advice series

disaster

A GUIDE TO PREVENTION AND PREPAREDNESS IN THE HISTORIC BUILT ENVIRONMENT

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An Roinn Cultúir,
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Introduction

The aim of this guidance is to help the owner or custodian of a historic property, where possible, to prevent or reduce the risk of disaster striking their property and to lessen the damage caused should disaster occur. It sets out how an owner can produce a disaster risk management plan (or 'Disaster Plan'), a simple document setting out sensible measures to minimise the likelihood of an emergency and to reduce the extent of damage and loss should it occur. A Disaster Plan can be tailored to the needs of the individual and the specific property in question.

Disasters can arise from human action, such as fire or vandalism, or from natural events, including extreme weather events. Sometimes disasters occur on a scale that commands attention across the world. More frequently, they affect specific places or buildings. They impact on homes, workplaces and the lives of people. They can be one-off occurrences or recurring events, although they are seldom the focus of attention for long, their effects are visible everywhere in the environment we inhabit. With some exceptions, disasters are sudden and unpredictable. While the events themselves may be beyond our control, direct measures can be put in place to identify and assess risks, introduce prevention measures and reduce loss.

By necessity, guidelines are based on general principles. Their purpose is to assist owners and guardians to act in their own interests and in the interest of their property. The guidelines draw attention to the various potential causes of damage to a historic property and outline how the risks can be assessed and indicate preventive measures based on sensible actions to prevent damage and loss.

The central pillar of these guidelines is the Disaster Plan, prepared specifically for the property by the person who knows it best, whether the building owner or manager. The very act of preparing the plan makes one think about the risks, the steps to be taken to avoid those risks or prevent them turning into disaster in the first place and the ways in which loss and damage might be reduced, should the worst happen.

The focus of these guidelines is the historic built environment and, in particular, small- to medium-sized buildings of historic and architectural value in private ownership. The guidance presented is in general terms but is not exhaustive. There are many large and complex historic properties of significance and these naturally carry a broad range of risk factors. While the principles set out here will still apply, the owners of such properties may require their own expert advice and assistance in assessing risk and preparing a Disaster Plan. Greater detail has been added to certain sections of these guidelines to indicate the additional demands and actions required in such cases. Large buildings in public ownership or repositories such as county museums have their own access to expert advice and have specific preparations in place.

The historic built environment

The historic built environment comprises the legacy of centuries of occupation and use. It is made up of landscapes, infrastructure such as bridges, harbours and roads as well as historic buildings and their settings. These comprise an irreplaceable resource, an inheritance of intrinsic economic and cultural value, both to their owners and guardians and to the community as a whole. Historic constructions range from large complexes in state ownership to modest structures in urban or rural settings. In many cases they have undergone alterations in form, fabric and use, reflecting changes in economic, social and political circumstances. They may have changed from domestic to commercial use and back again, from religious to commercial, from industrial to residential or community use. Over time, properties may have moved from private to public ownership, or from being devoted to a single function to accommodating a range of fluctuating uses. Others now exist in a ruinous state, features of the landscape but without themselves hosting human activity.



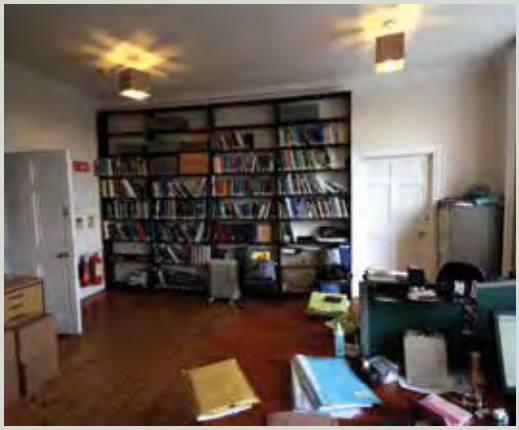



The historic built environment encompasses a wide variety of building types and cultural landscapes

What these structures and sites have in common is that they are vulnerable to damage and destruction from a range of causes, both natural and human. Some carry risks that derive from their very nature, their construction or their contents. Others are especially vulnerable because of their siting or location, being remote from facilities such as a fire station, from sources of water for firefighting or sometimes even without road access. The varying uses to which structures are put can increase risk; for example, a building may have been designed as a single-family dwelling but is now used to contain multiple dwellings or commercial units. On the other hand, unused or unoccupied buildings become especially vulnerable in the absence of regular oversight.

Appraising the risks

The appraisal of risk starts from an understanding of the nature of the resource and its vulnerability to damage. Fully understanding a structure is crucial to its long term protection. For example, adapting a building to new uses or intensifying existing uses without understanding its key characteristics and construction, can result in overloading of floors. The insertion or removal of partitions affects both structural performance and patterns of use, and increases the exposure to hazard.



An eighteenth-century Georgian house now in office use. The partition is carried by the floor joists, its weight is increased significantly by the bookcase. Note the distortion in the door and frame to the right caused by the overloading

Fire is probably the most common hazard and its traumatic effects most widely publicised. However, considerable damage can be caused inadvertently through ignorance of a building's weakness or the value of its contents, even in the course of repair or maintenance. The immediate settings of buildings, such as gardens or ancillary buildings, are often insufficiently appreciated in their own right and are especially susceptible to inadvertent or casual damage when dealing with threats to the principal structure.

The survival of historic buildings to the present day is often attributed to the robustness of their original construction and the quality of the materials used. However, structures evolve over time and may come to incorporate hidden historic alterations which increase their vulnerability. The insertion of inappropriate modern materials into a traditionally built building can impact on its structure and performance. Traditional building materials may be a risk factor in themselves. Floors are mostly of timber and naturally combustible. Thatch is another combustible building material but may be the very reason why the building is protected in the first place.

Building layouts may not easily allow for compartmentation to prevent fire spread and many old structures contain hidden voids which allow flame to spread rapidly. Roof spaces may not be subdivided and this is of particular concern where there are no divisions between the roof spaces of houses in a terrace.

Building services may have deteriorated over time or incorporate poor quality materials increasing the risks of fire and undetected leaks from water pipes. In itself, the decay of materials and construction may add to the vulnerability of buildings to moisture penetration, as can the use of hygroscopic (water-absorbing) modern materials - such as gypsum-based, wood fibre or particle board.

In remote locations, the time required for emergency services to reach a property may be a significant risk factor. The delays caused can be critical to the amount of loss and damage.

