

# maintenance

A GUIDE TO THE CARE OF OLDER BUILDINGS



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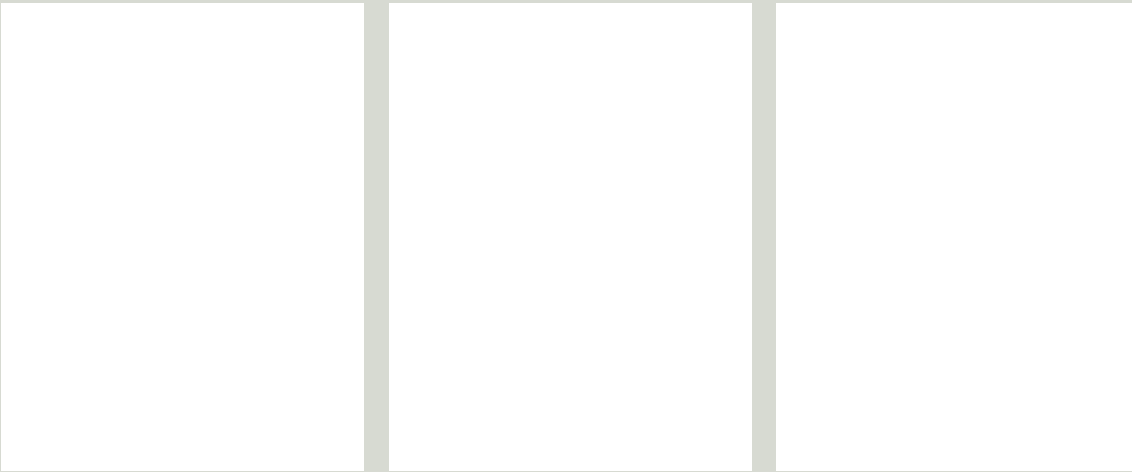
# Introduction

Well-maintained and cherished buildings enhance the quality of life of their occupants, their neighbours, and the community at large. Anyone lucky enough to live or work in a historic building will already appreciate the artistry and craftsmanship of handmade building materials, generous living spaces, and the sense of continuity with the past that these buildings provide. Keeping and repairing existing buildings reduces waste generation, conserves the energy embodied in the original building materials and construction, and so is in the wider interests of sustainability. Buildings that are properly cared for look well, enhance their neighbourhoods, and retain their economic value.

There is no such thing as a maintenance-free building. All building materials decay to different extents due to sunlight, rain, and wind. Whether historic or not, all buildings need regular maintenance. However, this guide is mainly concerned with traditionally-built buildings - those built of the materials and methods that were generally used before concrete and cement came into widespread use from the middle of the twentieth century onwards.

Regular maintenance and correct repair will extend the life of any building. There are very real economic benefits too. Checking the health of the building on a regular and systematic basis and attending to minor defects as they arise will save money in the long run. By doing this you can avoid the need for major repair works, which are not only damaging to the architectural or heritage value of the building, but can also be expensive and disruptive.

It should be remembered too, that the Planning and Development Act 2000 places a responsibility on owners and occupiers of protected structures to prevent their property from becoming endangered. Good maintenance and repair practices will keep the building from falling into decay and are part of the day-to-day responsibility of all owners and occupiers of protected structures.



Well-maintained buildings not only enhance their surroundings but hold their economic value too. A house is most people's greatest asset and needs regular care and attention to keep it in good condition

# 1. How old buildings work

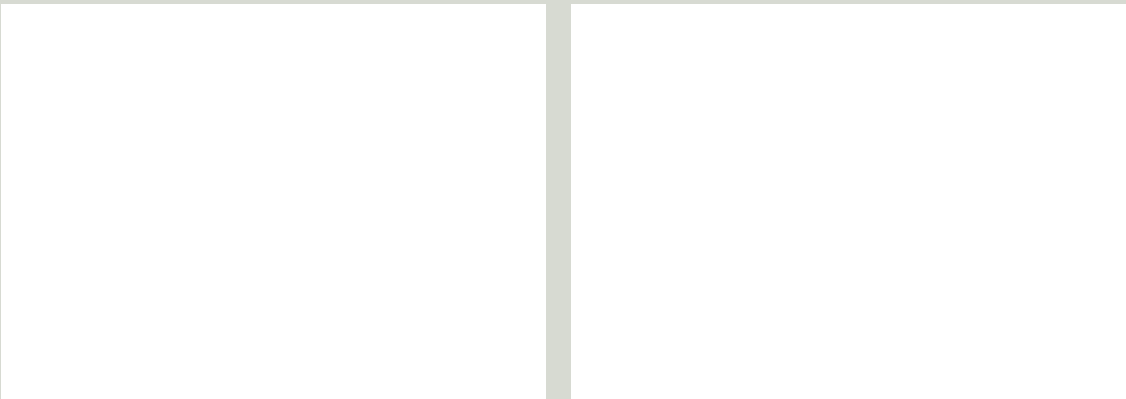
If you live in an old building, you need to have a basic understanding of how it works. You must also make allowances for its age and its character. Old buildings may not reach the same standards as modern buildings in some respects but they make up for that by having qualities that many new buildings do not such as history, character, and craftsmanship.

Traditional building methods have evolved over centuries, using available materials and craft skills to deal with local weather conditions in the best way possible. Traditionally-built Irish buildings are designed to absorb water, whether rainwater or rising damp, when conditions are wet and to allow the moisture to gradually dry out during warmer, drier weather. They do this by using soft, flexible materials, such as lime-based plasters and mortars. They also use timber, which can expand and contract as weather conditions change. These flexible building materials also mean that the building can absorb small amounts of movement; therefore its foundations can be shallower..

Modern buildings, on the other hand, use different methods and materials to cope with their environment. They tend to use hard, brittle materials to repel rainwater from their surfaces. To avoid any cracks appearing in these impervious surfaces, these buildings

need deep, rigid foundations to prevent movement in the structure, and expansion joints designed to absorb any slight movement that does occur.

Both methods of construction are valid and each has its place. However problems tend to arise where the two methods are mixed - particularly where hard, inflexible modern materials, such as cement, concrete, or steel, are introduced into a traditionally-built building. An inflexible cement render applied to an old stone wall is likely to crack. This is because the stone wall is probably bonded with soft lime mortars and standing on shallow foundations. Cracking of render is particularly problematic as water that enters through the cracks cannot escape easily. It will either look for another route out, perhaps through internal wall surfaces causing staining and damaging finishes, or else it will stay within the wall causing rot and decay.



Traditionally-built buildings need to 'breathe', allowing the moisture absorbed during wet conditions to evaporate when the weather is dry. Inhibiting this process by letting trees and other plants to grow up close around a building or using the incorrect materials in repair can cause decay to set in

Problems are likely to occur when strong modern materials, such as Portland cement, are used in combination with softer traditional materials. Hard cement repointing has here caused the original stone to crack as the building has moved and flexed

## Conservation principles

In a sense we look after our historic buildings for those who come after us. Many of these buildings have been around for generations before us and it is our responsibility to hand them on in good condition to allow future generations to enjoy them too. It is important to understand some of the basic principles of good building conservation so that the works you undertake do not damage the special qualities of a historic building. Many of these principles are common-sense and all are based on an understanding of how old buildings work and how, with sensitive treatment, they can stay special.

Before you start, learn as much as you can about your particular building. What is its history? How has it changed over time? Remember that later alterations may be important additions to the history of the building. If the building has been cared for and adapted over the years, each generation of change has made its own contribution to its character. Find out what is special about the building, and how you can protect these special qualities when carrying out works.

### CARRYING OUT MAINTENANCE OR REPAIR WORKS:

- > Do use the experts - get independent advice from the right people
- > Do repair the parts of the building that need it - do not replace them unless they can no longer do the job they were designed to do
- > Do make sure that the right materials and repair techniques are used and that even the smallest changes you make to the building are done well
- > Do use techniques that can be easily reversed or undone - this allows for any unforeseen problems to be corrected in future without damage to the special qualities of the building
- > Don't overdo it - only do as much work to the building as is necessary, and as little as possible
- > Don't look at problems in isolation - consider them in the context of the building as a whole
- > Don't use architectural salvage from elsewhere unless you are certain that the taking of the materials hasn't caused the destruction of other old buildings or been the result of theft

## Getting the right advice

When it comes to repairing a building, regardless of its age or size, it is important to know when specialist advice is needed and where to find the right help. It is a false economy not to get the best advice before having work carried out. Bad repair works can be difficult and expensive to undo. They can damage a building in the long-term and devalue your property.

You will need the right advice for the particular job. Sometimes you will require a craftsman, or an architect, a surveyor or a structural engineer. Sometimes you will need specialist advice from someone with a particular expertise such as a timber decay specialist or a stained glass expert. When undertaking a large or complex conservation and repair project, a multi-disciplinary team may be required. Most importantly, you should ensure that any adviser is independent and objective. Avoid taking advice from someone trying to sell you something, or someone with a vested interest in increasing the scale and expense of work. Many building professionals and contractors are only involved with modern construction and may not know how to deal sympathetically with an old building. You need someone who understands old buildings, has experience in dealing with them, and has trained to work with them. He or she should be knowledgeable and experienced in dealing with your type of building.

When employing a professional adviser or a building contractor, check their qualifications and status with the relevant bodies and institutes first. Ask for references, and for the locations and photographs of recent similar work undertaken. Do not be afraid to follow up the references and to visit other building projects. A good practitioner will not mind you doing this. If you see a good job successfully completed on a building similar to yours, find out who did the work, whether they would be suitable for the works you want to undertake, and if the building owner was satisfied.

Try to get at least three written estimates or quotations for the work from suitable building contractors. Do not make your final choice based on cost alone. The cheapest quote you receive may be from a person who does not fully understand the complexity of the problem. Do not make payments for work until you are satisfied it has been correctly completed.

Be clear when briefing your adviser what you want him or her to do. A good adviser should be able to undertake an inspection of your property, give you a report identifying the causes of damage, make a careful diagnosis of the problem, recommend repairs, specify the work required, get a firm price from a suitable builder or craftsman, and oversee the work on site as it progresses. If your building is likely to need ongoing works over a number of years, your relationship with your adviser and builder will be important both to you and your building, and continuity will be a great advantage. They will be able to become familiar with the property, and to understand how it acts, and will build up expertise based on your particular building.

The Royal Institute of the Architects of Ireland keeps a register of architects accredited in building conservation and will be able to provide you with a list. The Irish Georgian Society maintains a register of practitioners with traditional building and conservation skills. The Construction Industry Federation has a register of heritage contractors. The conservation officer in the local authority may be able to recommend suitable professionals, craft workers, or suppliers in your area.

## 2. Maintenance and repair programmes

### THE MAINTENANCE PLAN

Regular inspections will detect problems. If these are dealt with at an early stage, it will minimise the need for major and expensive repair work. As it is easy to forget to carry out routine maintenance tasks, it is useful to have a maintenance plan for the building. This will remind you of the tasks that need to be done and the parts of the building that should be inspected. It will also help you to make decisions and to control what happens to the building, rather than just reacting to faults as they arise. A maintenance plan can be used to plan short, medium, and long-term maintenance and repair programmes and to budget accordingly. The plan should be checked and updated every year to identify and document changes and potential problems.

### ACCESS

To make the job of regular inspection safer and easier, consider providing a permanent means of access to the areas that will need regular inspection. For example, where possible, provide ladders or folding staircases to attic spaces, provide lighting within roof spaces and access hatches to allow inspection of, and works to, areas such as valley gutters. Externally, duckboards fitted on lead roofs and gutters will avoid damage by foot traffic. Permanent ladders to access roofs will need to meet relevant health and safety standards and should be installed so as not to damage the part of the building they are fixed to. If any of these works are likely to be conspicuous, they may require planning permission. Check with the conservation officer in the local authority first. In the case of large and significant buildings which are likely to require regular programmes of conservation and repair in addition to routine maintenance, the purchase of scaffolding may be a cost-effective solution in the long-term.



Where a building has a complex roof and other high level features that need regular maintenance and repair, providing a permanent means of safe access should be considered

If the building is one of a terrace or group of similar buildings, neighbours could co-ordinate maintenance inspections for the whole group of buildings. This will be particularly useful where a terrace of buildings share gutters and roof valleys. It will help not only reduce the overall costs but may also avoid a situation where one neglected building in a terrace could jeopardise the well-being of the others.



Co-operating with neighbours to co-ordinate the maintenance and repair of a terrace of similar buildings can help reduce costs and protect the architectural coherence of the group

### MAINTENANCE WORKS GENERALLY FALL INTO ONE OF THREE CATEGORIES:

1. Routine or day-to-day maintenance tasks that arise as defects occur such as repairing slipped slates after a storm, replacing broken window panes and clearing blockages from rainwater goods and drainage channels.
2. Cyclical maintenance includes annual or six-monthly works such as clearing gutters, clearing vegetation and debris from roofs, repairing damaged paintwork, cutting back climbing and overhanging plants, and sweeping chimneys in use.
3. Occasional maintenance includes repainting external joinery and ironwork and carrying out minor repair works or works identified in a long-term programme of works.

### DEVELOPING A MAINTENANCE PLAN

The first step in developing a maintenance plan will be to record and document as much past maintenance and repair work as possible. This allows you and/or your advisors to judge whether previous repair work was successful or not. It can also help to identify where there may be patterns of problems. This can be particularly useful as recurring defects are often the result of previous alterations and repairs which have been poorly carried out and have disturbed the integrity of the original construction. Poor previous repairs may have treated the symptoms of a problem rather than addressing its cause.



