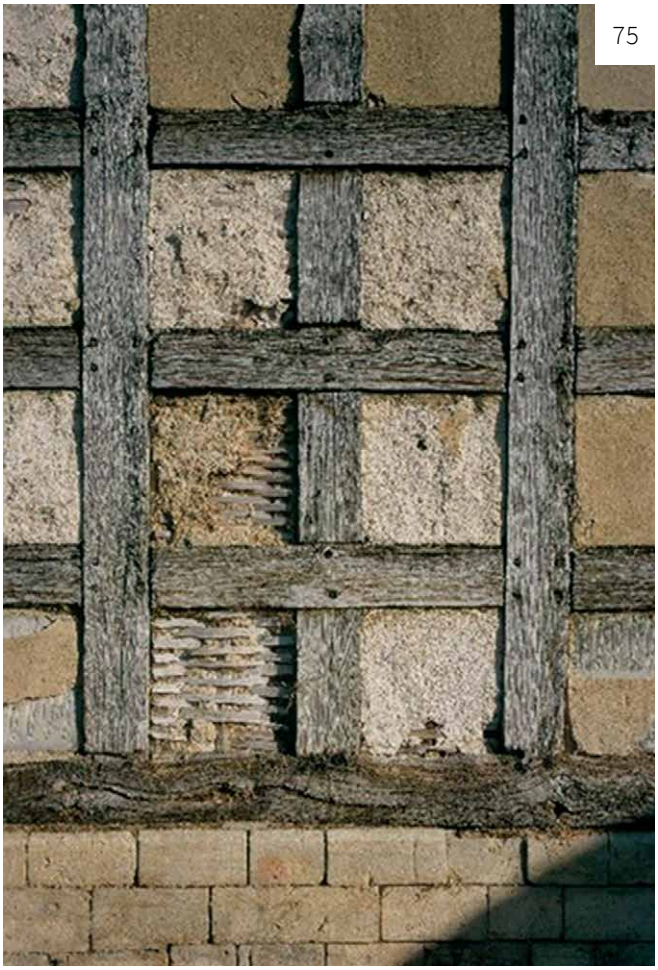

Image 75
Wattle-and-daub panels in need of repair.

Achieving the right workable consistency for any given combination of materials can only be determined through trial testing, although the finished mix should normally be as dry as possible. An earth-mix daub can be applied to wetted areas and then protected from hot sun, wind and rain. Wattle will be of oak or elm laths, or hazel or willow rods depending on local tradition.

Brick infill may be original but is often found to be a later replacement for wattle or lath. Grooves and holes in the inner faces of framing will confirm this.

Weatherboarding

In some parts of the country, especially the South East, East of England and West Midlands, timber frames were often clad in horizontal weatherboarding. Hand-sawn hardwood boarding is now rarely found, its place having been taken since the late-18th century by machine-sawn softwood. Early weatherboarding in oak or elm was usually left unfinished but the less robust softwood needed artificial protection – wood tar (also known as Stockholm tar) or limewash mixed with pigments were often used as coatings. Up until the 1950s weatherboarding

Image 76
Distortion and movement are common with timber framed buildings. Here the entire frame is leaning or ‘racking’ in one direction.

Image 77
When repairing weatherboarding as few boards as possible should be disturbed.

Image 78
A curved stainless-steel angle in place to accommodate a replacement wall plate to house the rafter feet.

Specification

Once the surveys and evaluation have been completed, attention can be turned to specification and subsequent cost of work that is needed. A competent specification can only be produced from comprehensive surveys and their proper evaluation. It should include for all works necessary to return a building to a weatherproof and structurally sound state in sympathy with its historic character.

However, there may be hidden problems that cannot be fully assessed from surveys alone. An experienced consultant will draw attention to such issues and may recommend that a contingency sum is included as part of the specification for costing.

in the South East and southern areas of East Anglia was commonly finished in white lead paint, and since then with lead-free alternatives.

As few boards as possible should be disturbed when repairing weatherboarding. Old boards are likely to be of better-quality timber and should be re-used whenever possible. Replacing slightly irregular boards with modern machine-cut ones may detract from the character of a building. New boards need to be matched to the original profile and width to maintain the historic and visual interest.

Image 79
Repairs have been carried out to the cruck roof of this medieval tithe barn retaining as much historic fabric as possible.

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Images 80 and 81
A utilitarian repair using stainless steel angles bolted together to support a failing roof truss.

Steel struts have been used to support sagging purlins at this medieval barn.