At a broader scale, changes in ground water levels due to prolonged periods of rain or cessation of ground water abstraction can introduce new conditions beneath foundations that compromise a building's structural stability and performance.

Overview of the guidelines

The primary purpose of this guidance is to enhance the protection of the architectural heritage by addressing the impact of disasters on the historic built environment. It deals with the common risks and causes of disaster and outlines standard preventive measures. It cannot address all situations but is intended to give background knowledge and understanding to support owners of historic buildings in addressing their own specific circumstances.

Chapter 1 lists various common causes of disaster likely to affect a historic building, sets out the risk factors for each disaster type and suggests some actions that can be taken to prevent or reduce damage to the historic building.

Chapter 2 focuses on the primary action that an owner or guardian should take: the preparation of a Disaster Plan for their property with its various steps and the provision of templates to assist in this task. Its focus is on simple plans for simple buildings, but it also sets out the more elaborate steps to be taken for larger buildings or complexes.

Chapter 3 describes the steps to take in responding to an unfolding disaster and dealing with the immediate aftermath.

Chapter 4 deals with returning to normal following the disaster and after the immediate actions have been taken. Seeking the right advice, planning the longer-term measures of conservation of the building and contents and learning lessons in order to avoid a recurrence are part of this process.

Chapter 5 gives an overview of insurance issues including: putting suitable cover in place; being aware of the issues; what to do when loss occurs; relevant terms; and obligations under current legislation.

1. Common causes of disaster

Disaster is a word that describes the traumatic impacts of events on environments and people, whether triggered by human action or arising from natural causes. Those triggered by human action include damage or destruction that is deliberate and targeted at the specific property, chosen perhaps because of its representative or symbolic value. At one extreme, attacks take place worldwide on buildings and sites of cultural significance such as churches, mosques, synagogues, schools or, as is increasingly the case, hospitals and refugee camps. Instances of this type are rare in the Irish context of today, but our history includes many examples, some dating from the recent past. More often than not, the causes of fire are accidental.

A fire at Slane Castle, County Meath in 1991 caused severe damage to a large portion of the building (Image courtesy of the Irish Architectural Archive)

At the other extreme of human actions leading to disaster are the everyday accidents arising from error or forgetfulness, or from poor decision-making and communications when dealing with a minor crisis. For example, in the confusion following a burst water pipe, turning off the mains but forgetting to open all taps to drain down the storage tank can turn a small leak into one in which hundreds of litres of water cause significant damage.

Disaster triggered by natural events may be a regular occurrence. Storms cause significant and widespread damage on an annual basis. Damaging lightning strikes may be infrequent, but inundation through flooding is a recurring experience for many. Such events may seem relatively minor when set against the effects of major earthquakes, tsunamis or landslides that occur in other regions of the world, but changing climate patterns are producing a significant increase in extreme weather events creating new circumstances that were not anticipated in times when our historic environment was being created. For those who experience repeated destruction of this kind, such events are serious and traumatic.

This chapter identifies the risk factors associated with the most common types of disaster that may affect a historic building or site and sets out basic prevention measures an owner can take to prevent or reduce damage. In the Irish context, the most common agents of destruction are fire and water. A range of potential sources of destruction are dealt with below. Every circumstance cannot be covered but it is hoped that increased knowledge and awareness of the topics will lead to greater safety.

Recurrent floods will damage the lower floors of a building and their contents. Sometimes, they are not predictable as shown by the number of cars in this flooded street (Image courtesy of Cork City Council)

A large building gutted by fire with roof and upper floor levels totally destroyed

A close-up view of the collapsed floors in the central bay of the same building

Fire damage is frequently accompanied by water damage. A standard firefighting hose can deliver 500 litres or half a tonne per minute. A hydraulic platform such as that shown here can deliver up to 1800 litres (Images courtesy of Cork City Council)

Fire

Fire is one of the most common causes of disaster in buildings in Ireland. The risk can be reduced, however, by taking simple measures and practicing good housekeeping.

As well as personal injury and loss of life, fire can result in total loss of a building and its contents. For a fire to be sustained it needs fuel, heat and oxygen. If combustible material is ignited, fire will continue to spread as long as there is an adequate source of fuel and oxygen.

An empty room may only have floorboards, paint surfaces and wall coverings that are flammable. However, if sufficient heat is generated by the initial fire, then paint surfaces, wallpaper and floorboards will all burn provided sufficient oxygen is available. In the case of fully furnished rooms with curtains, carpets, tapestries, oil paintings, hard and soft furniture, the total of combustible material (or 'fire load') can be such that temperatures in excess of 600°C can easily be reached. At these elevated temperatures, flashover will occur that will further increase temperatures to over 1,000°C. This will ignite all remaining combustible materials in the room and combustible particles within the smoke.

At such high temperatures, doors and/or ceilings may fail, allowing the fire to spread quickly into adjoining rooms where it grows as it reaches further combustible material. The ability of fire to spread in this way is the reason why fire outbreaks can have such disastrous consequences for building and contents, as well as for human lives.

Readily available fire suppression systems, coupled with early detection, may prevent a fire developing the high temperature levels which allow it to spread. In most occupied buildings, fire extinguishers will serve this purpose. In unoccupied buildings, the best method of early suppression is a water-based sprinkler or mist system or other installation which would create a hypoxic (oxygen-deprived) environment. However, such suppression systems can be difficult to install in an existing historic building and can cause damage to materials and contents which may be irreversible. Therefore, the appropriateness of the use of a suppression system needs to be decided on a case-by-case basis.

While fires may be caused natural events such as lightning strikes, they more commonly occur due to unintended human failures or failures in heating or electrical systems or appliances. Fire can also be caused during construction or maintenance works such as hot-working activities (for example, welding or soldering).

Some fire services use social media to give useful safety tips and advice to the general public on fire prevention.

A reception room, with a significant ornate ceiling, is filled with furniture, carpet, paintings and other flammable objects. The large open fire is lit regularly in this room and burns logs

Fire: associated risk factors

LACK OF EARLY WARNING SYSTEMS AND/OR BASIC FIRE-FIGHTING EQUIPMENT

The lack of early warning systems and/or basic fire-fighting equipment can turn a minor incident into a major fire. A Fire Detection and Alarm System (FDAS) gives early warning of smoke or heat. It alerts the occupants to the fact that a fire may have started, therefore giving them sufficient notice to safely evacuate the building. As well as saving life, acting when alerted can prevent a fire taking hold and spreading.