This poor quality, short-term repair of a broken downpipe, using a piece of lead to transfer rainwater from one part of the downpipe to the other, has already failed and will cause serious damp problems if not put right soon

### Smaller buildings

If the building is a relatively small one, such as a single dwelling, it may be possible to carry out a lot of the necessary maintenance work yourself. Ongoing and regular checks and actions are fundamental to good maintenance. Make a checklist of tasks to do on a monthly, annual, and five-yearly basis. This checklist should be regularly updated and amended to meet changing conditions.

### CARRYING OUT YOUR OWN INSPECTION

To carry out a maintenance inspection yourself you will need suitable clothes, a clipboard, pen and paper, binoculars, a camera and a torch. Inspect the building methodically to avoid missing any part or element. It is a good idea to start at the highest point of the building, usually the chimney stacks, and work downwards through the outside of the building and then systematically inspect the interior, starting in the roof space. Chimney stacks and ridges can be inspected from the ground, or from a neighbouring building or other high point, using binoculars. Do not avoid awkward or inaccessible spaces as it is often in these spaces that problems first show up, but make sure the necessary safety precautions are taken when accessing these. Use a checklist to make sure nothing has been forgotten or overlooked.



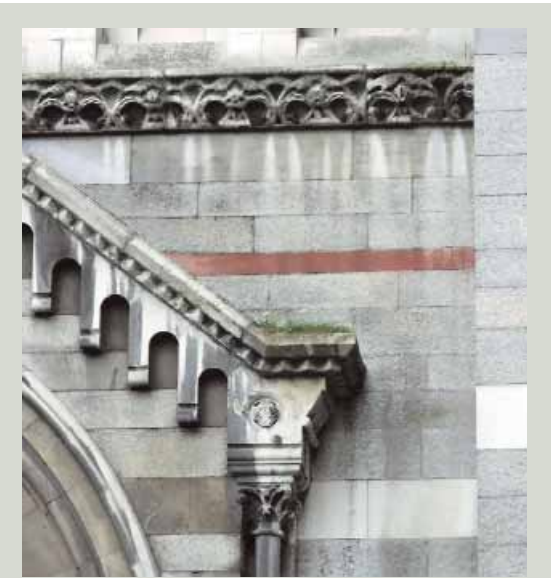
It may be possible to inspect the condition of a roof from an adjacent building



RECORDING THE INSPECTION

Keep a notebook or file to record the date of the maintenance inspection and the works undertaken as a result of it. It is useful to keep a simple record of the weather conditions of the days immediately preceding the inspection. For example, if there has been a period of dry weather in the days before the inspection, some problems with rainwater or damp may not be evident.

Record any items of concern noticed during an inspection even if they do not require immediate attention. This can be very useful in tracking the progress of any decay or damage. For example, if a minor crack is noticed during an inspection, photograph it and record the date. This will make it easier, on the next inspection, to determine if it has worsened and if action is now required.



Parts of a building may be difficult to access and are likely to be neglected for that reason. Plants have begun to take root on this high level decorative detail and should be removed before they cause damage to the fine stonework

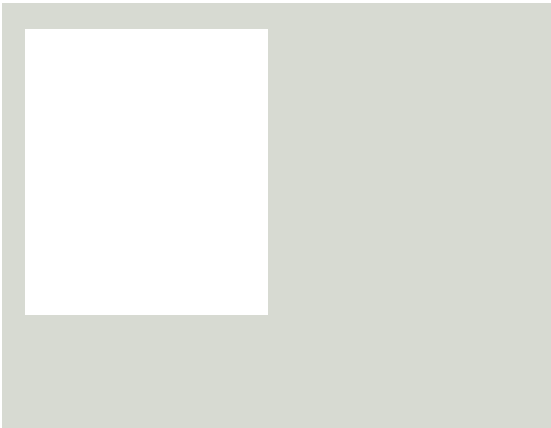
MAKING A MAINTENANCE PROGRAMME

As a result of the inspection decide:

- > **What needs to be done?** Make a list of the defects observed.
- > **When should it be done?** Put the tasks in order of priority. Defects that raise safety issues, suggest structural instability, or that allow water enter the building should be put at the top of the list.
- > **Who will do the work?** Some works can be carried out yourself, but you should honestly ask yourself if you have the necessary skills or the necessary time, if you can do the work safely and if you have the right equipment and materials. Some works may be suitable for a general building contractor to carry out. Other works may require specialist advice before a decision can be made on the best course of action.
- > **How much will it cost?** Remember that correct and regular maintenance costs less in the long run. Ignoring problems until major repair is needed will be both expensive and disruptive.

Larger buildings or complexes of buildings

The maintenance and repair of large buildings such as churches, banks, or institutional buildings is often a more complicated matter because of the size of the building, its height, its architectural complexity, and the consequent cost of scaffolding to access roofs. When dealing with complex buildings or particularly significant ones, it is recommended that the building is surveyed by a professional and a detailed inspection report prepared. If you are in charge of such a building, the necessary funds may need to be raised before undertaking a programme of repair works. It therefore makes sense to forward plan.



FIVE-YEARLY 'QUINQUENNIAL' INSPECTIONS

Good practice suggests that programmes of repair works should take place on a five-yearly basis. Five-yearly, or quinquennial, inspections are generally frequent enough to catch problems before serious damage is caused and yet far enough apart to allow programmes of work to be undertaken and to spread the costs of the works required. Five-yearly inspections leading to programmes of necessary repair works, combined with regular maintenance inspections, should ensure the health and well-being of a building.

WHO SHOULD UNDERTAKE THE INSPECTION?

A programme of work should be based on a thorough inspection of the building or building complex by a suitably qualified historic buildings expert and it is recommended that an architect with an expertise in the conservation of old buildings should be involved. The inspector appointed should preferably have experience of dealing with buildings of the particular type or period in question. It makes economic sense to get the best possible advice from the outset. This is specialised work and mistakes can be expensive to rectify.

PREPARING FOR THE INSPECTION

The inspection should be properly planned to ensure that the inspector has all the necessary information on the building before starting, including any maintenance log-book or other archive that exists. The correct equipment, such as ladders of the correct height and lighting within roof spaces, should also be on hand.

The inspector should be familiar with the history of the building, the relative chronology of any different building phases and any previous repair works or alterations carried out. This will help the evaluation and diagnosis of the cause of defects noticed. The evolution of the structure, and the relative dates of its parts and of previous alterations, often provide clues to persistent problems, particularly with water penetration or structural cracking. These faults most often occur at the junction of different phases of construction.

THE INSPECTION

It may take a day or more to thoroughly inspect a large or complex building and for a proper assessment to be made of its condition. The inspection needs to be methodical to avoid missing elements or spaces within the building. The inspection must also encompass the curtilage of the structure, including any ancillary buildings, boundary walls and railings, and garden features.

THE INSPECTION REPORT

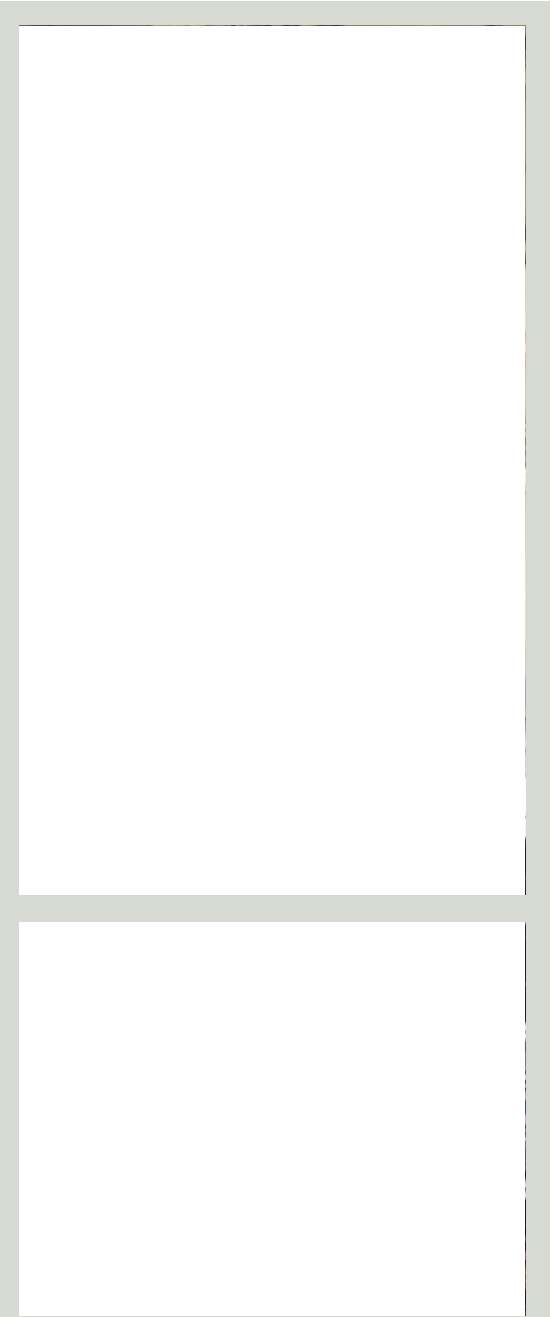
The inspection report should state the name and contact details of the inspector, the date of the inspection and the weather conditions at the time. A key plan of the building cross-referenced to the text will be helpful in locating problems identified. Photographs are a particularly useful way to supplement the findings detailed in the text and are a valuable record in their own right. The body of the inspection report should provide an account of the condition of the building fabric in general and the condition of the different building elements in detail, both internally and externally. It should record any works carried out since the previous inspection, including repair works and alterations. It should draw attention to any areas or spaces that were inaccessible during the inspection. The report should identify problems, formulate conclusions as to their cause, make practical recommendations for action, and set priorities for conservation and repair works. These may be categorised as follows:

- > **Urgent works that need immediate attention**
- > **Work required within 1 to 2 years**
- > **Work required within 5 years**
- > **Desirable work for which there is no particular timeframe**

The inspection report must identify who is to be responsible for each task. It should also include estimated costs, where possible. If further detailed inspections are required, these should be listed. For example, the inspection may reveal a requirement for further specialist advice regarding the conservation or repair of particular parts of the building fabric such as stained glass panels, wallpaper and textile

conservation, heating and lighting installations, fire safety and security enhancement or archaeology. The report may recommend opening-up or investigative works or the monitoring of defects such as cracking. Some building defects may require careful monitoring over a period of time before a decision can be made as to their cause and best treatment.

**Remember that even the best report will do nothing to conserve the building unless it is acted upon.**



*A maintenance inspection report may highlight the need for further specialist advice on issues such as the conservation of historic wallpaper or stained glass panels*

KEEPING RECORDS

Keeping records of maintenance and repair works is an essential part of any maintenance programme and will be particularly important in the case of a building which is not an owner-occupied single dwelling. This is especially important in an institutional building where the care and maintenance of the structure may be entrusted to many different people over time.

The compilation and updating of a maintenance log-book must be done by a designated competent person and made available to anyone undertaking an inspection of the building. The log-book will, in effect, be a case history of the building. It must record: details of all inspections carried out; copies of the inspection reports; the works undertaken as a result of an inspection or otherwise; and the person, craftsman, or company that undertook the work along with their contact details. It should also record the cost associated with works carried out. Other useful information could include comments by the architect and/or craftsman on how the work went, any problems encountered, and any potential for further problems noticed in the course of the works.

MAINTENANCE MANUALS AND MAINTENANCE ROUTINES

Maintenance manuals can be invaluable in ensuring the proper conservation of a building. Depending on the nature of the particular building, they can be complex and sophisticated documents. They may also take a considerable amount of time and expertise to compile.

A maintenance manual can be used to establish a maintenance routine for the building. It can also include a checklist specific to the building, outlining the tasks required. The manual should identify:

- > Specific maintenance tasks required
- > The frequency with which they should be undertaken, for example daily, weekly, monthly, annual or quinquennial routines
- > If relevant, the optimum time of year for different tasks to be carried out.
- > The person or type of person who should undertake each task. Tasks could be broken down into those that require particular trades or skills such as masonry work, and tasks that can be done by unskilled employees or volunteers such as clearing gutters.

**It is essential to the maintenance routine that staff are trained to carry out tasks correctly, from basic housekeeping to minor repairs.**

Some safety issues

GETTING READY

Wear the right clothes when carrying out maintenance or repair works. Wear shoes, or boots, with a good grip. Do not wear clothes with trailing pieces or cords as these may catch and cause you to fall. Heavy-duty gloves, safety goggles, and masks are recommended for clearing gutters and when clearing up bird droppings because of the associated health risks.

WORKING AT A HEIGHT

Carrying out repair works or maintenance inspections at a height is hazardous. If you feel do not feel safe, or are nervous working at a height, then get professional help with the work. Some roofs can be fragile or incorporate fragile elements such as rooflights or skylights. Check the condition of the roof from below before starting work. If it is not possible to access the roof easily or safely, it may be possible to inspect it from a neighbouring building using binoculars.

When working in attic spaces, make sure you have enough light to see what you are doing. Using a headlamp is a good idea as this leaves your hands free. Watch where you tread and do not step on unsupported plasterwork. Avoid moving or handling old cabling, or oil or gas installations - get an expert electrician or technician to advise.

Using ladders is a major safety issue. Avoid working on roofs or on ladders in windy, wet, or icy weather conditions. Do not work alone. Have someone competent with you to hold the ladder. Take care of people below when working at a height to avoid injuries caused by falling or thrown objects. Always use a ladder that is in good condition and of the correct height. Make sure that it is secure and angled correctly with the top resting against a solid surface, not a gutter or a fascia. When climbing ladders make sure you have both hands free. Always work so you can have one hand on the ladder at all times, maintain a good handhold and do not overreach.