4.5 Roof repairs

Structure

Most traditional farm buildings have roofs of timber construction, usually oak, although ash, elm and softwood were also used. Roof trusses are designed to contain and resist loading and it is a tribute to their design and fabrication that so many of them have survived unaltered. The condition of a roof structure is often overlooked in the belief that it is stable. It is important to remember that it has constantly to bear not only its own static weight but also the dynamic loading and stresses that the weather brings. The resistance to these loads depends upon the way in which it has been designed (and later modified) and subsequently maintained to keep it free from excessive moisture, movement or physical damage.

Close inspection is the best way to determine condition but much also can be seen from floor level. Defects such as sagging, tilting or twisting of timbers, gaps to joints and cracked or broken timbers should be looked for. These symptoms are typical of overloading or spreading of the structure. The feet of trusses where they bear on the wall or wall-plate can show signs of compression or crushing which can indicate long-term dampness. The cause of any moisture will need to be investigated as this may have been wetting and softening timber over a long time. Most insect holes are inactive but wood dust (frass) found on timbers or floors may indicate active infestation.

Where timbers are slightly decayed or softened, steel plates, brackets, flitches or shoes can be used so that original material is retained instead of complete replacement. Such repairs can be designed for minimal impact on visual appearance.

Slight sagging of purlins may be a natural response to loading over the years, but purlin rotation (tilting), open joints and cracked members are indicative of structural movement.

Racking is the term used for trusses that are beginning to ‘fall over’ and this is quite easy to see

from below. Concerns about any of these issues should be discussed with a structural engineer.

The most common cause of roof spread is lack of maintenance. It can also be seen when roof finishes have been replaced with a heavier product such as concrete tiles rather than the original slates. Sometimes roof structures have been adapted to provide space for agricultural equipment such as storage bins and this inevitably leads to roof spread if not correctly designed.

Carrying out repairs to failing roof trusses is not only difficult but can be very expensive because their failure can also affect walls and roof coverings. This makes attention to good maintenance all the more important. While the popular option of inserting steel tie rods between support walls may resist roof spread, it does not necessarily address other structural matters such as wall stability and truss integrity.

Before roof coverings are replaced, the roof timbers must be inspected and assessed for decay so that all damaged areas can be repaired. The aim should be to replace the minimum amount of historic timber necessary by splicing in new timber rather than replacing entire members. New timbers always should match the existing – for example oak heartwood for oak. Sourcing suitable sections of elm can now present problems, particularly for large members. If home-grown or imported elm cannot be found, then oak will be the best option. Ash is rarely found as roofing or structural timber and is not available as a stock item.

82

Image 82
Re-thatching in progress to a barn roof using combed wheat reed.

Roof coverings

A properly laid roof should be weatherproof. Before around 1900 roofs never incorporated under-felting. This allowed good airflow, which in turn helped dry an atmosphere made humid by animals, fresh crops, and occasional damping from rain or snow. Some roofs were laid with timber boarding (sarking) on top of the rafters both for lateral strength and to temporarily absorb condensation and minor rain penetration, while some later roofs clad in single–lap tiling used hessian felting. The inclusion of modern under-felting in historic buildings is usually unnecessary, inhibits drying and is visually obtrusive.

Abutment flashings often showed local preferences and these should be continued where they are shown to be traditional. Cement fillets are often found on late Victorian buildings. Roof coverings usually fail due to deterioration of their fixing nails or pegs, the battens or laths supporting the slates or tiles, or enlargement of the fixing holes. Where riven or sawn timber exists, this should be used in repair work to maintain character, uniformity and compatibility of strength.

Existing sound materials can be reused even when, in the case of worn slates, re-holing is needed. On roofs covered with random-sized slates it will often be worthwhile to re-dress the worn slates to smaller sizes as a way of recovering sound material. Replacement slates, tiles or flags should be of matching or compatible colour, size and thickness. Compatible thickness is particularly important for achieving an even plane of slating (slates lying close over each other without raised margins).

Whenever possible, replacement tiles and slates should match the original materials. In the case of listed buildings or grant-funded work, materials should come from the original source if possible.

Moss can increase dampness and deterioration and can be removed by brushing or by proprietary washes.

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Image 83 and 84
Repairs to a stone-slated roof nearing completion.

Corrugated cement-sheet roofing may contain asbestos.

Image 85
These stone slates had been covered in bitumen preventing their re-use.

Image 86
A barn being rethatched with heather.

Slate and stone slate

Slated roofs can give good long term performance, sometimes over a century. Once slates start to fail, indicated by them slipping down the roof, the best solution is to re-fix using tingles. If failure has been ongoing it is time to consider stripping the roof and recovering.

Many features of the roof need to be retained, not only to preserve traditional regional character but also to achieve a dry roof. Random slates should not be replaced with single-sized slates. Traditional details, such as mortar bedding, torching and abutment details should be retained.