An FDAS should be designed, installed and maintained in accordance with IS 3217 for commercial systems and BS 5389, Part 6 for domestic installations (see Further Reading below). It is essential that the system is selected based on the type of building and any hazard therein. FDASs are designed and installed to achieve different standards of coverage ranging from a basic manual system (type M System) through to full protection of every space and void throughout the building (type L1 system). Expert advice should be sought to determine the particular level of coverage required for different situations.

Under current building regulations, most modern buildings are required to have an FDAS fitted but many older buildings either do not have detection systems installed or they are not up to current standards.

There are a number of types of detectors for different applications – ionisation, optical and heat detectors and aspirating systems – the latter can be expensive but are typically used where very early detection is necessary, for example in buildings housing important collections, or as a means of compensation to provide early warning for evacuation purposes.

Basic measures to prevent or reduce damage

- The retrofitting of a Fire Detection and Alarm System to buildings that predate the Building Regulations is highly advisable.
- Ensure that sufficient early warning devices are in place such as smoke detectors and heat detectors for kitchens. These should be fully-wired and maintained systems. However, if this is not possible in the short term, battery-operated stand-alone devices should be used as a temporary measure and regularly tested. Keep a supply of spare batteries.
- Radio alarm systems are especially suited to historic properties as they minimise the need to run cables and disrupt decorative surfaces. To be effective, these systems must be regularly inspected and maintained.
- A fire extinguisher, correctly positioned and maintained, is a simple, first-response firefighting device, recommended for most applications. Use a CO_2 extinguisher at electrical distribution boards. Keep a foam extinguisher and a fire-blanket in the kitchen, within reach and not beside or over the cooker.

Detectors may be wired or radio devices. The heat detector (top) is wired. The smoke detector (below) is a radio device which can be fitted without any interference with decorative plasterwork. There are also aspirating devices which are unobtrusive but may be more expensive

OLD ELECTRICAL INSTALLATIONS

Old electrical installations can be easily overloaded and the protection systems bypassed, for example in older installations where cartridge, screw-in type fuses are installed. A dangerous but common practice was to insert a bigger fuse where the correctly-rated fuse regularly blew because of overloading.

A burnt-out switch on left indicates overloading

Older wiring insulation tends to become rigid and perish, leaving bare wires exposed, often in concealed floor spaces. Rodents may also damage insulation by gnawing at cables.

Floor spaces may contain wood shavings or other flammable material, which are easily ignited by sparking between exposed or damaged copper wires.

Many installations, especially in large houses, have been extended in piecemeal fashion, leading to possible overloading with older, defective cable runs being left in place, often for the lighting circuits.

Modern LED lighting is more efficient and creates less heat than traditional filament type fittings. Changing to LED lamps or fittings can reduce the risk of ignition. In addition, emergency light installations should be provided in all commercial buildings to provide adequate lighting for the purpose of escape. Emergency lighting installations should be designed to comply with IS3217.

Basic measures to prevent or reduce damage

- Electrical installations should be in accordance with National Rules for Electrical Installations. They should be checked and maintained in good condition on a regular basis and any defects remedied. Insurance companies can require a full test to be carried out.
- While the certification system provides a minimum standard for modern new installations, DIY or handyman interventions may survive in older buildings and can create serious problems. These should be rectified.
- If the installation is very old, it would be prudent to plan for full rewiring. Update fuse boards to the miniature circuit-breaker /residual-current circuit-breaker with overcurrent protection (MCB/ RCBO) type which give the best of protection in the form of over-current and earth leakage trip switches.
- Electrical distribution boards and switch panels should be on fireproof backing, kept accessible, free of clutter and well ventilated. In non-domestic situations, all distribution boards and systems should be housed within a fire-resistant enclosure.
- All maintenance and alterations must be carried out by a qualified electrician (who will have credit-card type ID or a certificate) or a contractor registered with Safe Electric Ireland (previously RECI - Registered Electrical Contractors of Ireland).

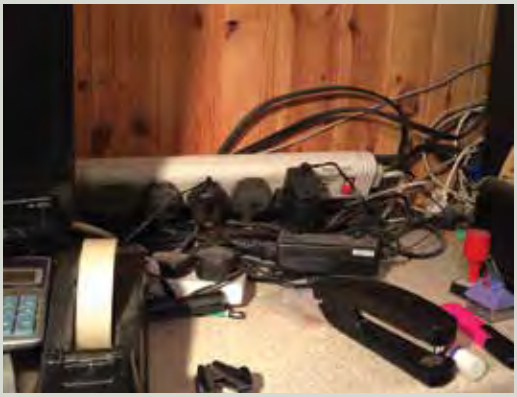
Against all regulations and good practice, this electrical wiring is jointed with an inadequate and unsuitable connector block. Insulating tape has been used to cover exposed cable. Note the new copper pipe indicating the work was done here relatively recently. Dangerous electrical wiring beside a copper water pipe is a potentially deadly mix

An extremely dangerous assembly of old wiring. Note the scorch marks on timber joists

ELECTRICAL APPLIANCES AND DEVICES

All electrical appliances carry varying degrees of risk and many owners and users do not properly inform themselves about their use. A simple example is the tumble-dryer, which becomes high risk if the filter is not cleaned regularly causing fluff to collect around the heating element and catch fire.

Extension leads and multi-gang extension bars are potentially dangerous as they can easily be overloaded by feeding high-wattage or too many appliances. They are in common use at computer or telephone locations, to power the array of multiple devices such as modems, chargers and printers. Rarely switched off when not in use, they tend to get covered over by files and papers - or piles of clothes in bedrooms - making overheating more likely.



A cluttered shelf in the office space of a significant historic building. There is potential for damage to the tangled electrical cables and for overloading of the extension bar which is supplying power to two computers and other devices. Note the timber sheeting behind which is varnished and highly flammable

An increasingly common hazard is the use of 3-pin plug chargers or USB chargers for mobile phones, e-cigarettes or other devices.

Old Christmas tree lights, and other string lights, need special care. The cables can be easily damaged during placing and removal for storage. They can overheat if a number of lamps have failed and have not been replaced. They produce heat and are surrounded by highly flammable materials whether the tree is natural or synthetic. This problem does not occur with modern LED-type Christmas tree lights.