With many buildings that are larger or higher than an average dwelling, it may not be safe for an untrained person to carry out even the simplest maintenance or repair tasks. In fact, it is not advisable for any untrained person to work from ladders above one-storey high. If you have a building that is too tall for safe working from a ladder, you should consider installing a permanent, properly-designed means of access to roof level. Some works may require planning permission and you should consult the planning authority first. If it is not possible to provide a permanent means of access to a roof, you could consider hiring, or investing in, a properly-designed mobile scaffold tower or a mobile elevated working platform.

For further information on the safety issues of inspecting or working on roofs, see the Health & Safety Authority's publication: *Code of Practice for Safety in Roofwork*.

WORKING WITH LEAD PAINT

Lead paint was the traditional high-quality finish for timber and metalwork and is extremely long-lasting. Its use continued into the 1960s. These paints used linseed oil as the binder and white lead as the pigment. The appearance of the painted finish ages in a characteristic way which cannot be replicated by modern paints.

There are serious health risks associated with lead paints where a painted surface is unsound or is disturbed. Test kits can be used which give an indication of the presence of lead paint. For absolute certainty as to the presence of lead paint, specialist laboratory testing should be carried out. The fumes created when applying lead paint or burning it off, and the dust resulting from sanding it down are particularly hazardous. Sound lead paint should be left in place and, if necessary, can be sealed by over-painting with a modern paint. If the need arises, it should only be removed and/or reapplied in compliance with all relevant safety standards.

Lead paints are no longer readily available to buy in this country. Their importation can be licensed on application to the Health & Safety Authority for use in certain categories of historic buildings.

### 3. Carrying out a maintenance inspection

Each old building is unique in the way it has weathered or been altered over time. It is therefore important to get to know your building, how it has developed and where the vulnerable areas are that may need special attention in a maintenance inspection. For example, a building may have been previously extended, creating a potential risk for cracking at the junction between the different phases of construction; the presence of large deciduous trees may mean the gutters on one side of a building need to be cleared more frequently than on the other; or extra attention may be required by projecting features, such as timber bay windows, which are more vulnerable to decay.

This section poses some of the questions that should be asked during the course of a maintenance inspection. As you get to know your building better, you will be able to add further notes and details creating your building's own individual checklist.

#### Roofs

The proper maintenance of all parts of a roof will be critical to the well-being of the entire building. Roofs are the first line of defence in preventing rainwater entering a building and they need regular inspection. To work properly, roof coverings must be intact and rainwater goods free of blockage so that they can drain water quickly and efficiently away from the



*The roof provides the first line of defence for the interior of a building against the weather and it is essential it is well-maintained and kept in good repair*

building. Getting access to roofs can be difficult and dangerous and, in the case of tall buildings, it can be an expensive procedure. Many parts of a roof may be relatively inaccessible or hidden from view. A rooftop inspection should be conducted at least once a year; gutters and downpipes should be routinely cleaned twice annually, while blockages of rainwater goods and gullies, and slipped or missing slates should be attended to immediately.

#### WHAT IS THE OVERALL CONDITION OF THE ROOF?

Firstly, stand back and observe the overall shape and profile of the roof. Unevenness and dips in the surface of an old roof may be part of the character of the building. It may be that the movement in the building that caused them took place a long time ago. In this case, it is advisable not to try to straighten the roof. But if there is evidence that deflections are affecting watertightness, or there are signs that the roof structure is continuing to move, the structural integrity of the roof may have been damaged. Immediate action should be taken and expert advice sought to discover, analyse, and repair the cause of the deflections.



*This roof is showing signs of sagging which probably indicates decay or damage of the structure beneath which must not be ignored*

#### IS THERE ANY GROWTH OF MOSS OR LICHENS ON THE ROOF?

Moss can take root in the joints between individual slates or tiles. If allowed to grow unchecked it will force the joints to open up and allow water into the building. Mosses also hold water against the surface of the roof cladding where it can cause deterioration. The growth should be brushed out from the joints, using a non-ferrous brush, and the debris cleared away so as not to block gutters and downpipes, or to take hold on other parts of the building. Pressure hoses should not be used to clear plant growth off a roof as this may drive water into the interior of the building. Lichen and green algae growth are not generally considered to be damaging to slates and tiles.



*Moss growth is likely to take hold on more porous cladding materials such as clay or fibre cement tiles. It must be regularly removed from all roof types as it can force open joints between slates and tiles allowing water into the roof space*

#### ARE THERE ANY BRANCHES OVERHANGING THE ROOF?

It is advisable to cut back any overhanging branches as these will drop leaves and other debris onto the roof which may eventually wash or blow into the gutters and cause blockages. Overhanging branches will also promote the growth of moss on the roof.

#### Slate and tile roofs

#### ARE THERE ANY SLIPPED, DAMAGED, OR MISSING SLATES OR TILES?

Missing or slipped slates or tiles should be attended to immediately. Individual slipped slates or tiles can be fixed back into place using tingles. Tingles are narrow copper, lead, or steel strips or wires which are attached to the fixing batten and hook upwards to support the base of the slate or tile and hold it in place. Broken or missing slates or tiles should be replaced immediately to match the existing ones in terms of size, colour, and thickness.

When carrying out an inspection, or undertaking works to a roof, avoid walking on slates or tiles as this is likely to damage them. Take care that fragile elements, such as gutters and ridge cresting, are not damaged when placing ladders.



*A number of tingles have been used in previous repairs of this roof but the slipping of slates continues, indicating a widespread failure of fixings. As a rule of thumb, where a third or more of slates have slipped the entire roof will require to be stripped and re-fixed, reusing the existing slates where possible*

#### WHAT IS THE CONDITION OF THE SLATES/TILES?

Slate is a natural stone cladding material which is generally very durable. Tiles are made from a variety of man-made materials including clay and concrete and their durability can vary depending on the material and the manufacturing process. Check for evidence of delaminating (flaking) or deteriorating slates or tiles. If deterioration is happening over a wide area of the roof, it may indicate that the slates or tiles are reaching the end of their lifespan or that environmental factors, such as pollution, are causing damage. This will need further investigation.

Never cover slate or tiled roofs in a coating of bitumen or similar material. This may seem to provide a quick and easy solution to the problems of a leaking roof but, as well as being unsightly, in the long-term it may seriously damage the health of the roof by preventing natural ventilation of the roof timbers and battens below. When further leaks occur, it will be extremely difficult to trace their source and the bitumen covering will often prevent the re-use of the original slates or tiles.



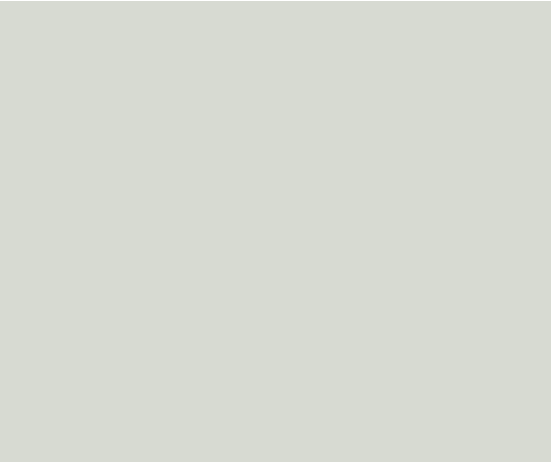


**ARE THE FIXINGS SOUND?**

If there are a significant number of slipped or missing slates or tiles, it may be an indication of an underlying problem with the fixings, or 'nail sickness'. This may be caused either by a failure of the nails or of the timber battens into which they are fixed. In either case, it will be necessary to assess the condition of the entire roof from both inside and out before deciding a course of action.

**ARE THE RIDGE CAPPINGS IN GOOD CONDITION?**

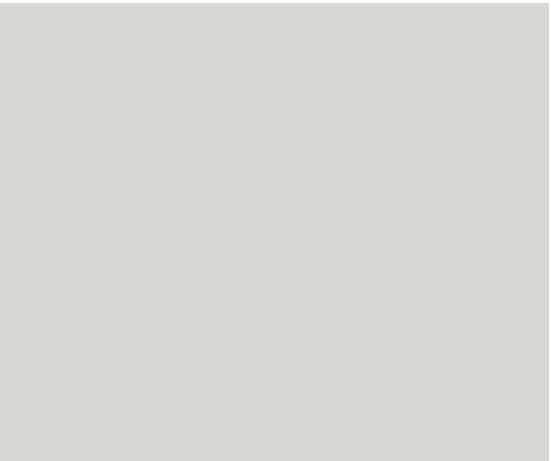
The ridge of the roof may be capped with special tiles, lead rolls or flashings, or metal cresting. These cappings play an important role in ensuring that the building is watertight. Check that there are no cracked or missing tiles or areas of capping. If there are, they should be replaced immediately to match the existing material. Check too that the mortar bedding of ridge tiles is intact.



**Thatched roofs**

**ARE THERE ANY SIGNS OF DECAY IN THE THATCH?**

Look for holes, sagging or excessive plant growth on the thatch. Thatching is a very specialised skill. Take advice and have repairs carried out by a competent thatcher. Repairs must be carried out in matching materials.



**DOES THE THATCH NEED TO BE RENEWED?**

Compared to a slate roof, thatch has a relatively short life-span. It requires renewal on a 10-20 year cycle, depending on the exposure and orientation of the roof and the thatching materials used. The ridge is more exposed and may require to be renewed more often. It is rarely necessary to remove existing thatch fully and usually only the top layers need to be replaced. Localised repairs may at first look bright in comparison with the rest of the roof but will soon weather in. Use the correct materials, for example do not substitute water reed for straw. It is also important to re-thatch in a style appropriate to the type of building and its location, retaining regional characteristics in the details of the roof.

**ARE ANY WORKS REQUIRED TO PREVENT FIRES?**

Keep the roof space clear of old thatch or other combustible materials. Sweep chimneys and flues in use twice a year and at the same time inspect their condition both internally and externally, keeping a lookout for any holes in the flues. It is advisable to install smoke detectors in the roof space and to keep them in good working order. Spray treatments designed to increase the fire resistance of thatch are not always recommended as some can increase the rate of decay of the thatch.

**Flat roofs**

**ARE FLAT ROOFS FREE OF DEBRIS AND DRAINING PROPERLY?**

Traditional flat roofs were clad in sheets of lead, copper, or zinc. So-called 'flat' roofs are not, in fact, completely flat but can have a pitch of up to 15°. Check that the roof falls correctly to the rainwater outlet and that it drains properly. Ensure that there is no build-up of moss or fallen leaves on a flat roof.

**IS THERE EVIDENCE OF INHERENT DESIGN FAULTS?**

Correctly-designed and constructed lead roofs can have a life-span of several hundred years. But not every roof has been correctly designed. With lead roofs, faults may occur where overlarge sheets were originally used or where fixings were incorrectly spaced. As the lead expands and contracts with changing temperatures, it can crack around the fixings or show signs of creep where the lead sheet gradually stretches due to its own weight. Where there is a fault in the original design of the metal sheeting, defects will continue to occur and the best long-term option is to have the roof re-laid to an improved design.

Lighter metal sheets such as copper, may be susceptible to lifting or wind damage. Check that fixings are secure and immediately renew any failed fixings.

**ARE THERE ANY SPLITS OR TEARS IN THE METAL SHEETING?**

Splits, cracks, pinholes, or tears in the roof covering should be repaired without delay. The origin of a leak can be difficult to locate as water entering through holes in the sheeting can travel a considerable distance before showing up internally.

Avoid carrying out short-lived, temporary repairs using mastic or repair tapes. These types of repairs will often create further, more serious problems at a later stage. Splits and pinholes in lead sheets are best repaired with lead patches welded over the damaged area by a competent lead worker. Repairing cracks in lead sheeting with solder can be effective, but only if carried out properly. Both lead-welding and soldering pose a serious fire risk as most traditional metal sheeting is laid on timber supports which can ignite. Ensure that this type of work is undertaken by an experienced contractor who takes all necessary fire safety precautions.

**IS CONDENSATION FORMING ON THE UNDERSIDE OF THE METAL SHEETING?**

Inspect the underside of metal sheeting for evidence of condensation, which can corrode the metal, particularly lead sheeting. Problems will show up in the form of a white bloom on the underside of the lead sheeting, or as white blotches on the outer surface. Avoid direct contact with this white powdery material - it is highly toxic. Wear gloves and a face mask when doing any works that would disturb the lead work. Take steps to eliminate or reduce the condensation, and to provide increased ventilation to the underside of the metal sheeting.

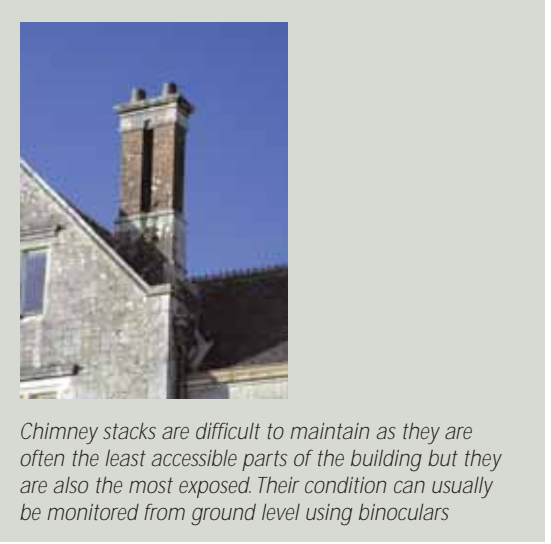
**IS THERE ANY SIGN OF DAMAGE?**

Metal sheeted roofs and gutters can be damaged by foot traffic. Ensure that anyone accessing the roof wears appropriate footwear that will not puncture or otherwise damage the roof covering. If a roof or gutter is likely to receive regular foot traffic, consider installing timber duckboards.