Some roofs featured stone or slate ridges which were sometimes fixed without mortar. Cement-based mortar may sometimes have been added as part of a later re-roofing. This can make it difficult to recover ridge pieces intact and care is needed when removing them.

Slated roofs become ‘nail sick’ with age when nails rust and fail, allowing the slate to fall out. Lead, copper or zinc tingles or clips are useful for re-fixing the odd slate. This highlights the need for high quality nails in repair and re-roofing. Nailing with galvanised nails should be avoided as these will have a shorter life than copper alloy or other non-ferrous types. They are also often harder to remove from battens when later repair is needed. Pegged slates are now rare but still exist in older roofs, particularly those laid in diminishing courses. They are typically laid onto narrow split (riven) laths or battens. The end of the peg is usually held in place against the lath or batten by partial or full torching. Pegs fail either by falling out or by slipping due to the weight and movement of the slate. Hardwood pegs are readily available for repair. A few roofs, mainly in northern areas, used sheep bones as pegs and these should be re-used whenever possible.

One modern alternative to timber pegs, which might be suitable for unlisted buildings is to use metal alloy pegs. These need to be made in a number of different lengths to suit individual slates or courses. As they cannot be easily shortened, their use would preclude the renewal of torching that provides some roofs with their distinctive regional character. Also aluminium pegs should not come into contact with lime mortar as this can corrode them.

In older roofs large areas of the finish can all move at once. This is usually caused by failure of the nails holding the laths or battens to the rafters. Thin battens may also split under sustained load over many years. Where battens are failing they should be renewed. Treated sawn softwood is usually used, but for listed buildings like-for-like replacement is usually required.

Image 87
Salvaged plain clay tiles have been mixed with new in this re-roofing.

Tiles

Most early plain tiles were pegged and these will be of historic significance where found. Some plain tiles will have integral nibs and may have holes for nailing. Where intermittent nailing of tiles occurs this is usually to a regular pattern and its purpose was to help resist wind uplift on exposed roofs. Whenever possible it should be replicated in repair.

All traditional tiles were made of clay and many types are still widely available. Less common varieties may need to be sourced from specialist manufacturers.

Tiled roofs need little attention beyond checking for any dislodged tiles, particularly following a storm. Signs of failure include spalling and breakage. In this case, tiles should be carefully removed and inspected. Acceptable tiles should be stacked under cover to avoid accidental damage. It is usual to renew battens prior to retiling.

Single-lap and larger tiles such as 'double Roman' tolerate undulation in a roof less well than plain tiles. This should be considered during roof repair and it may be necessary to provide packing over sagging purlins to create a suitable line.

Thatch

The maintenance issues are similar for all types of thatching material, whether of straw, water reed or heather. Early signs of failure occur at ridges, gables, and chimney abutments. Thatched ridges will always deteriorate sooner than the coat itself and so particular attention is needed for ridge maintenance, which usually consists of recapping. Wire netting over the ridge can prolong the life of the thatch by retaining material in place.

As the thatch ages it attracts moss, algae and fungi. This is often worse where trees overhang or restrict airflow over the roof. Raking down of the roof can be beneficial but ideally requires the expertise of a thatcher.

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Image 88
Combed wheat-reed thatching in progress with the fixings visible.

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Image 89
Most roofs of farm buildings have no underfelt allowing the roof timbers to be well ventilated.

Moss growth can also be exacerbated by wire netting over the main coat because of its tendency to retain debris and thereby increase moisture retention. It also makes raking or brushing down less effective. More important still, it seriously inhibits removal of thatch in the event of a roof fire. New material may be stitched in where faults are beginning to show. The advice of an experienced thatcher can prove invaluable.

Traditionally, straw thatch was repaired by patching and was only re-coated when absolutely necessary. In some cases, it may be beneficial to reduce the thickness of the thatch by removing more than just the remains of the previous coat. However, only the minimum amount of thatch to achieve the correct thickness should be removed. Basecoats can be very old and contain historic information. If they have to be removed they should be recorded first.

The local planning authority is likely to have a policy concerning the thatch types that are appropriate to its area. The thatcher will not necessarily deal with repair work to roof timbers but may insist on certain sizes of batten to suit the style of work. This may not be the same as that used previously, so any changes in method should be specified beforehand, as should any required attendance by a builder for scaffolding or preliminary repair work.

If the finished level of the thatch is to be changed its relationship to chimneys and protective gables must be checked. It may be necessary to adjust both in order to provide a weatherproof junction when renewing or remaking flashings and fillets.

Less commonly used materials such as heather and bracken require specialist help because they each have their own special methods of application.