Basic measures to prevent or reduce damage

- The misuse of electrical items is the top cause of accidental fires in homes. Read and follow instruction manuals which carry important safety advice. Carry out recommended maintenance tasks.
- Switch off appliances not in use at night.
- If there is a regular need to use extension bars, have additional sockets fitted by a registered electrician. Only use one extension lead/bar per socket. Never plug one extension lead/bar into another. Check the rating of the lead or extension bar, usually 13amp but can be 10amp. Never overload by plugging in items that will together exceed the rating shown for the lead or extension bar. Even small appliances that heat, such as microwaves, hairdryers or irons, will overload an extension bar. There are online calculators to check electrical overloads on sockets and extension leads and bars. Search using terms 'electrical safety' and 'socket calculators'.
- Never leave devices charging overnight or when unattended. Mobile phones are a particular risk as there is a tendency to charge overnight in bedrooms where there is a lot of combustible material. Always place the device on a non-combustible surface when charging.
- Do not use counterfeit, unbranded, cheap or substandard chargers. Even if using good quality chargers, do not swap between devices without checking that the output voltage and current ratings on charger and device are the same.
- Avoid using plugged-in appliances such as modems on escape routes.
- Replace old, screw-in type Christmas tree lights with modern LED-type lights.

OPEN FIRES, FLAME-EFFECT GAS FIRES, LPG OR ELECTRIC RADIANT HEATERS

Open fires are a significant hazard, particularly where wood in the form of logs is being burned. Wood that is insufficiently dry can splutter and fly as substantial sparks from the grate, or burning embers can roll out of the fire grate.

Flame-effect gas fires or LPG radiant heaters do not carry as high a risk as open fires but can ignite flammable materials in contact.

Portable radiant electric heaters are no longer available on the market but almost certainly still survive as back-up in many houses. They can ignite nearby furniture or fabric if left unattended or knocked over.

Basic measures to prevent or reduce damage

- Choose well-seasoned firewood that is at 20% moisture level or less.
- Do not load an open fire above the level of the fire bars. Use a fireguard or sparkguard when leaving the room even for a short time.
- Keep flammable materials such as fabrics, especially curtains, away from fires of all types.

Moisture meters are not expensive and can ensure that firewood is at 20% moisture level or lower. This example shows a moisture level at 17% on the timber scale on the left. The scale on the right is for brick and plaster

CHIMNEYS

Chimneys are a significant risk where still used for open fires or stoves. Older houses did not have earthenware liners installed but depend on render, applied during construction, to seal the flues. This render starts to fail with time and may get damaged or knocked off during chimney cleaning operations, so increasing the risk of fire spread from the chimney.

Sooty deposits in the chimneys can begin to glow when a large fire is burning and fall onto ledges or behind fire backs. Structural timbers were often built into the chimney and slow smouldering fires can begin in joist and trimmer ends borne out by the evidence of charred floor timbers abutting chimneys often uncovered during repair works.

The burning of insufficiently dry timber can cause the build-up of volatile oils in the chimney and result in a high-temperature chimney fire.

Basic measures to prevent or reduce damage

- Where chimneys are to be kept in use, it is essential that they be re-lined through their entire length. There are various methods of relining, one very adaptable method being the insertion of a flexible flue, which is then steam-cured to form a ceramic-type liner. Because flues in old houses often traverse distances to join a chimney stack, it may be necessary to open access points when installing a flexible flue.
- Have chimneys cleaned regularly. Check that there is no fall of sand or evidence of damage to the flue after cleaning.
- Avoid burning unseasoned or damp firewood with moisture levels over 20% and resinous timber such as pine in order to minimise a coating build-up in flues. Patent flue cleaning substances produced by stove manufactures may be placed on lit fires at regular intervals. These act to dissolve residues in flues.

THATCHED ROOFS

Buildings with thatched roofs are particularly vulnerable to fire which can be caused by sparks or burning splinters being carried up the chimney and out onto the thatch. This can happen easily during the fire-lighting process, when fast-burning materials such as paper, firelighters and kindling are often used. Sparks can also blow from another chimney or fire nearby.

Enclosed stoves with retrofitted flues pose a greater risk of carrying sparks and embers up to roof level due to the higher temperatures, induced draught and the greater velocity especially in high winds. Wood-burning and multi-fuelled stoves are not recommended for use in thatched buildings as research has shown that they present a greater risk of fire to the thatch.

Basic measures to prevent or reduce damage

- The chimneys that are best and safest for thatched roofs are the traditional fire opening and chimney that is large in cross section and does not have the intense draught to carry burning material up to roof level. Light small fires and slowly build up as the fire takes. Do not burn paper.
- Do not light a barbecue or burn garden or other refuse in the vicinity of thatch. This may involve reaching an agreement with neighbours.
- If there is an enclosed stove fitted, either remove it or extend the flue or add a chimney pot to achieve a height of 1800mm over the ridge. This may change the character of the structure and require consultation with the architectural conservation officer in the local authority.
- Fit a bird guard to prevent nesting.
- Ensure the chimney is correctly lined.

The thatch has been pulled down from this roof that unfortunately was not saved. In years past, the fire services would have used a thatch hook

HEARTHS AND FIRE SURROUNDS

Hearths in older houses are almost invariably stone flags or tiled surfaces supported on timber joists. A combination of cracking and joint movements can lead to glowing embers escaping into the space beneath the hearth and so igniting either the joists or the ceiling laths below. Structural timbers often extend under hearths and, as in chimneys, slow smouldering fires can begin in joist and trimmer ends which are often found charred during repair works.

Traditional cast-iron or stone fire surrounds (also known as chimney pieces or fireplaces) generally have cast-iron fire backs fitted into the larger stone or brick opening. These have voids behind them, sometimes left unfilled, into which glowing soot may fall with the same potentially deadly outcomes as outlined above. In this case, timber skirtings may ignite as well.

Basic measures to prevent or reduce damage

- Check hearths for cracks or gaps and thoroughly fill/seal with fire and heat proof material such as fire cement or grout.
- If a stone hearth is broken, it can be lifted and re-laid on a new cement-based board base.
- Cast-iron firebacks generally have an iron moveable throat piece through which a void can be checked. If a void exists, it may have filled with sooty deposits. These can be removed by a chimney sweep and the space filled with non-flammable material such as vermiculite granules available in a builders providers. The granules can be topped with a weak lime mortar mix.

A traditional cast iron fireplace where glowing soot fell behind the fireback and began to burn the floor and skirting (circled) adjacent to the fire surround

OTHER NAKED FLAMES – CANDLES, CIGARETTES, BARBECUES, BONFIRES

Candles can be knocked over, especially candelabras which are top heavy. Any naked flame can easily ignite loose fabric such as curtains especially with open windows.

Cigarette-smoking indoors has decreased but has become more surreptitious, leading to matches and cigarettes being stubbed out in secret places such as work storage areas which may contain flammable materials.