**Roof details**

**WHAT IS THE CONDITION OF THE CHIMNEY STACKS?**

Chimney stacks are one of the most vulnerable elements of a building because of their high exposure. Unfortunately, they are usually the most inaccessible parts. It may be possible to examine them from the ground or from a neighbouring building with the aid of binoculars. If the stack is of brick or stone, examine the condition of the mortar pointing. If it is rendered, check for cracking in the coating. Check also that chimneys pots are securely fixed.



*Chimney stacks are difficult to maintain as they are often the least accessible parts of the building but they are also the most exposed. Their condition can usually be monitored from ground level using binoculars*

ARE THERE ANY LOOSE OR DAMAGED FLASHINGS?

Flashings are narrow sheets of an impervious material, often lead, used to cover the junction between different materials or elements of a building to prevent water penetration. They play a very important role in ensuring that a roof is watertight. Check for damaged or slipped flashings where the chimney stack meets the surface of the roof. This junction may instead have been sealed using fillets of mortar and these should be checked for any cracking or missing sections. If repairing or replacing these fillets, use a soft lime-based mortar rather than cement.

Check for loose or damaged flashings in other areas: behind parapet walls, in valley gutters, along the verges of the roof, and around features like dormers and rooflights. Refix any loose lengths of flashings securely. Replace any missing or damaged lengths in a matching material.

Rainwater disposal

IS THE RAINWATER DISPOSAL SYSTEM WORKING PROPERLY?

The best way to check if the rainwater system is working correctly is to take an umbrella and walk around the building during heavy rainfall to spot if gutters or hoppers are overflowing, if joints in the downpipes are leaking, if gullies are blocked, and if soakaways and French drains are draining effectively. Make sure that gutters are sloping the correct way towards the downpipe, and not overflowing at the ends, wetting the wall below and softening the ground around its base. Ensure that gutters and downpipes are adequately fixed and that gutters do not sag between brackets, particularly when full of water.



*Inspecting a building during, or immediately after, a downpour can be a useful way to discover defects in rainwater goods. In this case, it is easy to spot the location of a leak in the gutter*

ARE THERE ANY BLOCKAGES?

Check that gutters and downpipes are working efficiently. Pay particular attention to the joints in the pipes. Plants growing out of joints or on walls behind downpipes indicate that there are problems with blockages or leaks. The presence of efflorescence (a bloom of white salts deposited on the surface) and discolouration of the wall surface may also indicate localised saturation. Swan-neck connections between gutters and downpipes are particularly prone to blockage. Blocked downpipes are susceptible to frost damage as the trapped water can split the downpipe in freezing weather.



*Leaking joints and missing sections of downpipe are relatively cheap and easy to fix if attended to promptly. When defects are not remedied, they lead to serious problems which are expensive to repair and involve the loss and disruption of parts of the building fabric*

Litter, leaves, and plant growth in gutters, hopper heads, gullies, and drains should be removed regularly. This operation needs to be carried out at least twice yearly, once in the spring and again in late autumn after the leaves have fallen. Pay special attention to clearing blockages in valley gutters. Valley and parapet gutters tend to be forgotten as they are rarely visible from ground level and are difficult to access, but it is essential that they are kept clear of blockage.

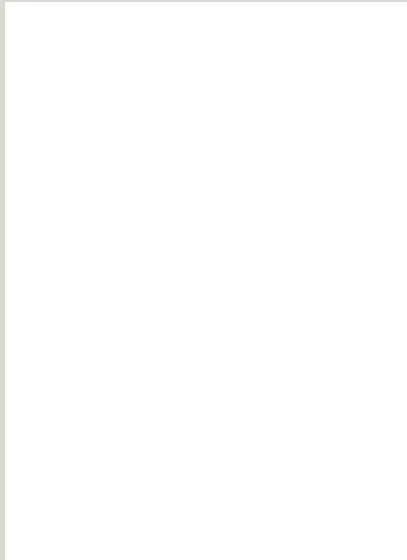


*The staining of the stone wall behind this downpipe joint suggests there is a blockage inside the pipe. If the water trapped inside freezes in cold weather, it may burst the pipe*

If the building is located in an area prone to heavy falls of leaves, consider installing leaf guards. These are non-ferrous, often copper, wire balloons that simply sit into the hopper head and prevent the outlet becoming entirely blocked with debris.

WHAT IS THE CONDITION OF THE PAINT FINISH ON IRON GUTTERS, DOWNPIPES, AND HOPPER HEADS?

Ensure that the paint finish on iron rainwater goods is kept intact and is regularly and frequently renewed. Lead gutters, hopper heads, or downpipes should not be painted. Inspect the condition of the paintwork and, if there are chips or other defects in it, repair them as soon as possible to prevent corrosion. Paint should be worked into all joints in the ironwork to ensure that there are no gaps left which would allow water to reach the iron surface. Do not paint over rusted iron but clean off the rust first and prepare the surface properly before repainting. If the rust is particularly extensive, removing it will be a specialist task. Get advice as to the best approach to take. When repainting, take particular care to paint the back of downpipes. This can be an awkward task but is necessary to avoid rusting and deterioration of the ironwork. Protect the adjacent wall surface from paint. If any paint does get splashed onto the wall, remove it immediately and do not let it dry and harden onto the wall, as it will become more difficult to remove without causing damage.



*Iron rainwater goods such as gutters, hopper heads and downpipes are extremely long-lasting if given regular and frequent painting to prevent corrosion. Where they have already started to rust, the iron should be properly prepared before repainting*

DO ANY SECTIONS OF THE RAINWATER GOODS NEED REPLACEMENT?

Repair or replace any defective sections as soon as possible on a like-for-like basis with sections that match the existing in terms of materials, size, and profile. The use of plastic, extruded aluminium, or galvanised steel rainwater goods should be avoided on a historic building. They are often visually unacceptable. They also move excessively as they warm up or cool down, causing the joints to leak. They tend to sag between fixings and degrade in sunlight, and are easily damaged by ladders or other impacts. Where the building is a protected structure or is located within an architectural conservation area, the substitution of cast iron with plastic or extruded aluminium rainwater goods is unlikely to be considered acceptable.



*The end of this replacement gutter has not been properly fixed and has begun to sag with the weight of water trapped in it. Already the wall has been stained and there may be further damage if the saturation continues*



## External walls

External walls generally do not require the same degree of maintenance as roofs and rainwater goods, but it is necessary to keep an eye out for the types of problems that may build up over a number of years. Regular tasks include monitoring any cracks, checking the condition of the mortar pointing between bricks and stones themselves, and the condition of any plaster, render or paint coatings. It is also important to ensure that traditionally-built walls are allowed to ‘breathe’ and are not allowed to become saturated.

### HAS EARTH BANKED UP AGAINST THE BASE OF WALLS?

Clear soil, leaves, and litter from around underfloor vent grilles. Make sure that planting beds have not built up against the face of the wall to the extent that they could allow moisture into the upper levels of the walls and into the interior.

### IS THERE ANY PLANT GROWTH ON OR AGAINST THE WALLS?

Regularly clip back climbing plants and hedging growing against the building. Ivy and other climbing plants, which cling to the wall can damage it. Plants such as ivy and buddleia are particularly destructive as the roots penetrate deep into joints and crevices. As the roots grow, they force gaps to widen and open up the core of the wall, or even the interior of the building, to water penetration.



*The mortar filling, or pointing, between brick or stones decays over time and needs renewal. This generally does not need to be done over an entire wall but can be confined to the areas that need it*

Remove excessive plant growth growing on external walls. While they can be seen as an attractive feature, even plants whose roots do not deeply penetrate a wall can be detrimental to the building's health and well-being. They will hold water against the wall surface, cause discolouration and can conceal cracks and other faults in the wall. They can also penetrate

window frames and, if unchecked, will eventually block gutters and hopper heads. Plants with roots embedded in the wall, like ivy, should be killed off using an appropriate herbicide before being removed. Otherwise there is a danger of damaging the wall by pulling stones or bricks loose.

### WHAT IS THE CONDITION OF THE POINTING?

Check the condition of the pointing, or mortar filling, between stones or bricks. Traditional mortars are lime-based and soft; they drain any rainwater absorbed by the wall back out to the surface where it will evaporate. The pointing in the joints should be designed to decay faster than the brick or stone of the wall itself and will need renewal at intervals over the lifetime of the building. If the pointing needs replacement or repair, the work should be done in a suitable lime-based mortar. Cement-based mortars, and lime mortars that contain some cement, are hard and brittle and not suitable for use in a traditionally-built building as they prevent the water draining out through the joints and force it into the brick or stone, causing decay.



*All plants growing against external walls should be clipped back regularly to avoid blocking gutters and concealing defects in the wall behind*

### ARE ANY CRACKS VISIBLE?

Any cracks in external walls should be carefully monitored. Some may have come about as a result of settlement of the foundations when the building was first built or was altered. Some cracks only exist within the external render and may have occurred as the render was drying out. Such cracks may not be serious and may simply require filling.

Where there are deep cracks in external walls, particularly those that are continuing to widen, these may have a more serious root cause which should be identified and dealt with before further damage is caused. Seek specialist advice from a structural engineer with suitable conservation expertise.



*Dealing with structural cracking in walls requires specialist advice. Cracks can be successfully repaired once the cause of the structural movement has been identified and the problem solved*

### IS THERE ANY SIGN OF DECAY OF BRICKWORK?

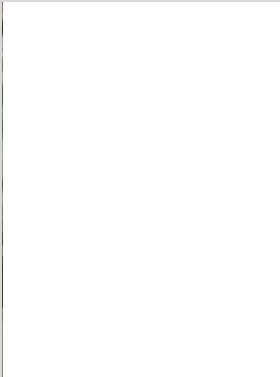
Look for signs of decay in the brickwork of a wall. Brick is generally a durable material but older bricks were handmade and fired at relatively low temperatures with the result that they are softer and less durable than the bricks that were made under more industrialised conditions from the second half of the nineteenth century onwards.

Check for salts deposited on the surface of the brickwork. These are caused by dampness within the walling which dissolves salts present within it. As the moisture evaporates, the salts are deposited on the surface creating a white bloom known as efflorescence. Efflorescence in itself is harmless and can be brushed off using a non-ferrous brush, but it is a sign of excessive dampness within the wall and should be investigated. Similarly, plant growth like moss or algae on the surface of brickwork is an indication of saturation which should not be ignored.



*A white bloom of salts deposited on the surface of a wall, known as efflorescence, usually indicates saturation of the wall. In this case, the problem is almost certainly associated with the rainwater downpipe and needs immediate action to investigate the cause of the problem and to solve it*

Avoid painting over decayed brickwork. It may seem an easy way to improve the appearance of an unsightly wall in the short-term, but it will cause the brickwork to decay faster because the moisture, when trapped, cannot evaporate. If paint is applied it will be very difficult, and expensive, to remove. If there are particular reasons why a wall must be painted, then a traditional limewash, which can be coloured if necessary, may be a suitable solution. Seek the advice of the conservation officer in the local authority before deciding on a course of action.



*Painting brickwork or stonework as a short-term solution to cover over defects is not advisable. Applying impermeable paints will make most problems worse and the coatings are difficult, or impossible, to satisfactorily remove later without damaging the wall beneath*

**IS THERE ANY SIGN OF DECAY OF STONEMWORK?**

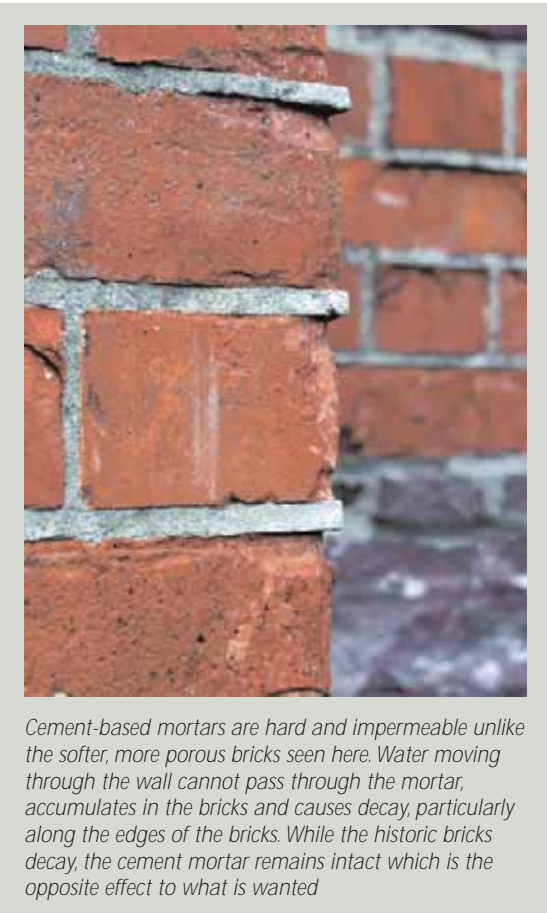
Check for signs of decay in the stonework. Decay can come about for a variety of reasons. It can be the natural decay caused by the exposure of soft or vulnerable stone to the elements. It can also come about because of poor, or misguided, original craftsmanship, such as bedding the stone incorrectly, or the use of iron cramps to hold the stones in place. Sometimes the original stone was of inferior quality or is porous. Stonework can also decay from environmental conditions such as pollution. Analysing the causes of stone decay is a specialised job. Seek expert advice on what is causing the decay and how it should be treated.