As well as the material used the lifespan of a thatched roof is influenced by local climate, exposure, roof pitch, airflow over the roof and the skill of the thatcher.

Corrugated sheeting

Corrugated sheeting has been used from the 19th century, either as a replacement or covering for thatch and other roofing materials or (mostly in the case of Dutch barns) as part of the original construction. Unprotected galvanised sheeting will eventually decay naturally, but its deterioration will be accelerated if it has been damaged during storage or fixing. The first signs of decay are often seen at the under-laps and are due to moisture retention between sheets, particularly in animal houses that have inadequate ventilation. In such buildings, painting between the laps or indeed across the whole underside before fixing is an excellent aid to preservation.

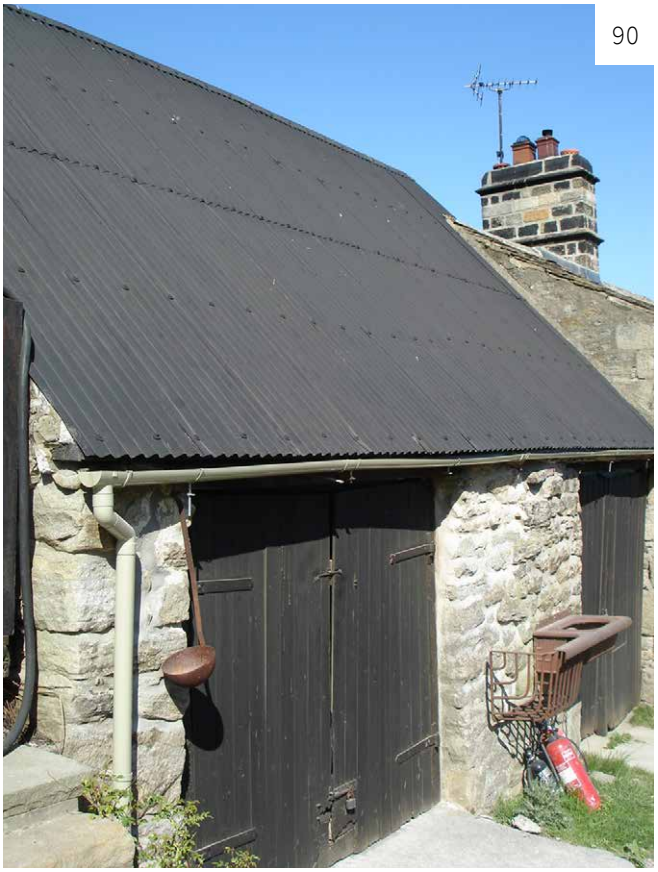

Image 90
Corrugated iron sheeting has become part of the farm building vernacular and has saved many roofs from decay.

Painting metal roof cladding is the best way of prolonging its life. Some regions have a long-standing practice of using a particular colour, generally red raddle or black. Traditionally, the chosen colour related to that of the local soil; in general a matt black finish is particularly good at helping the building sit into the landscape. On new galvanised sheeting, an etch paint needs to be applied as a basecoat. Alternatively, the material can be left to weather and tone down for around a year before painting.

4.6 Floor repairs

It is not uncommon to find the joist ends of timber floors housed in solid walls decaying due to damp. It is normally less disruptive to splice on new ends or add steel support brackets and flitch plates than replace whole lengths of joist. Resin can sometimes be used as a repair medium and might be justified when joists or beams contain historic information such as chamfering or ritual marks. It is important that any sources of damp are rectified as part of the repair.

Floorboards of oak or elm are especially likely to be of historic interest but softwood boarding may also be of significance, particularly if it involves broad planks. The type of wood, its size and the age of boarding are all important. Softwood boarding does not last as long as hardwood and the existing flooring may well be replacement work.

Many ground floors were constructed simply of compacted earth. Rammed chalk floors occur in chalkland areas and these are relatively easy to repair with lump chalk thoroughly wetted and rammed into place.

In some areas such as the East Midlands, upper floors may be made of plaster (usually gypsum but occasionally lime-based) laid over a support of reeds or laths spanning closely spaced joists. Such floors are surprisingly robust if kept dry. Repairs using matching materials can be undertaken by a specialist contractor.

Some solid ground floors may also be of a lime-ash composition. Now rare, these are softer, warmer and more flexible than later concrete floors and can be repaired using similar materials. Early Victorian concrete floors can be lime-based and often included additives such as animal blood, or isinglass. Again, knowledgeable specialist contractors will be able to repair these.

In the case of cobbled or pitched stone floors, the stones were beaten into a clay base and packed down tightly. Joints can be brushed with a lime bedding mix to further tighten the stones. Repair is possible but sourcing compatible stones may be difficult. Original sources include riverbeds and weathered stone from field margins. Commercially available imported sea cobble is a poor match in most cases and cement should always be avoided as a bedding material.