Bonfires, such as those at Halloween, pose a very serious risk in some areas as there can be a sudden spread to adjacent properties.

Basic measures to prevent or reduce damage

- Prevention here is based on common sense. All naked flames must be treated with great care and never left unattended.
- Candles, cigarettes and matches must be kept away from fabrics such as curtains. Loose, flowing clothing is also a hazard near flame.
- Barbecues should be positioned well away from any combustible materials.
- In the workplace the installation of smoke alarms in concealed spaces should be considered.
- Be watchful for accumulations of flammable materials or debris nearby which could be set alight.

KITCHENS AND COOKING

Cooking (especially when using oil and deep fat fryers) is a common cause of domestic fires.

Gas flames, hot cooking oil, unattended cookers, loose cloths and dirty extract filters all combine with the human factor to make a deadly mix. Fuel oil supply to former solid-fuel cookers can also create a significant hazard.

Extract ductwork can contain a build-up of greasy deposits which is highly flammable especially if there is a flare of flame from the cooking process.

A historic seventeenth-century country house in northern Spain, now used a guest house. The kitchen and dining facilities are in the stone outbuilding on the left linked to the main building by a short flight of steps covered by a simple roof and posing no fire risk to the main house

Basic measures to prevent or reduce damage

- Never leave a cooker unattended. Be careful not to trail leads from small appliances such as kettles or blenders across a cooker.
- Fire extinguishers, correctly positioned and maintained, are a simple, first-response firefighting device, recommended for most applications. Use a powder extinguisher at electrical distribution boards. Keep a foam extinguisher and a fire-blanket in the kitchen, within reach and not beside or over the cooker.
- Ensure that sufficient early warning devices are in place such as smoke detectors and heat detectors for kitchens. These should be fully-wired, maintained systems. However, if this is not possible in the short term, battery-operated stand-alone devices should be used as a temporary measure and regularly tested. Keep a supply of spare batteries.
- Wash the grease filters on extract hoods regularly to maintain maximum effectiveness. They are generally designed to fit into a dishwasher.
- Gas supplies, whether mains or from a bottled or LPG source, should be fitted with automatic slam-shut valves external to the building; these are triggered either by sudden loss in pressure or by the fire alarm. Oil supplies to kitchens or internal boilers should also be fitted with readily accessible isolation valves. Valves should be checked on a routine basis.
- Non-domestic, catering-type kitchens should be located away from historic buildings where at all possible. Where it is not possible to locate a non-domestic kitchen remotely, it should be fitted with reliable fire suppression systems, not only within the kitchen but also within any ductwork leading from the kitchen. Extract ductwork should be internally cleaned at a minimum once every 12 months. More frequent cleaning may be required depending on how heavily the equipment is used, and subject to inspection.

A manual gas valve with yellow handle and an automatic slam-shut valve (bottom) with power cable activated by the alarm system

UNSAFE DISPOSAL OF BURNING MATERIAL

The unsafe disposal of burning material is a serious risk, such as cigarette butts or ashes which can retain burning embers into the following day.

Basic measures to prevent or reduce damage

- Always place ashes in a metal container and move it outside, away from overhanging eaves and other flammable building elements. Never use a vacuum cleaner. Never leave a cigarette burning or dispose of it in a refuse bin until extinguished.

STORAGE OF FLAMMABLE MATERIALS

The casual storage of flammable materials such as solvents and paints, which are easily ignited, presents a significant hazard.

Basic measures to prevent or reduce damage

- Flammable materials are best kept either in a fireproof cabinet or in an outside storage area away from the historic structure.

FIRE SPREAD FROM ADJOINING SPACES OR PROPERTIES

When planning preventive measures, remember that containment of a fire is crucial to avoiding total loss. Compartmentation of the historic building can help to prevent a fire spreading from its source throughout the entire building.

Lack of compartmentation or fire separation is a major risk in historic buildings. Many eighteenth- and nineteenth-century terraced houses frequently have attic spaces common to the whole terrace so that a fire in one building can spread along through the roof-space to others.

Many large houses have been subdivided into apartments where separating walls and ceilings between units generally should have a minimum of one-hour fire resistance. This can be breached by services, whether electrical or plumbing, where they pass through floors or solid walls.

Generally, the greater the fire resistance of each contained space the better. Walls are generally fire-resistant, ceilings much less so and traditional doors, unless specially treated, offer little resistance.

It may be difficult in a historic building to create a fire-resisting enclosure to the staircase but doors opening on to stairs and landings can be made more fire-resistant.

Basic measures to prevent or reduce damage

- Form the habit of keeping spaces separated by closing doors, shutters and windows especially at night. This gives some degree of fire resistance and the oxygen supply is also reduced, which can help to slow the rate of fire spread.
- In terraced or semi-detached buildings, it may be simple and relatively inexpensive to compartmentalise attic spaces with timber and plasterboard and so prevent any fire outbreak from spreading from house to house. Ideally neighbours would cooperate to have this work carried out jointly. Proprietary fire barriers that prevent fire spread are an alternative and available from specialist suppliers.
- Building services, both piped and wired, should always be fire-stopped at the time of their installation. Fire-stopping can also be done retrospectively. It is both low-cost and easily achieved, using readily available intumescent materials which expand when exposed to heat and seal any voids through which fire can pass. Ensure that contractors are trained and competent to carry out the fire-stopping works.
- The fire resistance of ceilings may be improved significantly by the installation of a fire resistant layer within the ceiling void, inserted from the floor above.
- The fire resistance of existing doors may be improved by applying intumescent varnishes and/or paints and fitting intumescent seals into the door or frame. Door closers are effective but may not be acceptable in all cases.

Fire-stopping (white patch) where pipes run through compartment wall

ISSUES FOR THE FIRE SERVICES WHEN CALLED OUT

Time is a key factor when a fire breaks out. The time taken for the fire brigade to reach the fire, the time taken to access the building once the alarm has been raised and access to fire-fighting water will be significant factors in the level of damage occurring and the extent of fire spread.

Where the historic building is located away from the public water supply, there may insufficient water close by to control the fire. The location of ponds or other sources of water should be made known to the local fire brigade.

Lack of information about the property is also an issue. The more the firefighters know about the building, the greater the chances of saving it from destruction. While it may not be practical for the Fire Services to hold files on every historic building in their areas, they should certainly be briefed about larger buildings, building complexes and buildings with significant contents. If access is not simple and straightforward to buildings, regardless of size, the fire services should be informed.