Check for any signs that the stonework is damp or saturated and take action to find the source of the moisture and eliminate it. As with brick walls, do not paint decayed stonework in the hope of a quick-fix solution as this will only exacerbate the problem and the paint will be difficult, if not impossible, to remove successfully. In particular cases, applying a traditional limewash may be a suitable solution. Seek the advice of the conservation officer in the local authority before taking action.

**IS THE EXISTING MORTAR CAUSING PROBLEMS?**

The use of cement-based mortars to repoint brickwork or stonework can cause decay by allowing the brick or stone to become saturated by trapped water. This will first show itself in a darkening of the brick or stone around the joints where the water lodges. In more severe cases, parts of the face of the wall may begin to spall off. Get expert advice on what is causing the decay and how it should be treated. Removing cement mortar, where it is causing problems, is a specialised task that should be undertaken by experienced craft workers to avoid damage to the brick or stonework.



**DO THE WALLS NEED TO BE CLEANED?**

The cleaning of brick and stonework is specialised work which should only be done by experienced contractors under expert supervision. Cleaning of brickwork is rarely necessary except for aesthetic reasons. Some types of stone can benefit from cleaning where dirt and other encrustations are causing damage. Expert advice will be needed.



*Some types of stone cannot be cleaned without unacceptable damage while other types may benefit from the removal of damaging soot deposits. It is important to get independent expert advice before undertaking a stone cleaning project*

It is not advisable to use a power hose on the exterior of an old building unless it is in the hands of a specialist. High-pressure washing can force water into the fabric of the building through small cracks or fissures, or can simply saturate soft building materials such as timber or lime renders. In the short term this can produce damp patches inside the building as the water tries to escape from the wall. In the long term more serious problems can result from saturating the building fabric, such as insect or fungal attack on timber and decay of renders. During the winter, cycles of freezing and thawing can open large cracks in the saturated wall; these in turn allow more moisture into the building.

**WHAT IS THE CONDITION OF THE EXTERNAL RENDER AND LIMEWASH?**

Check external render for cracks, which may allow moisture to enter behind the coating. Loose areas of render can be located by tapping. A hollow sound will indicate where the coating has become detached from the wall behind. The detached area can be cut out and new render patched in.

If a wall requires complete re-rendering, do not allow the new coating to surround the downpipes. Make sure a gap is left around all pipes to allow for repainting and the repair of any future leaks.

Limewash is the traditional finish for soft, lime-based render coatings. Where the external walls are finished in limewash, it should be renewed regularly in multiple layers. As a rule of thumb, one coat of limewash will last approximately one year, depending on the exposure of the location.

**IS THE PAINT RIGHT FOR THE WALL?**

Never apply so-called 'waterproof' coatings or sealants to the external wall surfaces of an old building. These weather badly and cannot guarantee a fully waterproof cover. Any water that does get in through small cracks in the coating cannot easily get out again and will remain trapped in the fabric of the wall to cause decay. Also, many of these coatings trap dirt and other airborne pollutants.

**Windows and doors**

The majority of historic windows and doors are made of timber although some are of metal or have metal parts. The maintenance tasks associated with windows and doors will involve ensuring they remain weathertight and operational and that the different materials of timber or metal, glass and putty are kept in good condition. Other external timber elements of the building should be included in the maintenance inspection.

**IS THERE ANY EVIDENCE OF DECAY IN TIMBER WINDOWS AND DOORS?**

Check for timber decay, particularly in the sills and bottom rails of doors and windows as these are the more vulnerable parts and most likely to show signs of decay. Rotten or damaged timber should not necessarily be seen as a reason to replace a historic door or window. A good joiner will be able to cut out the damaged section and splice in a new piece to match. If the building is a protected structure or is located in an architectural conservation area, planning permission will generally be required to remove an early or original window or door. Check with the local conservation officer first.

If windows or doors, or other external joinery elements, show signs of rot other than in the sills or bottom rails, it is essential that the root cause of the problem is identified and solved. There is little point in carefully repairing a decayed window or door if the cause of the problem is allowed to continue.





*Flaking paint must be sanded or rubbed down to a sound surface before repainting. Where there are panes of historic handmade glass, care will be needed to avoid damaging them in the process*

#### IS THERE ANY EVIDENCE OF RUST OR DECAY IN METAL-FRAMED WINDOWS AND DOORS?

It is essential to protect metal window frames and door frames from rust. This is best done by maintaining the paint finish in good condition and regularly renewing it. Inspect the condition of the paintwork. If there are chips or other defects, repair them as soon as possible to prevent corrosion. Do not paint over rusted metal but clean off the rust first and prepare the surface for repainting. If the corrosion is particularly extensive, removing it will be a specialist task. Get specialist advice first as to the best approach to take.

#### ARE THERE ANY GAPS AROUND THE EDGES OF WINDOWS AND DOORS OR OPEN JOINTS IN THE TIMBERWORK?

Open joints in timberwork, or between timber and the surrounding masonry, can fill with water and cause rot within the timber frame. Open joints between the frame and the wall should be filled with an appropriate mastic filler to prevent decay.

#### WHAT IS THE CONDITION OF THE PAINTWORK?

Check for damaged, blistering, or flaking paintwork on windows, doors, and all other external joinery. Paint finishes on external joinery are not just decorative but provide essential protection for the timber against the elements. Paint finishes on both timber and metal frames must be kept in good condition and renewed approximately every 3-5 years, depending on the exposure and orientation of the window or door. Paintwork on south-facing windows and doors will deteriorate more rapidly and require more regular renewal.



*Traditionally, most external joinery was painted not just for decoration but as an essential part of its weather protection. The paintwork requires regular and frequent renewal*

Before repainting, carry out all necessary filling, splicing, repair, re-glazing, or re-cording of sashes. Remove dirt and grease by washing down the paintwork and rinsing off. Sand or rub down the existing paint to a sound surface and brush away all resulting grit. It is rarely necessary to strip paint down to bare wood. Doing so would remove evidence of original or historic paint schemes. Also, if there are likely to be coats of lead paint in the lower layers, sanding would be a health hazard.

Profiled paint scrapers can be used to remove paint layers from mouldings such as glazing bars. Avoid the use of hot air guns to remove paint unless used by an expert. These have the potential to cause damage to historic glass if used at the wrong temperatures. The use of a blowlamp or torch to 'burn off' existing paint poses a very serious fire hazard to an old building and should be avoided. Historic joinery should never be dipped or soaked in caustic baths to remove paint. This process will damage the timber, open up the joints,

and cause cracking. If using warm air strippers or chemical paint removers it is important to ensure that they are suitable to the type of paint to be removed, and to the substrate, and that the manufacturers' instructions are followed carefully.

Protect surrounding stonework and brickwork from paint and paint splashes. Protect historic glass and door and window furniture, like handles, hinges, and sash fittings. Never paint the edges of the stiles of sashes, sash cords, pulleys or weights, or any other moving parts of a sash window. Painting these parts can cause sticking.



*All external joinery, not just windows and doors, requires regular repainting. There may be other external timber elements that need attention including the bargeboards that trim the gable ends of a roof*

#### WHAT IS THE CONDITION OF THE PUTTY?

Putty will start to deteriorate if its paint cover fails. The putty will then dry out and, when it does, small cracks may allow water to enter. The paint cover should be renewed every 3-5 years, depending on the exposure of the glazing. Check the condition of all putty during the annual inspection of the building. Where the glass is historic or fragile, it may be damaged by removing the existing putty. Sound older putty that has some cracks can be repaired by applying a slurry of new putty, thinned with boiled linseed oil, and working this into the cracks.

#### DO THE EXISTING WINDOWS RATTLE OR LET IN DRAUGHTS?

Draught proofing measures, which maintain a seal around the edges of the window frames or around the individual sashes in a sash window, can be discreetly introduced. There are specialised companies who overhaul, repair and draught-proof historic windows. A draught-proofing of historic windows by an expert will stop draughts, prevent rattling in windy conditions, and enable sashes to slide more easily.

#### DO THE WINDOWS OPEN AND SHUT EASILY?

Open and shut all windows during the inspection to check for sticking, loose hinges, and other defects. Sash windows in particular can be prone to sticking. This may be caused by a build-up of paint layers over many years and can be treated by sanding down the excess layers of paint.

Check that sash cords are not broken or frayed. If the cords need renewal, this will involve the dismantling of the sash window. Dismantling a historic window is delicate work and should be done by an experienced person. The work will require particular care where there is historic glass present in the sashes.

#### DO THE DOORS OPEN AND SHUT EASILY?

Open and shut all doors during the inspection to check for sticking, loose hinges, and other defects. Check the condition of the hinges and repair them as necessary rather than replace them. Hinges should be oiled at regular intervals. Timber doors will expand and contract depending on the moisture content of the air. If a door is sticking, wait until dry weather before deciding if remedial action, such as sanding it down, is necessary.

ARE THERE ANY BROKEN OR MISSING GLASS PANES?

Broken and missing panes must be replaced as soon as possible. As well as allowing water to enter, they can make a building look derelict and uncared for, and may invite vandalism. Panes with hairline cracks however, should not automatically be replaced particularly if they are of historic glass as these are irreplaceable and should be kept. This hand-made glass has imperfections such as bubbles, undulations and tints that give it character and which cannot be replicated by modern industrially-produced glass. Do not replace historic or decorative glass without specialist advice. Where replacement glass is required it will be important that it matches the panes around it, not only in terms of texture and colour but also in thickness as using a thicker pane of glass may affect the balance of a sash window.

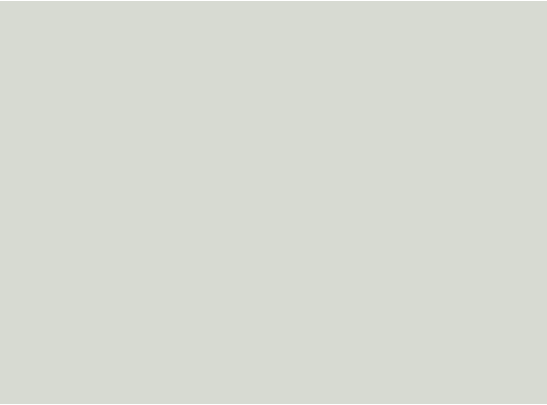


ARE EXISTING REPLACEMENT MATERIALS CAUSING DAMAGE?

In addition to being visually undesirable, the use of impermeable and inflexible elements such as aluminium or uPVC windows and doors can cause damage to a traditionally-constructed building by inhibiting ventilation of the interior rooms and by obstructing moisture movement within the fabric. They are also unable to absorb minor deflections or movements in the building fabric and may crack and warp, allowing water into the interior. If the building is a protected structure, the use of these materials is unlikely to be granted planning permission. If they already exist in the building, their effect should be monitored and, if necessary, they should be replaced with materials more appropriate to the age and style of the building.

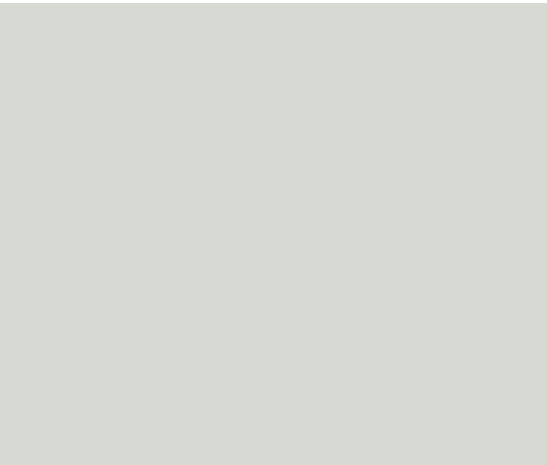
ARE FLASHINGS OVER PORCHES, CANOPIES, AND PORTICOES IN GOOD CONDITION?

Flashings protect the junction between a porch or canopy and the wall of the building and prevent water from entering. Check that no flashings have blown off or slipped, and replace or refix them where necessary. Sometimes the original design may not have included a flashing. If there is evidence of damage occurring as a result (such as evidence that the surrounding wall is being soaked), a new, properly designed flashing should be installed.



ARE FANLIGHTS AND SIDELIGHTS IN GOOD CONDITION?

Check for broken panes, leaks, or damaged frames. In particular, the bottom rail of the frame should be inspected for timber decay. Panes of glass with hairline cracks should be left in place. Fanlight repair is a specialist task and should preferably be carried out in situ but in some cases, particularly where there is structural damage, it may be necessary for the restorer to remove a fanlight to the workshop for repair.



WHAT IS THE CONDITION OF ANY LEADED GLASS PANELS?

The repair of leaded panels of stained or painted glass is also specialised work which should be left to experts. Check leaded glass panels for corrosion of the metalwork or buckling of the panels. Cracked panes should not be replaced but repaired by a specialist. Never wash painted glass windows as this can damage paintwork.

Interiors

Inspect the interior of the building in a methodical way to ensure no areas are missed. For example, start the inspection in the roof space and work downwards through the building, inspecting the rooms and spaces on each floor in a clockwise direction. Pay particular attention to the less-used spaces of the building such as roof spaces, basements, and cellars, as these are often where defects first show up. Ensure that these underused rooms and spaces are kept adequately ventilated to prevent problems with damp.