Images 91 and 92
Joist end repairs using steel T-sections.

Images 93 and 94
New joist end scarfed onto an existing joist.

4.7 Mortars, renders and plasters

The appearance of masonry owes as much to the character of the mortar joint as to the brick or stonework itself. Inappropriate re-pointing can have a significant impact on the character of farm buildings and can ultimately be damaging to the fabric.

Before the mid-19th century masonry bedding mortar was either lime-based or, particularly in earlier buildings, made simply of earth or earth mixed with lime. Mortar was also often spread across the face of stone as a render finish. Further information on repointing can be found in our guidance *Repointing Brick and Stone Walls: Guidelines for best practice* (2017).

Decayed joint mortar is vulnerable to water penetration. The subsequent expansion of frozen moisture can cause surface spalling which damages the mortar surface. Spalled brickwork and stonework (particularly softer stone) caused by cement-based mortar that has forced moisture to evaporate through the weaker medium is one of the commonest problems affecting historic farm buildings.

Mortar should be weaker and more porous than the masonry in which it is placed. Although it is necessary to take account of the exposure to which the walls are subject, it is the nature and attributes of the masonry that will usually dictate the strength of mortar required. Establishing a compatible composition may well require trial mixes to be tested on site. The use of contractors

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Image 95-97
95 Well-executed lime mortar pointing to random stone walling.

96 Cement renders should be avoided for all farm buildings of traditional construction.

97 Limewashing provides a protective coating used here on wattle and daub panels within a timber frame.

experienced in lime mortars is fundamental to the success of a project.

Much damage to masonry is caused by the use of cement-rich mortar. Soft lime-based mortars are preferable because their elasticity allows slight movement and their porosity allows the wall to breathe. When deciding on a mortar mix look for evidence of the aggregate and sands used in the past, which may well have local significance and will enable a close visual match.

Until the advent of harder mortars in the mid-19th century many rubble, earth and some brick-walled farm buildings were lime plastered and lime washed for additional protection. If they are regularly maintained, external plasters can last for many decades. However, a reduction in maintenance or the application of inappropriate cement renders will cause the original finish to degrade or fail.

When considering external finishes as part of a repair project it is well worth trying to find out what kind of coatings may have been used before. Does the building show remnants of a lime plaster or was it simply lime washed? Lime plaster and lime wash create an authentic and protective external finish for many traditional farm buildings and are especially appropriate where there is surviving evidence of previous use.

The 20th-century practice of nailing wire mesh to walls as a support for cement rendering has caused varying degrees of damage to walls, most disastrously to earth walling because of moisture ingress and physical damage from nailing. Because cement renders are inflexible they invariably start to crack and let in water which is then unable to freely evaporate. Defective cement render should be removed entirely and replaced with a lime-based render.

Defective plaster coats may not need to be removed entirely particularly where the decay is at low level. Where a basecoat strengthened by hair remains in sound or repairable condition a further finishing coats could just be applied.

4.8 Drainage

Rainwater goods

Particular attention will be needed if gutters and downpipes are near to, or overhung by, trees. Though rare in farm buildings, any parapet or valley gutters require particularly close attention to check for blockages. Signs of blockage to gutters and downpipes will be most obvious during heavy rain. Leaking joints to cast-metal gutters should be disconnected, cleaned and resealed with a non-acidic gutter sealant suitable for metal application or a joint-sealing tape suitable for use on metal. Painting metal downpipes and gutters (both inside and out) can extend their lives for many years.

Some traditional buildings now feature plastic rainwater goods. Plastic products are generally not as suitable as metal products as they are not designed to follow the often sinuous changes of line that occur on the eaves of traditional buildings. As a result they are liable to respond to stress by deforming, springing, and sometimes breaking their fixing brackets. Their insubstantial visual appearance can also impair the historic character of a traditional building.

It is now common practice to attach modern guttering to fascia boards but for farm buildings these are often out of character. They are relatively short-lived in comparison with metal fixings, which in contrast, can be safely connected with a wider tolerance of angles. In many cases installations are mounted on gutter spikes driven into the bedding joints.

Below-ground drainage

Drainage runs and outlets need to be regularly inspected for blockages and leaks, especially after storms. The latter are likely to cause the most serious problems in autumn and winter when leaves and debris can be washed into drains. Leaking drains can cause structural instability and severe damp.

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Image 98
The gutters to most farm buildings are attached with either gutter spikes or rafter brackets (as shown here). This allows gutters to follow the often irregular lines of outside walls.