Owners of remote dwellings should consider making their own water storage for fire-fighting by using precast concrete sections underground or excavating a pond to take run-off from the hill behind. In this example, such a provision together with a hose and submersible pump might well deal with smouldering thatch on a roof which would otherwise be lost while waiting for a fire tender to arrive with its small volume of water

Potential structural instability often inhibits firefighting due to the risk of injury or death to members of the fire crew, should collapse occur. Therefore, the provision of fully protected and structurally secure firefighting access may be considered essential in certain cases, especially for buildings where the contents may be of greater importance than the building itself.

It must be remembered that, in preventing a fire from becoming catastrophic, firefighting itself is capable of causing extensive damage to historic properties.

Basic measures to prevent or reduce damage

- Any relevant information for the fire services will be contained in the Disaster Plan as well as names and contact numbers for keyholders. If the building is large or complex with valuable contents, it is advisable to arrange to meet the Fire Officer or a Duty Officer to brief on the property. All fire crews hold regular training sessions and it may suit all parties if the historic property can be used as a training venue thus familiarising the crew with the site.
- Provide the fire service with information about the property such as access routes suitable for a fire tender (for example, avoiding narrow gateways or low arches, etc.), the type and height of building, if roof is of thatch, layout plans with locations of electrical distribution board, electrical isolation switches, gas mains shut-off or LPG storage tanks and the location of the nearest source of water. Any locked gates should have a soft lock (i.e. a padlock and chain) that can be cut off in an emergency. Otherwise another means of access should be provided. Remember that fire tenders cannot move on soft ground so cannot go off-road to avoid obstacles such as low-hanging boughs on approach avenues. Hard surfacing will be required close to higher buildings to support outriggers for high-reach appliances.
- If there is no public water supply, consider how to make available an adequate amount of stored water, close by but at a safe distance from the building. Options might include a garden pond or artificial lake or a large low-level tank for rainwater storage. Firefighters can pump from ponds or tanks which can be topped up during the fire by other fire service tankers or by farming neighbours bringing slurry tankers full of water. It may be wise, depending on the specific property and on the terrain, to run a dedicated fire main from a water source to the building pressurised by electric pumps with standby generator. These are judgements to be made depending on the specific building and its contents in consultation with the fire services and perhaps with insurers. If adding a water storage feature, consider if there are any planning or archaeological issues that need to be addressed.
- The Disaster Plan should be available when the firefighters arrive on site. All critical information should be in large type and on laminated paper. An external post-box is an example of a good place to store a copy on site but at a safe distance.
- Remember that the fire tender may not have access to records in the station – it may arrive at the emergency from another call-out or may not be based in the nearest station.

Flooding

Flooding is the disaster type that is most likely to be foreseeable and to recur periodically – though this is not inevitably the case. Flooding may arise from sources external to a building including from the sea, from rivers, canals or small streams. It is also the most likely cause of damage to landscape features, gardens and archaeological or historic sites with sub-surface remains.

Flooding may also be caused by rising ground water or high water table and this is more difficult to counteract. A further type of flooding is caused by internal or external burst pipes, blocked drains, and various other sources that are less predictable. It is necessary to describe types of flooding in detail so that the nature of each is understood in assessing risk.

Flooding: associated risk factors

Location is the overriding factor in assessing the risk of flooding from external sources. The government, through the Office of Public Works, has carried out extensive flood risk assessments. All those who are assessing their risk should access the website: http://www.flooding.ie.

While government action is reducing or eliminating the risk in the worst-hit areas, many owners need to be proactive in managing their property and taking their own preventative measures.

Flood risk assessment will always require an investigation that goes well beyond the immediate surroundings of the historic building. Historic mapping may often indicate risks of flood which have been forgotten because of changes in the landscape including drainage, river diversion, dredging, etc., but which still leaves vulnerability as a result of accident or exceptional weather events.

Significant late eighteenth- and early nineteenth-century changes occurred where navigable canal systems were built which frequently required the re-routing of local rivers and streams with diversions passing under the canal. The later construction of railways also resulted in drainage diversions. The assessment, therefore, must look beyond the immediate surroundings into the river and stream catchments, and the head waters of canals.

FLOODING FROM SEA, RIVER OR CANAL

The risk of flooding from the sea can, quite often, be predicted, as can the risk of its occurrence. It is particularly severe when a high spring tide follows a period of heavy rainfall. The construction of defences against tidal flooding can be both expensive and intrusive, either on the landscape or on the historic building. Total protection can never be guaranteed. The conditions which give rise to exceptional tides are well understood, generally involving the high point on the tidal cycle coupled with low pressure and gale or storm force winds from a critical direction, especially a continuation of the storm winds over a prolonged

Repairs underway to a nineteenth-century bridge damaged by flooding. The initial damage was caused in 1948, not by the river itself, but by a haycock carried downriver from a flooded meadow which jammed under the bridge as the river rose. During the repair works in 2004, material carried downriver by another flood destroyed the aluminium scaffolding built off the bed of the river but did not cause any further damage to the bridge

period. The preparation and rehearsal of an evacuation plan for historic material is, therefore, essential if effective use is to be made of warnings received. Where flood defences are deployed it is important to understand that rising water levels may also inundate the drainage system for the building and back flood through drainage gullies, sewers and the like. Where a system is in place to isolate those services, it will then be necessary to have a standby pumping system with its own power supply to dispose of rainwater and infiltration.

The ability of rivers, streams and drainage ditches to discharge flood water is dependent on their gradient and elevation above sea level. River systems with a steep gradient may have local interruptions such as rapids or man-made obstructions such as weirs and bridges, so that a local portion of the system may remain subject to the risk of flood while the river as a whole may be capable of discharging most flood water. Rising river levels, which ultimately overflow into the surrounding countryside, may cause flooding which could be very slow to disperse and linger in hollows long after the river level has started to subside. Rivers, which historically were subject to flooding but have been controlled by the building of dams, also need to be assessed in relation to long-duration storms. This can result in the exceeding of the capacity of the dam to retain rising flood waters. The emergency release of water from dam systems is necessary on occasions.

Canals can act as a collection system for surface water run-off in severe storms, which is discharged to local streams and thus increases their flow and vulnerability to flood.

Flooding caused by rivers, canals and local streams will generally be preceded by a reasonable degree of warning so that the precautions described for tidal flooding should be in place for this risk also. As with tidal flooding, the cost of providing flood defences for individual buildings may be prohibitive and all of the issues already described will apply.