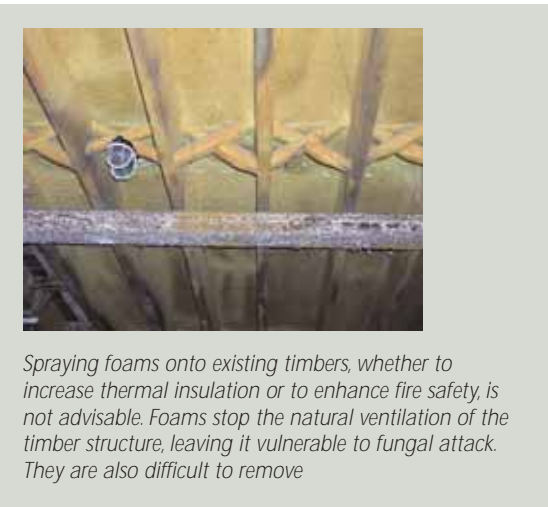
Try to keep the interior of the building at a constant temperature and relative humidity to avoid timber joinery drying out and its joints opening up. Relative humidity is a measurement of the amount of moisture the air holds compared with the maximum amount it could hold at that temperature. Changes in relative humidity can have a significant effect on organic materials such as timber, leather, and fabrics. Steady environmental conditions will benefit valuable contents such as furniture and fabrics as well as the building itself.

Cleaning is an important aspect of the maintenance of a historic interior. Use the correct cleaning method and materials for the different parts and surfaces of the building. Follow the manufacturer's instructions carefully. Many modern solvent-based cleaning fluids can damage fragile historic finishes while some materials and finishes can even be damaged by simple water washing.

WHAT IS THE CONDITION OF THE ROOF FROM THE INSIDE?

Check for signs of any leaks and trace where they originate. If the source of the water is thought to be rainwater, it may be easier to locate the leak from outside the building, during a heavy downpour. Alternatively, check if the water could be coming from a leaking pipe or tank. Insulate water pipes in roof

spaces or other exposed places where they would be liable to freezing and bursting. Insulate water tanks to the top and sides but leave the insulation off the underside of the tank to prevent the water freezing. Never apply spray-on insulating foam to the underside of a traditional roof. This will prevent ventilation of the roof timbers and lead to decay of the timber and potentially of slates too.



Check for any signs of insect and fungal attack on roof timbers. If the roof space has been insulated, make sure that the insulation is not blocking vents at the eaves or ridge and that there is a good flow of air through the roof space and beneath the slates.

Old roofs are often used by bats. Bats, together with their breeding places and resting places, are protected by legislation. If you suspect that there are bats living in, or using, a roof space, you should get advice from the National Parks and Wildlife Service on how to time and organise inspections or works in the roof space to avoid disturbance.

WHAT IS THE CONDITION OF THE WALLS AND PARTITIONS?

Check the inside faces of all external walls for loose or flaking plaster and paint, and for patches of mould or damp. Where damp patches or encrustations of salts have appeared on wall surfaces, do not simply paint over them to cover them up. This will only build up problems for the building in the medium or long term. First identify where the water is coming from and cure the root problem rather than just treat the symptoms. Remove any salts that have appeared on internal wall surfaces by brushing them off with a non-ferrous brush.



Check internal walls for cracks. Some may have occurred a long time ago and will simply need filling, but deep cracks in structural walls should be carefully monitored and action taken if they appear to be widening.



*Neglect and lack of roof maintenance over a number of years have allowed water into the interior of this fine building. Redecoration will be pointless until the building is watertight again and the water already in the fabric has been given time to dry out*

#### WHAT IS THE CONDITION OF THE CEILINGS?

Traditional ceilings were made of laths of timber nailed to the floor joists above and then plastered over. Decorative plasterwork cornices were often then fixed around the edges of the ceilings. Alternatively, cornices were made in situ with wet plaster formed into shape by a running mould.

Ceilings on the top floor may display signs of water damage if the roof above is leaking. Damp patches on ceilings of the lower floors may be caused by leaking pipes in the floor space. It is important to identify the cause of any damp and to cure the problem. Untreated problems can lead to the ceiling joists and plaster laths becoming saturated and susceptible to insect or fungal attack.

Inspect ceilings for evidence of sagging or cracks. Sagging may be a sign that a lath-and-plaster ceiling has become detached from the structure above, either because of failed fixings or decayed laths. If the ceiling is of decorative plasterwork, it is particularly important that any refixing should only be done with specialist advice.

Fine or hairline cracks in a ceiling are rarely a cause for concern. They can be filled but should be monitored from one inspection to the next to see if they widen or become more widespread. Deep cracks or ones that appear suddenly should not be ignored and advice should be sought from an architect or structural engineer with suitable conservation expertise. Ceiling cracks may indicate that the floor above is overloaded. If there is an item of heavy furniture or equipment above, this may be the cause of the overloading and it should be moved to an alternative location. A recent change of use of a building may have resulted in overloaded floors.



*Plaster ceilings are vulnerable to the failure of their backing materials. In this unusual example, bunches of reeds, rather than timber laths, were used as a base for the plaster finish. The reeds have failed due to flooding caused by a leaking roof above and part of the ceiling has collapsed*

#### WHAT IS THE CONDITION OF THE FLOORS?

Floors and floor finishes are generally subject to more wear-and-tear than any other internal finishes. Valuable floor surfaces such as timber, stone, or antique carpets, can be damaged by foot traffic and must be protected in vulnerable spots using mats. If the building is surrounded by gravel or sharp stones, the provision of a mat or grid outside the entrance will greatly reduce the wear-and-tear of floors, caused by small stones being carried in and around the building on the soles of shoes.

Check timber floors for any dips or areas of excessive springiness. This could be an indication of rot or weakness in the floor joists which needs immediate attention.

Where there are stone-flagged floors, remember that these need to 'breathe'. Avoid sealing the surfaces of the stone floors with wax or oil. Not only will sealing damage the stone but may also change the colour and character of the flooring. Check the condition of the pointing between flags and stones and repair this where necessary. Damaged pointing will collect dirt and dust and also trap water. Do not fill the joints between the flagstones with hard, impervious cement mortars.



*Stone flags in basements were often laid directly on the earth below. It is essential that their surfaces are not sealed or the joints between flags filled with cement as this will trap moisture in the stone and cause decay*

Stone, brick, or timber floors should be washed using as little water as possible and dried off immediately afterwards to avoid soaking the floors and mobilising the movement of damaging salts.

#### IS THE INTERNAL JOINERY IN GOOD CONDITION AND IN GOOD WORKING ORDER?

Check that internal doors open and close easily without putting undue pressure on the hinges, frame and handles. Window shutters must be inspected to ensure they are in good working condition. Damaged elements can be repaired by piecing in new timber rather than replacing the entire element. Check joinery and timber furniture for signs of furniture beetle (or woodworm) attack. Active attack should be obvious from fresh deposits of wood powder around new holes in the timber. There are a number of proprietary products on the market which can be used to treat beetle attack. Choose a suitable one for the particular situation and follow the manufacturer's instructions carefully. Remember that indiscriminate spraying may have adverse consequences such as killing off the insects' natural predators too, such as spiders, and may also have potential consequences for the health of the occupants of the building and any pets.



*Furniture beetle, or woodworm, is attracted to timber with a high moisture content. The presence of active furniture beetle can be detected by the appearance of small piles of fresh timber dust from early spring onwards*

#### DO ANY DECORATIVE FINISHES NEED ATTENTION?

Some historic interiors contain a variety of materials in their finishes, each of which has different needs as regards cleaning and maintenance. Using the correct cleaning materials for each surface is important. Do not use the same cloth to clean a number of different surfaces in turn, as the cleaning material required for one type of finish may damage the next one. Have separate cleaning cloths or brushes for each element or surface finish.

If the building has important decorative finishes, get expert advice on how to clean and maintain them and incorporate this advice into the maintenance manual as appropriate. Some finishes should not be cleaned without expert advice. For example, types of gilding can be washed off if water is used to clean the surface. A marble finish should never be washed, as any liquid applied to it may drive stains and dirt further into the marble. Some stains on marble can be removed by specialised poultices.



*Some buildings have elaborate interiors that include a range of different materials and finishes. It is essential to understand how best to clean and maintain each particular surface*

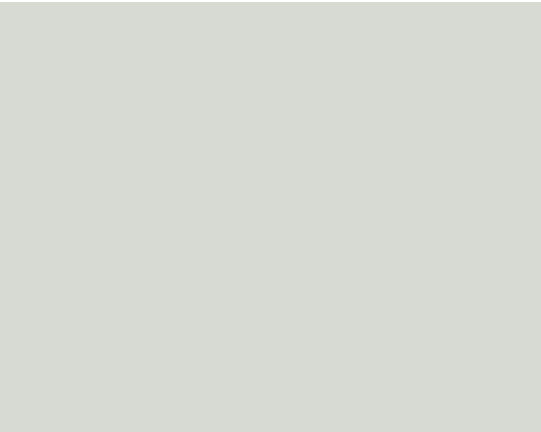
**ARE THE BUILDING SERVICES IN GOOD WORKING ORDER?**

The service installations in the building may not be of historic interest but must be correctly maintained and kept in good order to avoid damage to the rest of the building. This could range from relatively minor problems such as leaking pipework to catastrophic damage from fire or major flooding. Check the service installations regularly as part of the regular maintenance inspections.

Chimneys and flues that are in regular use should be swept annually. Boilers should be serviced regularly. Check all pipework, including radiators, for leaks. The electrical installations should be checked regularly by a qualified electrician. Some buildings may have relatively old wiring which may require upgrading to modern standards. Ensure that there are smoke detectors fitted in strategic locations and that they are kept in good working order.

**Outside the building**

A maintenance inspection should not just be confined to the main building but should also include any outbuildings. The inspection of outbuildings should follow the same principles as the inspection of the main building. Other features on the site, such as boundary walls and railings, gates and gate piers, and hard landscaping features like paving, steps, terraces, and patios should not be forgotten. If the building is a protected structure, the features in the curtilage of the site are also legally protected so it is important to keep them in good condition.



**IS RAINWATER LODGING AROUND THE BASE OF THE BUILDING?**

Check that any paving around the building is properly angled so that water is drained away from the base of the external walls. Often damp problems in external walls are caused when rainwater is allowed to gather at the base of the walls or, in some cases, is even directed towards the wall rather than away from it. Hard surfaces also encourage rain to splash back against the wall thus soaking it. If there are problems noticeable at the base of the external walls, consider removing hard paving from the area immediately around the building and replacing it with a free-draining material such as gravel or earth, making sure that the finished level is below the level of the internal floor, preferably at least 150mm below floor level.

If damp is a particular problem, consider installing French drains around the building. However, if the building is in or near a site of archaeological significance, contact the National Monuments Section of the Department of the Environment, Heritage and Local Government for guidance before undertaking any subsurface work.

**ARE THE RAINWATER GULLIES DRAINING PROPERLY?**

Check that these are clear of debris such as leaves or litter and that water discharging into them from rainwater pipes flows away quickly and efficiently. Inspect them during or immediately after a heavy downpour to judge how they are working. Remove any leaves or weeds growing around the grille that could block the free flow of water.



*All gullies require inspection on a regular basis to ensure that litter or plant growth is not blocking the free flow of water*

**ARE FRENCH DRAINS AND SOAKAWAYS WORKING PROPERLY?**

Check that any French drains are clear of blockages and flowing properly. In some cases, French drains and rainwater drainage do not discharge to a public sewer but into a purpose-built drainage pit called a soakaway. Soakaways can silt up over time and should be monitored to check their performance. Again, an inspection after heavy rain will help discover if they are draining water away efficiently. If they are not functioning properly, water will pond above them and may make its way into the building or under the foundations where it may cause damage.

**ARE THE AIR VENTS FREE OF BLOCKAGE?**

Vents placed in external walls allow air to circulate into underfloor spaces, keeping them ventilated and preventing conditions arising in those spaces that would encourage dry rot outbreaks. Check that vents are clear of blockage and allow the free passage of air.



*Installing hard paved surfaces around the base of a building can cause damp problems both inside and out. Here the new tarmacadamed surface is higher than the original ground level, is partially blocking an underfloor vent and making it more likely that water will flow into the building through the vent hole.*

**ARE PAVED SURFACES IN GOOD CONDITION?**

Check that paved surfaces such as flagstones, cobbling, and setts are not being damaged by heavy vehicles driving over or parking on them. This can cause direct damage such as cracking of stones, and can also cause the paving to deflect, which will in turn lead to ponding of rainwater.

**WHAT IS THE CONDITION OF THE BOUNDARY WALLS?**

Inspect the boundary walls in the same way as the external walls of the building, except that boundary walls obviously do not have to perform to the same standards as the walls of a building which must be watertight. Remember that boundary walls are more vulnerable to the elements as they are exposed on both sides.

Check walls for evidence of structural cracking. Boundary walls are usually built on shallow foundations (and sometimes on no foundations at all) so some settlement can be expected. Deflections and settlement should not reach the point where the stability of the wall is put in doubt, so carefully monitor any defects that are noted.

Check that the pointing of brick or stone walls is in sound condition. Pay particular attention to any coping stones. These play an important role in protecting the wall from the rain, preventing it from washing out the mortar and saturating the wall itself. Make sure that all coping stones are securely fixed and that any missing stones are replaced to match.

Clear excessive plant growth from walls, in particular any ivy growth should be removed, as this will damage the wall. Make sure the ivy has been treated with herbicide and allowed to die off before removing it. Otherwise, parts of the wall can come loose and be dislodged. Plant growth with shallow root systems can be attractive on a garden wall and, providing it is kept under control, should not cause irreparable damage. Certain species of hedging or tree have deep roots which can undermine or damage foundations; these should not be planted or allowed to take root near buildings.