Adequate ground drainage around the building in the form of French drains, which are simple trenches filled with gravel, perforated pipes and a geotextile lining, can be particularly effective in maintaining dry walls.

Recording

Recording is carried out in order to collect information about a building that will help with its future management, whether it is about to be changed or not. Where parts of an historic building are likely to be dismantled prior to repair an accurate record of existing detail can help to avoid unnecessary loss of historic information. It is strongly recommended that records should be sent to the county or district Historic Environment Record by the project manager or building owner. The local authority's conservation officer should be able to provide advice on how this can be done.

The level of recording required will depend on the nature of the building, its significance and the extent of the intervention in its fabric. The cost of recording should not usually be disproportionate to the cost of the repair work. Advice on the levels of recording appropriate to different kinds of structure is set out in the Historic England guidance *Understanding Historic Buildings: A guide to good recording practice* (2016). The four levels are linked to the complexity of the building and the amount of repair required.

Level 1

is essentially a basic visual record supplemented by the minimum of information need to identify the building's location, age and type.

Level 2

is a descriptive record, made in circumstances similar to those of Level 1 but when more information is needed. Both the exterior and the interior will be viewed, described, and photographed. The record will present conclusions regarding the building's development and use, but will not discuss in detail the evidence on which these conclusions are based.

Level 3

is an analytical record, and will comprise an introductory description followed by a systematic account of the building's origins, development and use. The record will include an account of the evidence on which the analysis has been based. It will also include all drawn and photographic records that may be required to illustrate the building's appearance and structure and to support an historical analysis.

Level 4

provides a comprehensive analytical record and is appropriate for buildings of special importance. The record will draw on the full range of available resources and discuss the building's significance in terms of architectural, social, regional or economic history. The range of drawings may also be greater than at other levels.

A photographic survey differs from other surveys in that it provides a very full visual record, accompanied by a brief written account, but without an analytical or drawn survey at a comparable level of detail.

5 Where to Get Advice

5.1 The role of Historic England

Historic England is the Government's advisor on the historic environment. We are consulted by local authorities and other bodies on a wide range of policy and development activities. Central to our role in the planning system is the advice we give to local planning authorities and government departments on development proposals affecting listed buildings, conservation areas, scheduled monuments and registered parks and gardens.

We have a network of staff across England who have a wide range of skills, but it is neither possible nor necessary for us to engage with every planning issue. We will usually get involved only in schemes that include proposals with the potential for major change or damage to nationally important heritage assets.

Broadly speaking, Historic England must be consulted on:

- Listed building consent applications relating to a Grade I or II* listed building, or for demolition or partial demolition of a Grade II listed building
- Applications for planning permission for development which affects the setting of a Grade I or II* listed building and (in some circumstances) for development which affects the character or appearance of a conservation area or registered park or garden
- All applications for scheduled monument consent

Historic England welcomes initial or pre-application advice for the above types of application. Before offering detailed advice we need a full understanding of the proposed works so that we can assess their impact. In some circumstances we also need to understand why the changes are proposed. Providing us with as much relevant information as possible at the earliest stage in the development process saves everyone time and money.

For more information see the Historic England advice note *A Charter for Historic England Advisory Services* (2015).

5.2 Local and national park authorities

Locally specific pre-application advice and local plan policies for traditional farm buildings can be obtained from the local authority and the National Park Authority if the farmstead or building lies within one of England's ten national parks.

5.3 Wildlife and habitats

Many species of wildlife that live in or gain benefits from farm buildings may be adversely affected by major works of repair. If any of them are legally protected, a licence will need to be obtained before the project is started.

The Wildlife and Countryside Act (1981) is the principal law protecting wildlife, habitats and species. It is supported by the Conservation of Habitats and Species Regulations 2010.

An ecological survey should be considered at the outset to establish the presence of any protected species such as bats, predatory birds and reptiles. If there are any positive sightings or indirect evidence of occupation you should seek advice

should from the local Natural England office and if necessary obtain a licence before the project is started. This licence may require mitigation measures to prevent disturbance of the species or its habitat, particularly during nesting and breeding seasons.

Buildings can become important habitats for birds and mammals (including bats). These can be further enhanced by the provision of nest boxes, improvement of eave and roof design, retention of rough surfaces and use of the small openings typical of farm buildings.

Farm buildings also serve as habitats for many species of plants, which should not be removed unless they are clearly causing physical damage or speeding up weathering.

Regular maintenance on a rolling basis is good for wildlife as only a proportion of the building is affected at any one time.