A medieval monastic complex subject to flooding from a nearby river. This type of flooding tends to damage foundations and cause subsidence leading to possible collapse

Flooding in a small building can be prevented in a variety of ways, the first line of defence being a barrier at the entrance to divert the water flowing down the approach road (Images courtesy of the Irish Landmark Trust)

The Vartry river at Mount Usher Gardens in flood in 2010 up to the level of the bridge deck. Both suspension bridges were swept away in a 1986 hurricane and were faithfully remade based on the salvaged remains of the originals. The decision not to raise the bridges to a higher level over the river was based on retaining the character of the gardens. The paths on each side of each bridge would have had to be ramped to a higher level. As well as changing the character, raising the paths would have impeded the flow of the flood water and increased the damage caused (Image courtesy of Mount Usher Gardens)

Basic measures to prevent or reduce damage

- In many instances, damage from this type of flooding can be prevented or reduced by barrier systems, which are available in many types. They can be purpose-made for the building if the flood risk is serious and regular. Professional advice is required.
- If the property is enclosed by a wall, a first line of defence can be formed by placing a barrier at the gates. This is effective if the source of the water is external to the site and the soil is non-porous. It will not work in areas with a high water table.
- **Sandbags and sand:** these should be filled in position, otherwise they will be too heavy to move into place. They are low-cost and adaptable. Note that sandbags can become contaminated by foul water and in which case should not be re-used.
- **Clip-together/interlocking PVC barriers:** there are a number of types of patent barriers. The weight of the floodwater anchors them in position.
- **Door barriers:** commercial models which slide into door frames are highly effective. They need to be accompanied by vent barriers in buildings which have floor vents.
- **Vent covers:** there are devices available which will prevent water entry through floor vents. Patent covers can be clamped on quickly to vents or special air-bricks to replace traditional vents and seal automatically as water rises and reopen when it subsides.
- **Barriers made from inflatable tubes:** these have an attached skirt at ground level. They are light, easily moved, stackable or inflatable and easily cleaned and reusable.
- **Barriers attached to buildings:** barriers are a maximum of one metre high if attached to a building. The weight of the water over one metre high is likely to do greater structural damage than the flood.
- **Barriers not attached to buildings:** these can be higher than one metre but are usually heavy-duty, and generally used by local authorities. They are considered to be outside the scope of these guidelines.

For further information refer to www.flooding.ie

Although these terraced houses have boundary walls to the street, flood water entered the front gardens via the gateways. Temporary barriers at the gates would have helped prevented this occurring (Image courtesy of Cork City Council)

The use of sandbags can protect a building from flooding

FLOODING FROM RISING GROUND WATER LEVELS

Prolonged periods of intense rain may give rise to situations which have not been experienced in living memory so that, even where the historic building is located above the risk of riverine or tidal flood, rising ground water levels may also constitute a risk. Forgotten wells may overflow, some of which may even be located within historic buildings, and those with basements may be vulnerable to flooding from that source. This may also arise in urban areas where ground water abstraction was the common source of water supply and which is no longer used.

Modern structures will not be as badly affected by this as they have barriers against damp and water built in at time of construction. However, in older buildings, the water can rise through floors and walls.

Basic measures to prevent or reduce damage

- The only effective preventative action here is to prevent back flow from drains (see below). In reality, the ground water is most cases will probably be contaminated to some degree.

BACK FLOW FROM DRAINS

In floods, drainage systems can become inundated and foul water can back up and enter buildings which are otherwise protected by barriers. This water is heavily contaminated and it is essential to deal effectively with the risk.

Basic measures to prevent or reduce damage

- **Non-return valves:** a pipe fitting containing a gravity flap can be fitted to soil, waste and rainwater systems to allow only outward flow. These can also be fitted at the manholes closest to the building. They are designed for modern materials and pipe sizes so adapters may be necessary.
- **Pipe bungs:** a simple temporary DIY retrofit to prevent back-flow fitted to WC pans. These are not as fail-safe as the non-return valves but easily accessed and fitted.

FLOODING FROM EXTERNAL PIPES AND DRAINS

Water mains and drains also present a risk of flooding. Local distributor water mains can, if fractured, flood basements. Larger trunk mains can result in very significant flooding and water flows with an attendant risk of damage. The same is true of blocked surface water drains or sewers which carry the added health hazard of contamination.

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Basic measures to prevent or reduce damage

- This is a local authority matter and very little can be done by a building owner except to carry out regular inspections of basements especially where these are unused.
- Be vigilant for signs of seepage on walls adjoining public services and contact the emergency services at the first sign of problems.
- Also look out for blocked road gulleys close to the property and report.

FLOODING FROM INTERNAL PIPES AND DRAINS

Water storage cisterns, mains water supplies, hot and cold water distribution systems and central heating systems all have the potential to develop leaks which may be quite damaging when caused by the action of frost and freezing.

It is also the case that even very small leaks, which go undetected for a long time, can create the conditions for dry rot to flourish, the results of which can be equally catastrophic to a historic building.

The assessment of risk in relation to water services must always start with the knowledge of where all the services are located, combined with routine inspection.

Plans and, where necessary, elevational drawings of pipe services are an essential tool in carrying out routine inspection and maintenance. Such drawings should show the location of all isolating valves with their identification numbers, as well as the external isolating valves for incoming water supplies, including external routes of heating and hot water systems, where boiler rooms are located remotely.

Water storage cisterns, mains water supplies, hot and cold water distribution systems and central heating systems all have the potential to develop leaks which can do serious damage. Slow drip leaks can cause dry rot over time. Sudden leaks, such as a pipe joint parting, can bring down ceilings and destroy contents.

A galvanised steel tank which has been emptied and is showing signs of corrosion. Steel will corrode at different rates depending on the pH of the water. Such a tank can fail suddenly and cause serious water damage as it will continue to take in and leak water until the incoming mains supply is turned off

A slow leak from water pipes has caused this outbreak of dry rot

Basic measures to prevent or reduce damage

- All pipe positions and pipe runs should be marked up on plan and elevation diagrams locating and identifying all isolating valves as well as the external isolating valves for incoming water supplies. This should include external routes of heating and hot water systems, where boiler rooms are located remotely.
- Have installation inspected by a competent plumber.
- Replace galvanised water storage tanks with PVC or GRP tanks standing on a drip tray which has its own overflow located prominently, such as over a door.
- If a serious leak occurs at upper levels, turn off relevant valves but especially the rising main to avoid the storage tank filling. Empty the tank quickly by running all taps unless the leak can be isolated.
- Punch small holes with a screwdriver in the ceiling between floor joists – avoiding decorative mouldings - to release water which can be collected in various receptacles on the floor below as it drains. This action, if taken quickly enough, will save ceilings from collapse.