*Although the plants which have taken root between the stones of this boundary wall may be visually attractive, they are a clear sign that the mortar has decayed over a widespread area, water is lodging within the wall and action is needed*



WHAT IS THE CONDITION OF EXTERNAL IRONWORK?

There can be many historic ironwork features associated with a building. These include gates, railings, balconies, window boxes, and even glasshouses or conservatories. Historic ironwork will generally fall into one of two categories: wrought iron or cast iron.



*Wrought ironwork was traditionally made in a forge by a blacksmith hammering the material into the required shapes. It is essential to keep the paint covering intact on both wrought and cast iron to prevent corrosion.*

Ironwork which is exposed to the air and water will rust. In rusting it can expand to several times its volume. Where iron elements are fixed into other materials, it is essential that they are not allowed to rust. Rusting iron fixings can cause significant damage such as spalling stonework and, in extreme cases, dislodging entire stones. It is essential to keep water and rain away from iron surfaces. The most effective way of doing this is by using a paint finish which is regularly and frequently renewed. Inspect the condition of the paintwork and, where there are chips or other defects; repair them as soon as possible to prevent corrosion. Paint should be worked into all the joints in the ironwork to ensure that there are no gaps that would allow water to reach the iron surface. Do not paint over corroded iron. Clean off the rust first and prepare the surface properly for repainting. If the rust is particularly extensive, removing it will be a specialist task. Get advice as to the best approach to take.



*Corroding iron will expand up to ten times its volume as it rusts. Where iron that is fixed into stonework rusts, this expansion can literally blow the stone apart shattering it into pieces and exposing the ironwork to further corrosion*

Broken and damaged ironwork must be noted and can be repaired by a specialist metalworker. Repair can include the use of different methods including cold-stitching, welding, and other techniques. Missing pieces of ironwork, such as finials on railings, can be replaced with a replica cast from surviving original features.



*Missing pieces of decorative ironwork can be replaced with replicas cast from the original pieces*

**Security**

Even a vacant building must be maintained. Most vandalism and arson attacks occur to neglected or unused buildings. Good maintenance practices make the site and building appear occupied and cared for, and may help prevent it becoming a target. Other measures to increase the security of a site can also help. Where buildings are occupied and in use, their security must also be considered.



*Remove graffiti as soon as possible. Not only does it disfigure the building and encourage further attack, but many paints become more difficult to remove the longer they are allowed to dry and harden*

HOW SECURE IS THE BUILDING?

Check that the windows and doors are closed and locked when the building is unoccupied. Inspect and test intruder alarms and smoke detectors regularly. Ensure that there is no access to the building from upper floor windows or from the roof. If the building or its contents are particularly valuable, consider installing enhanced security measures such as intruder warning systems, motion-sensitive lighting, and camera monitoring, or provide monitoring by security guards.

IS THE BUILDING VULNERABLE TO ARSON?

In addition to ensuring that the building is secure from unauthorised entry, check that no flammable items, such as gas cylinders, petrol cans, or paint tins, are left unsecured around the site. Such items should not be left unsecured within outbuildings, or visible inside the building through windows or doors.

DOES THE BUILDING APPEAR NEGLECTED?

Ensure that 'walkabouts' around vacant buildings are undertaken regularly to note any damage. Broken window panes or signs of attempted break-in should be repaired immediately. Make sure that grass is cut regularly and that any planting around the building is kept clipped and pruned. Clear away litter and other rubbish that may accumulate around the site.

Remove graffiti as soon as possible as it will become more difficult to remove successfully the longer it is allowed to dry and harden. Specialist advice will be required to identify the most appropriate method of removal.

## 4. Dealing with damp

The incorrect diagnosis of damp is one of the biggest problems associated with old buildings. If the symptoms of damp are treated without correctly identifying the source, future problems will almost certainly occur. An ongoing problem has often been caused by earlier inadequate or misguided attempts which dealt with the symptoms of damp, such as mouldy patches and musty smells, rather than treating the root cause. Untreated, or incorrectly treated, damp problems can have serious long-term effects, many of which are difficult and expensive to remedy. These can include wet or dry rot attacks on timber, insect infestation, rusting of metal, deterioration of brick and stone, and damage to internal finishes.

Even when the cause or causes of the damp problem have been located and treated, remember that there will still be water within the building fabric which may take some time to dry out fully. Superficially it may appear that the problem still continues to exist. So be prepared to wait before deciding that a particular solution did not work.



*This hopper became blocked with debris during a construction project and was not cleared after the works finished. It will cause serious saturation of the wall behind if the situation is not remedied*

Water generally gets into a building or causes damp problems by one or more of the following ways:

- > Penetrating damp
- > Rising damp
- > Condensation

### Penetrating damp

Rainwater is likely to enter a building because of cracks in external render finishes or chimney cappings, gaps between slates, defective pointing between bricks or stones, blocked or leaking rainwater goods, or poor or damaged construction details such as slipped or damaged flashings. Another cause of penetrating damp is where an external render coating has been removed to expose a rubble stone wall beneath.



*Poorly-fixed flashings may become detached and allow rainwater to soak into the building. They should be refixed or replaced as soon as possible*

Water lodging at the base of walls can also cause damp to penetrate. This may happen because incorrect ground levels are preventing rainwater from running away from the building, or because earth or plants are holding it against the face of the wall. External walls can also become damp because the building is surrounded by hard, impervious paving surfaces such as concrete, stone or tarmacadam. These prevent rainwater, often over a wide area, from being absorbed naturally into the ground. If the surface is badly laid, the water that gathers on the surface can be directed towards the building creating damp problems internally.

To treat penetrating damp, first locate the entry point of the water and tackle the problem at its source. This is often not as easy as it may sound. Water can travel a considerable distance within the fabric of a building before finding its way to a surface where the problem is first noticed. If the building has its original external render coating, this should be retained and kept in good condition. If render has been removed, consideration should be given to replacing it in a suitable material to give the walls back their waterproof cover.

Do not be tempted to apply so-called 'damp sealants' to the surfaces of walls to deal with damp penetration problems. The manufacturers of some of these products may claim that they stop water getting into walls but in fact they are rarely successful in the long-term and are often damaging to a traditionally-built building as they can trap moisture within the walls and cause decay.

### Rising damp

Rising damp is the result of moisture from the ground being absorbed up into porous building materials by capillary action. The moisture will rise to a certain height before evaporating out to the atmosphere or into the interior of the building where it can cause the musty smells associated with damp. Any salts absorbed by the moisture as it rises through the wall are left behind on evaporation and these can cause problems such as unsightly, and potentially damaging, deposits on wall surfaces.

It is normal practice for modern buildings to incorporate an impervious damp-proof course (or DPC) to block the upward movement of rising damp, usually a thick layer of polyethylene or similar material. Some older buildings were also built with DPCs and early forms included the use of slate, metal sheets or glazed ceramic tiles which have generally proved quite durable. Other early forms of DPC, such as tar or bitumen-impregnated hessian, may be less durable. Buildings constructed before the second half of the 1800s generally did not include a DPC of any kind. If a building constructed with a DPC has problems with rising damp, it may be that the DPC has been bridged allowing a route for the moisture to bypass it and enter the wall above. This bridge may be provided by a render or plaster coating, whether internal or external. Alternatively, problems may occur where the ground level has been allowed to build up against the outside of the wall to above the level of the DPC. Rising damp problems may also be a sign that the original DPC has decayed or, in the case of a slate DPC, has cracked and is no longer capable of doing its job.



*Damage attributed to rising damp may have another cause. Rainwater splashing off hard paving can soak the base of a wall, encouraging mould growth on the wet stone*

Make sure that the problem has been correctly diagnosed before considering any drastic or invasive action. It is rare for rising damp to cause serious problems in a building. What looks like rising damp problems may in fact be caused by 'falling damp'; that is water from blocked or leaking gutters which has splashed down the wall and soaked in. Make sure that the build-up of the levels of earth, planting beds, and paths around the base of the wall are not the cause of the problem. If they are, the levels around the base of the walls should be reduced, taking care not to expose the footings of the wall or undermine its foundations. Also check that the ground levels around the building are not forcing rainwater to flow towards the building rather than away from it. Remember that remedial



works such as lining damp walls internally with tanking or so-called 'waterproof' plasters will often simply drive the problem elsewhere within the building, or force the damp to rise even higher in the wall where it may cause the decay of ceiling joists. Linings that are designed to allow air to circulate behind them can be effective but, unless very carefully installed and the through-ventilation maintained, they can also have the effect of pushing the damp further up the wall.

As with penetrating damp, the first action should be a careful analysis of where the water is coming from. The most common sources of water for rising damp are ponds of rainwater, leaks from damaged water pipes or rainwater drainage pipes around the base of the wall, as well as from the water table itself. Removing these problems by repairing and maintaining rainwater goods and other pipework, clearing silted-up soakaways, or installing French drains to take water away from the base of the walls may prove successful in solving the damp problem.



*Damp problems in ground floor or basement rooms may not be caused by rising damp but by rainwater from broken gutters above saturating the wall and the ground beneath*

In sites of archaeological potential, specialist archaeological advice should be sought before any digging in or around the building is undertaken. Archaeological testing in advance, and/or monitoring of works in progress, may be a requirement of the National Monuments Section of the Department of the Environment, Heritage and Local Government.

Improved ventilation will also help alleviate damp problems. This should include not only ventilation of the rooms and spaces of the building itself but also, where applicable, of underfloor spaces. Often the systems of ventilating underfloor spaces which were originally designed into a building have been allowed to become blocked or have been deliberately blocked. Re-opening these vents and re-establishing a flow of air through the underfloor space may go a long way to curing the damp problem.

In cases of severe rising damp, where problems persist even after the above measures have been taken, the installation of a new DPC may be considered necessary. This can take the form of a physical DPC, such as the insertion of a layer of lead or slate or polyethylene. Alternatively, a chemical DPC injected into the wall may be an option.

Installing a new physical DPC in an existing building can be difficult and potentially damaging. It is only successful in buildings with coursed masonry or brickwork. The installation involves carefully slicing through the external wall in short lengths and inserting the new impervious layer. Alternatively, it can be done by the removal of a full course of brick or stone and its replacement with, for example, a dense engineering brick. Installing a physical DPC, even where the work is carefully carried out, still carries the risk of causing cracking and settlement of the building above and is often damaging to internal finishes. Installing a new DPC will rarely be an appropriate solution for a building with walls of uncoursed stonework, or with fine internal plasterwork, panelling, or floors. DPCs should not be installed in mud or earthen walls as a certain moisture content is necessary to bind the materials of the wall together. Inserting a DPC can cause the earthen wall to dry out and lose stability.



*The drill holes associated with injecting a chemical DPC can be unsightly. A more effective method of dealing with the damp problem in this case would have been to reduce the level of the impermeable paving around the building and ensure that rainwater drains away from the base of the wall*

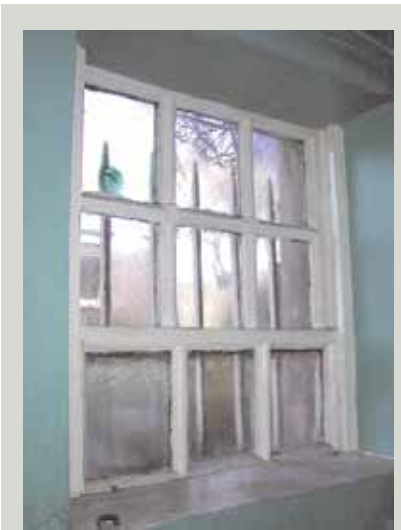
The installation of a chemical DPC is usually done by injecting water-repellent compounds into a series of pre-drilled holes close to the base of the wall. Injecting DPCs into thick walls is rarely successful as it is difficult to ensure that the chemicals have fully penetrated through the wall and have formed a uniform and intact layer. These treatments also involve the introduction of yet more moisture into the wall. There is also the added disadvantage of the sometimes unsightly appearance of the line of injection holes. If the building is a protected structure, this may not be acceptable. Contact the conservation officer in the local authority for advice before making a decision.

Electro-osmosis is a system to prevent rising damp within a wall which enjoyed some popularity a number of years ago. It consists of anodes inserted into a wall and linked by earthed wires along the base of the building. A small electric charge run through the system was intended to have the effect of repelling water molecules rising through the wall. However, the efficacy of such systems is now considered doubtful.

Even after the source of damp has been removed, the problem of accumulated salts in the walls may continue for a time as the walls dry out. Leaving these salts on the surface will only continue the cycle of decay as the salts will draw water into the wall from the atmosphere. Salts should always be removed by brushing down the surfaces with a non-ferrous brush or, in severe cases, by poulticing. Poulticing involves applying absorbent clays to the wall which draw out the salts.

## Condensation

Some damp problems are caused by warm, moist internal air condensing on cold surfaces such windows and walls where it can promote unsightly growth of moulds. Hard, cold internal surfaces, such as tiles, gloss paints, metal and glass, are particularly susceptible to condensation. Condensation forming on cold pipework and fittings in bathrooms and kitchens may then drip onto floors causing more staining and damage.



*Condensation problems are best solved by reducing the moisture level of the air inside the building. While a dehumidifier may be useful for coping with the aftermath of an individual flood, the only successful long-term solution is to improve the levels of ventilation*

Condensation can also occur within the depth of a structure when moist air cools as it travels through a wall and reaches dewpoint within the wall itself. This will result in damaging amounts of water being trapped within the wall where it can cause rotting of the wall fabric.

The best ways of overcoming condensation problems are to ensure that there are adequate levels of ventilation to reduce the moisture level of the internal air. Condensation can be reduced by giving careful consideration to the location of moisture-generating activities, such as cooking and showering, and by avoiding the use of gas-fired space heaters.