5.4 Professional help

Hiring experienced professional consultants will add to the overall costs of repair but can be the best way to avoid 'cowboy' builders and problems with inappropriate or poor workmanship. The tasks that can be dealt with by professionals such as architects and surveyors include:

- carrying out surveys
- obtaining consents and approvals
- writing specifications of works, appropriate materials and standards for repair
- finding suitable builders
- drawing up a contract
- tendering works and deciding on a contract
- supervising on site and administering the contract

The amount and type of professional help required will depend very much on the size, complexity and nature of the farm building and kind of repair that it needs. It is important to choose a professional who has a thorough understanding of traditional buildings and is aware of the problems and pitfalls associated with their repair.

Many of the repairs needed by traditional farm buildings are relatively straightforward and involve little risk. A reliable local firm of building contractors skilled in traditional construction may be perfectly suitable. Independent recommendations can be useful, especially if they allow examples of a contractor's work on comparable buildings to be inspected at first-hand.

If costs have to be kept to a minimum, contractors may be relied upon to offer sound impartial advice on the works that are needed. However, independent professional advice should be sought if there are doubts as to the experience or competence of a building contractor.

Sometimes hidden repair problems will only become apparent once 'opening up' works have begun. It is therefore a good idea to establish with the builder before work starts how any additional unbudgeted works will be costed. It is also sensible to allow a contingency sum in your own budget to allow for such problems.

If the building is listed, unusually complicated or a candidate for grant aid for repair then other expertise may be required:

Historic environment specialists

There are specialists in the heritage sector who can provide advice and expertise on many aspects of a project from development planning issues to more specialist areas such as archaeological investigations or particular aspects of agricultural management and development. The Institute of Historic Building Conservation has a database of accredited practitioners from a variety of disciplines (www.ihbc.org.uk).

Architects

An 'architect' is a person whose name appears on the register held by the Architects Registration Board (www.arb.org.uk). There are other professional design practitioners who are not registered architects but adopt similar titles such as 'architectural designer'.

Only a small proportion of architects specialise in the repair of old buildings. Those registered as Architects Accredited in Building Conservation (www.aabc-register.co.uk) or on the Conservation Register of the Royal Institute of British Architects (www.architecture.com) have been assessed as having knowledge and experience in conservation work. The Society for the Protection of Ancient Buildings (www.spab.org.uk) also keeps a list of architects (and surveyors) experienced in the repair of traditional buildings. Architects can also carry out condition surveys.

An architect would be particularly useful for overseeing adaptation and repairs that are more complex, that require a number of different craft trades or involve a significant design element.

Building surveyors

Members of the Royal Institution of Chartered Surveyors (www.rics.org) have a broadly similar role to architects but are trained primarily in building construction rather than architectural design. An RICS Building Conservation Group has its own list of members accredited in building conservation. Building surveyors can also deal with condition surveys.

Structural engineers

Structural engineers deal primarily with defects in building structures including matters of ground movement. For buildings with any sign of structural problems, a structural engineer's report will provide a sound basis from which to design a scheme of repairs.. The Institution of Structural Engineers (IStrucE) and the Institution of Civil Engineers (ICE) maintain a list of engineers accredited in building conservation (Conservation Accreditation Register for Engineers – CARE, (www.careregister.org.uk).

Quantity surveyors

These professionals deal with the financial side of building work and contractual issues. Those who are members of the RICS are termed 'chartered quantity surveyors'.

Ecologists

The Chartered Institute of Ecology and Environmental Management (www.cieem.net) has a professional directory of ecologists.

Builders and specialist contractors

It is worth spending as much time as possible choosing a builder. If an architect or surveyor is appointed, they should help find a suitable builder. If you are not employing a professional adviser for the works, it is important to find a builder with experience and knowledge of work to older buildings. Check references and see work they have carried out. Many elements of old buildings can be quite fragile, such as stone or joinery, and may require specialist expertise rather than the skills of a general builder.

Specialist suppliers

There is a wide range of specialist suppliers who can help with the sourcing of traditional materials, ranging from lime products and earth block to ironmongery and specially matched bricks.

Reclaimed materials can sometimes help to sustain the visual character of repaired and restored farm buildings. However, to avoid the risk of materials being stolen or taken from listed buildings without legal consent, it is important that they are obtained only from legitimate suppliers. A statement of provenance could be requested at the time of purchase.

A number of suppliers adhere to the voluntary Salvo Code (www.salvo.co.uk/salcoinfo) Members undertake not to buy any item if there is the slightest suspicion it may be stolen or taken from a protected historic building without legal consent. Seller's details are recorded including proof of identity.

5.5 Sources of funding

Countryside Stewardship and the historic environment

Countryside Stewardship provides incentives for land managers to look after the environment.

It is open to eligible farmers, woodland owners, foresters and other land managers through a competitive application process. It is one of the main contributors to meeting the government's targets for Heritage at Risk and in conjunction with managing other aspects of the environment, funds activities which maintain the character of the countryside and preserve features important to the history of the rural landscape.

The scheme is run by Natural England and the Forestry Commission on behalf of the Department for Environment, Farming & Rural Affairs (Defra). Claims and payments are managed by the Rural Payments Agency. Both Historic England and local authority historic environment staff provide advice on the scheme to Defra and its agencies in relation to heritage.

Further information can be found on the Gov.uk website:

www.gov.uk/countryside-stewardship-grants

Heritage at Risk

Historic England run a repair grants scheme for Heritage at Risk. The grants given under this scheme are intended to reduce the risk faced by some of the most significant historic sites in England as shown on the Heritage at Risk register. Grants are focused on those sites which are most in need of repair and where, without our grant, a project would not be able to go ahead.

Further information can be found on our website:

www.HistoricEngland.org.uk/advice/heritage-at-risk

5.6 Further reading

Historic England research and guidance on farm buildings

Adapting Traditional Farm Buildings: A guide to good practice (2017)

Designation Listing Selection Guide: Agricultural buildings (2016)

Farm Buildings and Change on the Bolton Abbey Estate, North Yorkshire: A character-based pilot study (2009)

Farmstead Assessment Framework: Informing sustainable development and the conservation of traditional farmsteads (2015)

Historic Farm Buildings: Constructing the evidence base (2005)

Historic Farm Buildings: Extending the evidence base (2009)

Historic Farmsteads: Preliminary Character Statements (a series of eight regional documents) (2006)

National Farmsteads Character Statement (2014)

National Farm Buildings Types (2014)

Other Historic England advice and guidance

A Charter for Historic England Advisory Services (2015)

Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (2008)

Energy Efficiency and Historic Buildings: Application of Part L of the Building Regulations to historic and traditionally constructed buildings (2011)

Practical Building Conservation

This series of fully illustrated books published by Routledge provides detailed guidance on understanding, deterioration, assessment and care and repair:

Basics (2013)

Building Environment (2014)

Concrete (2013)

Earth, Brick & Terracotta (2015)

Glass & Glazing (2012)

Metals (2012)

Mortars, Renders & Plasters (2012)

Roofing (2013)

Stone (2012)

Timber (2012)

www.HistoricEngland.org.uk/pbc

Repointing Brick and Stone Walls: Guidelines for Best Practice (2017)

The Setting of Historic Assets (2011)

Understanding Historic Buildings: A guide to good recording practice (2016)

Wildlife

Barn Owl Trust, 2015. *Barn Owls and Rural Planning Applications: A guide.* Ashburton: Barn Owl Trust

Bat Conservation Trust, 2012. *Bats and Buildings.* London: Bat Conservation Trust

English Heritage/National Trust/Natural England, 2009. *Bats in Traditional Buildings*

Mitchell-Jones, A J, 2004. *Bat Mitigation Guidelines.* English Nature

National Trust, 2013. *When Nature Moves In- a guide to managing wildlife in and around buildings.* London: National Trust

Bat Conservation Trust, www.bats.org.uk

Barn Owl Conservation Trust www.barnowltrust.org.uk

Other advice and guidance

Boutwood, J, 1991. *The Repair of Timber Frames and Roofs.* Technical Pamphlet 12. London: Society for the Protection of Ancient Buildings

British Standards Institute, 2013. *Guide to the Conservation of Historic Buildings* (BS 7913). London: BSI

Building Conservation Directory. A range of articles are available on many aspects of the care and repair of older buildings at www.buildingconservation.com

Cadw and Monmouthshire County Council, 2004. *Converting Historic Farm Buildings in Wales: A Guide to Good Practice.* Cardiff: Cadw & Monmouthshire County Council

Darley, G, 1988. *A Future for Farm Buildings.* London: SAVE

Davey, A, 2001. *The Conversion of Redundant Farm Steadings to Other Uses.* Edinburgh: Scottish Executive Central Research Unit

Reid, K, 1989. *Panel Infillings to Timber-Framed Buildings.* Technical Pamphlet 11. London: Society for the Protection of Ancient Buildings

Society for the Protection of Ancient Buildings,1982. *Barns Book.* London: SPAB

Society for the Protection of Ancient Buildings, nd. *First Aid Repair to Traditional Farm Buildings*, Information Sheet 7. London: SPAB

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6 Acknowledgements

Images

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2, 83: Natural England

5, 6, 8: Bob Edwards

7: Herefordshire Council

78: Simon Doling, Acanthus Ferguson Mann Architects

79: Chris Balme, Acanthus Ferguson Mann Architects

85: John Sewell, Peak District NP

86: Yorkshire Dales NP

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Historic England

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