### VENTILATION

The well-being of most old buildings relies on good ventilation to keep damp under control. Once dampness in a building reaches a high level it makes the timber elements of the building fabric vulnerable to attack from insects and from fungi. Ventilation was traditionally supplied by open fireplaces and through the small gaps between slates and around windows and doors. Modern building methods on the other hand use stronger, harder materials to create more rigid watertight and airtight buildings. But there are dangers to sealing up an old building as this can lead to condensation on the internal surfaces and a build-

up of moisture within the fabric which cannot then dry out as it should. Installing sealed double-glazed windows in rigid frames, such as uPVC or metal, into a traditionally-built building, sealing up existing chimneys, installing rubber-backed carpets and blocking ventilation gaps all have the potential to create, or exacerbate, damp problems within the building.



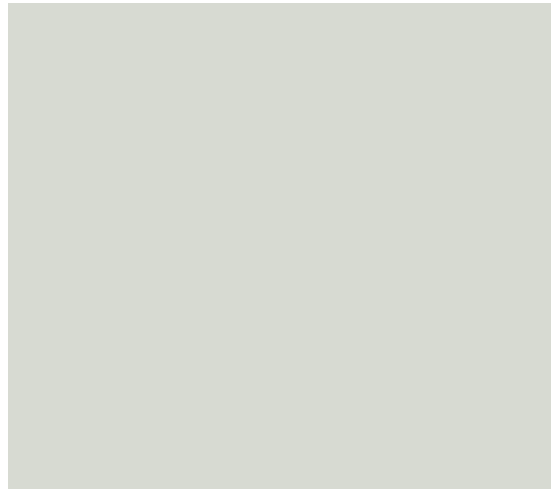
*Poor ventilation of the space between a stained glass window and new storm glazing has created so much condensation that plants can now grow which will damage the stained glass panel*

Actions that will help keep a building properly ventilated include:

- > Keep existing air bricks, and ventilation grilles and gaps open and working
- > Do not seal up disused chimneys
- > Avoid sealing around window frames and doors unless an alternative source of fresh air has been provided
- > Reduce the levels of moisture that are put into the building. For example, do not use gas-fired space heaters as these produce large, and potentially damaging, amounts of water. Do not dry washing indoors
- > Install extract fans in bathrooms and kitchens and use these whenever necessary. (These may need careful consideration regarding the type and location of fittings. If the building is a protected structure, consult the local authority conservation officer)
- > Open doors and windows whenever possible to allow natural ventilation of the interior
- > If insulating a roof, make sure there is still a good flow of air through the roof space as otherwise the timbers may become vulnerable to insect or fungal attack.

## DRY ROT TREATMENTS

If there is an outbreak of dry rot in the building, there is no need to panic. Treatments of dry rot are not as invasive as they used to be and there is good advice available that should minimise the damage and disruption to the fabric of the building.



Always get expert advice if an outbreak of fungus is discovered in a building. This advice should be independent, preferably coming from someone who is not trying to sell a particular product or treatment method. Any treatment of dry rot should include a detailed survey of the building to locate and deal with all sources of water penetration. Plumbing should be inspected for leaks. Modern dry rot treatments recognise that the fungus is a living organism which will die off naturally, as any plant would, if the environmental conditions that support it are removed. Removing the source of water and supplying good ventilation will kill off the fungus. Keeping the building dry will prevent it re-establishing. The fungus may continue to produce its fruiting bodies (or mushrooms) for a while after the treatment as the plant dies off, so some patience will be required before it can be certain that a particular solution was successful.

Be very cautious about proposed treatments that require the removal of large amounts of timberwork within a certain radius of the fungal infection. It should only be necessary to remove timber which has decayed to a state where it is no longer capable of doing its job.



*Timber which has suffered dry rot attack has a distinctive cuboidal pattern of cracking. Only timber which has decayed to the extent that it can no longer do its job should be removed in the course of treatment*

Avoid the extensive use of chemicals to treat an outbreak. As well as the potential health hazards associated with many of these chemicals, the practice of irrigating masonry walls to kill off dry rot is questionable as stone and brickwork provide no nutritional support to the fungus. Rubble walls cannot be successfully irrigated because of their thickness and the random nature of the stonework in them. Companies that carry out chemical treatments for dry rot outbreaks often qualify their guarantees by placing conditions on the building owner to repair rainwater goods and drains, to remove earth and planting away from the outside faces of the walls, and to take measures to prevent condensation. In many cases these measures would have cured the original problem on their own by killing off the fungus without the need to resort to chemical treatments. Meanwhile the chemical irrigation will have introduced large amounts of moisture into the building fabric, which will greatly lengthen the drying out time for the building. Irrigation also has the potential to mobilise salts within the fabric which can accumulate on the surface of the wall and cause decay.



# Historic buildings and the law

Under Part IV of the Planning and Development Act 2000, buildings which form part of the architectural heritage can be protected either by being designated a protected structure or by being located within an architectural conservation area.

Where a building is a protected structure, or has been proposed for protection, or is located within an architectural conservation area, the usual exemptions from requirements for planning permission do not apply. In the case of a protected structure any works, whether internal or external, which would materially affect its character, will require planning permission. Legal protection also extends to other structures and features associated with a protected structure such as outbuildings, boundary walls, paving, and railings. In an architectural conservation area, any works to the exterior of a building which would affect the character of the area also require planning permission. Owners and occupiers of protected structures have a responsibility to maintain their buildings and not to damage them or allow them to fall into decay through neglect.

A notice was sent to every owner and occupier of a protected structure when the building first became protected but subsequent owners and occupiers will not have been notified. If you are not sure of the status of your building, check the Record of Protected Structures in the Development Plan for the area. If your building is a protected structure, or if it is located in an architectural conservation area, your planning authority will be able to tell you what this means for your particular property.

As an owner or occupier of a protected structure, you are entitled to ask the planning authority to issue a Declaration which will guide you in identifying works that would, or would not, require planning permission. Maintenance and repair works, if carried out in line with good conservation practice and the guidance contained within this booklet, will generally not require planning permission. If you are in any doubt about particular proposed works, you should contact the conservation officer in the local authority for advice

For general advice on planning issues relating to architectural heritage, a publication entitled *Architectural Heritage Protection Guidelines for Planning Authorities* (2004) is available from the Government Publications Sales Office or can be downloaded from [www.environ.ie](http://www.environ.ie)

# Grant aid

Conservation grants are available for the conservation and repair of protected structures and are administered by the planning authorities. You should contact the relevant one for guidance on whether the works you are planning are eligible for a grant and, if so, how to apply. These grants are not available for routine maintenance works, alterations, or improvements. The type of works must fit within the schedule of priorities set out by the planning authority. In order for works to qualify for these grants, they must be carried out in line with good conservation practice. Repair work following the guidance set out in this booklet should be considered as satisfying this requirement.

Other bodies also provide grants for building conservation projects. These include the Heritage Council and the Irish Georgian Society. Their contact details are included below.

Tax incentives are available under Section 482 of the Taxes Consolidation Act 1997 for expenditure incurred on the repair, maintenance, or restoration of certain buildings or gardens determined to be of significant horticultural, scientific, historical, architectural, or aesthetic interest. The building or garden must receive a determination from the Revenue Commissioners who must be satisfied that there is reasonable public access to the property. Application forms can be obtained from the Department of the Environment, Heritage and Local Government, Dún Scéine, Harcourt Lane, Dublin 2.

# Useful contacts

The conservation officer in the local authority should be the first person to contact with queries regarding a historic building. Other useful contacts include:

Architectural Heritage Advisory Unit, Department of the Environment, Heritage and Local Government, Dún Scéine, Harcourt Lane, Dublin 2.  
Telephone: (01) 888 3109  
Web: [www.environ.ie](http://www.environ.ie)  
[www.buildingsofireland.ie](http://www.buildingsofireland.ie)

Construction Industry Federation, Construction House, Canal Road, Dublin 6  
Telephone: (01) 406 6000  
Web: [www.heritageregistration.ie](http://www.heritageregistration.ie)

Heritage Council, Rothe House, Kilkenny, Co. Kilkenny  
Telephone: (056) 777 0777  
Web: [www.heritagecouncil.ie](http://www.heritagecouncil.ie)

Irish Architectural Archive, 45 Merrion Square, Dublin 2  
Telephone: (01) 663 3040  
Web: [www.iarc.ie](http://www.iarc.ie)

Irish Georgian Society, 74 Merrion Square, Dublin 2  
Telephone: (01) 676 7053  
Web: [www.igs.ie](http://www.igs.ie)

Royal Institute of the Architects of Ireland, 8 Merrion Square, Dublin 2  
Telephone: (01) 676 1703  
Web: [www.riai.ie](http://www.riai.ie)

5. Checklists for maintenance inspections

ANNUAL OR BIENNIAL INSPECTIONS

Building:	Inspector:	Inspection date:	Weather conditions:
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WHAT TO CHECK:	WHAT TO LOOK FOR:	TICK BOX:	NOTES: (For example: was a defect noted?; what needs to be done and when?; does the defect needed to be monitored?)
Rainwater disposal	> Plants, leaves and other debris accumulating in roof valleys, gutters, hopper heads and downpipes or on flat roofs		
	> Water ponding on flat roofs		
	> Loose fixings of gutters, sagging gutters or gutters sloping the wrong way		
Roofs	> Overhanging branches or climbing plants to be cut back		
	> Delamination, or flaking, of slates and tiles		
	> Cracked ridge tiles or cappings, missing pieces of mortar bedding to ridge tiles		
	> Slipped, loose or missing flashings		
	> Holes, sagging or excessive plant growth on thatched roofs		
	> Splits and pinholes in lead sheeting		
	> Corrosion on the underside of metal sheeted roofs		
	> Failed or loose fixings to metal sheets		
	> Failed or damaged mortar pointing to chimney stacks, or cracks in render coatings.		
	> Loose chimney pots		
> Loose, displaced or missing coping stones			
External walls	> Earth, paving or planting beds that have built up against the outer face of the wall		
	> Climbing plants and hedges that need clipping back		
	> Failed or damaged mortar in the joints between bricks or stones		
	> Cracks in walls or in external render		
	> Salt deposits, plant or algae growth on surfaces indicating saturation of the wall		

External joinery: windows and doors	> Cracked, blistering or flaking paint		
	> Cracked or failing putty		
	> Signs of decay in timber, particularly at sills and bottom rails		
	> Open joints between the edges of windows and door frames and the surrounding masonry		
	> Open joints within the timber frame		
	> Sticking or jamming doors or windows		
	> Slipped, damaged or missing flashings		
Inside the building	> Leaks, damp patches, condensation, flaking paint or salt deposits on surfaces		
	> Signs of structural movement such as cracking		
	> Cracking or movement in timberwork, particularly panelling		
	> Signs of fungal attack, insect infestation in timberwork and furniture		
	> Sagging in ceilings		
	> Damage to floor surfaces		
	> Adequate ventilation to interior spaces, particularly unused, or underused spaces such as attics and basements		
	> Staining or damage to decorative finishes or to features such as fireplaces, staircases, etc.		
Service installations	> Chimneys and flues in regular use that require to be swept		
	> Leaking pipework and radiators		
	> Old or defective electrical installations		
	> Correct operation of smoke detectors and other fire detection, suppression and fire-fighting equipment		
	> Correct operation of lightning conductors		
Outside the building	> Rainwater draining away correctly and not ponding around the base of walls		
	> Gullies, land drains and soakaways operating properly		
	> Blocked or closed ventilation grilles		
	> Cracked or damaged flagstones, cobbling and setts		
	> Excessive plant growth, cracking or damage to boundary walls and balustrades		
	> Condition of ironwork including railings, verandas, conservatories, etc. and the joints where the metalwork is set into walls or plinths		
	> Litter, graffiti and untended plant growth if the building is currently unoccupied		

REGULAR MAINTENANCE INSPECTIONS

The following is a list of the type of building defects that must be attended to as soon as they occur and not wait until an annual inspection

WHAT TO CHECK:	WHAT TO LOOK FOR:	TICK BOX:	NOTES: (For example: was a defect noted?; what needs to be done and when?; does the defect needed to be monitored?)
Rainwater drainage	> Overspilling gutters, leaking joints in gutters and downpipes, blocked gullies, missing or defective sections of guttering or pipework		
Roofs	> Slipped, broken or missing slates or tiles		
	> Slipped or damaged flashings		
Openings	> Broken glass panes (panes of historic glass with hairline cracks can be left in position)		
External walls	> Blocked ventilation grilles		
Interior	> Leaks and damp spots		

3 - 5 YEARLY INSPECTIONS

The following is a list of the type of actions that may only be required every 3 - 5 years and the type of building defects that may only become obvious over a period of time

WHAT TO CHECK:	WHAT TO LOOK FOR:	TICK BOX:	NOTES: (For example: was a defect noted?; what needs to be done and when?; does the defect needed to be monitored?)
Rainwater disposal	> Repaint cast iron gutters, hoppers and downpipes		
Roofs	> Monitor any changes and deflections in the overall profile of the roof		
	> Remove moss growth on the roof surfaces and in the joints between slates and tiles		
	> Check for signs of delamination or deterioration in slates and tiles		
	> Check for evidence of 'creep' in lead sheets		
External walls	> Check for signs of decay or deterioration in brick or stone walls		
	> Check external render for signs of loose areas or patches		
	> Reapply limewash where necessary		
External joinery	> Renew paint finishes on windows, doors, bargeboards and any other external joinery		
External ironwork	> Repaint exposed ironwork such as railings, verandahs, balconies, conservatories, etc.		