WATER DAMAGE TO CONTENTS

All flood sources have the potential to cause damage to the contents of the building.

Basic measures to prevent or reduce damage

- Review the property and its contents. Identify the most important and precious contents. Select the most suitable space at higher level.
- Use waterproof stackable boxes with sealable lids. These will have two functions: to safely store items and to act as a stacking system to raise the storage level of important contents off the floor, especially in a single storey building.

Weather damage

This section addresses the risks associated with weather events created by storms and high winds, intense rain or snow, and lightning, including combinations of these.

STORMS AND HIGH WINDS

Storms and high winds can cause extensive damage to roof finishes, particularly if the roof is vulnerable or slates are starting to slip. If a few slates fall, a small opening in the roof can admit strong winds and much of the roof can be ripped open causing rain damage to the building interior as well as to the roof finish.

Debris and rubbish, such as plastic bags, can be whipped up and blown onto roofs with the risk of blocking the outlets from internal valleys. External gutters, which are not well secured, may be dislodged and blow off and in falling, may cause damage or injury elsewhere. Less frequently, windblown debris can break windows.

These images are examples of damage during a severe storm in 2017. When a breach is made, the wind gets under the roof covering and lifts it off. Had the storm lasted for longer, entire roofs might have been stripped

Detail of slates stripped from a roof and piled up at the bottom of the valley gutter

The upper part of this roof has been almost fully stripped and the lead ridge has been blown back

A nineteenth-century farmyard building with no gutters. The wind got under the projecting eaves and blew off the slates

In older tiled roofs, the tiles are simply laid in place. The lugs on the back of the tile hang over the battens without any fixings. Such roofs can suffer more extensive damage in high winds than slated roofs

Where roof coverings are assessed as being vulnerable to high winds, access to temporary roof covering material should form part of the contingency planning. This is particularly important because a major storm is likely to result in damage to other nearby structures too, and so competent personnel to carry out repairs may not be immediately available.

Trees are vulnerable to being blown over in high winds, particularly if the storm has been preceded by a period of wet weather. The risk assessment should examine the potential of a falling tree or branches to damage the historic building or elements within an ornamental garden. Where possible, it is essential to reduce that risk either by reducing the height of the tree or, where it is very close to the building, removing it entirely.

Historic structures which do not have roofs, such as ruins, can be particularly vulnerable to damage in storms and high winds. In addition, the heavy growth of vegetation, such as ivy, on the walls can increase the risk of wind damage to a structure.

Storm winds may come with an advance warning, but the time available is unlikely to be sufficient to undertake robust mitigating measures to prevent damage. It should, nonetheless, trigger the contingency element of the Disaster Plan.

Basic measures to prevent or reduce damage

- Roofs and gutters should be examined regularly and outlets kept clear.
- Where roof coverings are assessed as being vulnerable to high winds, it is advisable to keep temporary roof coverings to hand such as tarpaulins which can be tied down with lorry straps, weighted with nylon rope tied to concrete blocks or otherwise anchored. Timber laths and plastic sheeting could also be used in an emergency. This should form part of the contingency planning as a major storm will, inevitably, result in damage on a wide scale in the local area, and competent personnel to carry out repairs may not be immediately available.
- If safe access to the roof is not possible due to the storm, every effort should be made from the roof interior to seal the gap and stop the wind blowing through.
- Trees close to buildings or garden features should be inspected regularly. Boughs may need to be cut back or height reduced or, as a last resort, the tree removed if it is diseased.

While this windblown tree has fallen away from the gates in a storm, the uprooting has lifted the gate pier with the attached gate (Image courtesy of Irish Landmark Trust)

Part of a Chinese poplar ripped off in a storm and lying in the river. The trunk split but was removed as it was judged to be unsafe. The best prevention of tree damage is to practice good tree care - keep them healthy and trim back when necessary (Image courtesy of Mount Usher Gardens)

RISK FACTOR: RAIN

Exceptionally intense rain may overwhelm the rainwater disposal systems, especially at roof level. Internal valleys are very vulnerable in this regard as are external gutters and downpipes and the underground drainage system to carry the rainwater away from the building. In urban situations, gutters and drainage outlets can be blocked by food containers or nesting material brought by birds to roof level or by dead birds. Risk evaluation in relation to rain should consider the installation of secondary outlets for rainwater from internal valleys and the stability of gutters when running full to the brim. The risk of increasing rainfall intensity and duration needs to be factored in to the evaluation of underground storm drainage systems.

Saturation of solid masonry walls may lead to raised moisture levels on the inside of the building, which will expose timber in contact with the wall to the risk of dry or wet rot.

Basic measures to prevent or reduce damage

- Check gutters regularly to ensure that they are clear. Also check gutter and downpipe brackets and fixings. Reset gutter brackets if not level or running to a good fall.
- It is good practice to provide a second outlet to internal gutters as an overflow to prevent water ingress.

RISK FACTOR: SNOW

Substantial falls of snow are relatively rare in Ireland, although we have seen an increase in recent years, and to date little attention has been paid to the risk associated with heavy snow fall. Internal valleys of roofs are at risk of being blocked by heavy snow fall, followed by the risk of overflowing into the building when a thaw sets in. External gutters are vulnerable to being swept off their brackets by snow slides down the roof slope as a thaw sets in or as the weight of snow increases which can cause it to slide off. The weight of a build-up of snow on fragile or vulnerable roofs has the potential to cause structural damage.

Snow poses similar risks to water in that external gutters and internal gutters are vulnerable. External gutters may collapse under the weight of deep snow sliding off the roof. Internal gutters will hold a great depth of snow which can leak into the building when a thaw sets in.

Basic measures to prevent or reduce damage

- Check gutter brackets and fixings as snow will add a lot of weight.
- Be aware of the danger with internal gutters when a thaw sets and carry out an inspection. Collect water in the roof space to prevent it damaging the building interior.

LIGHTNING

Isolated buildings in the countryside and tall buildings in towns and cities are vulnerable to lightning strike, which can result in very substantial damage and occasionally may be the cause of fire. In towns, the tallest buildings will normally have lightning protection and as a result provide some protection to neighbouring buildings. However, in unprotected buildings the effect can be similar to an explosion. Ruinous structures can be particularly vulnerable to lightning. Many are isolated and unroofed, more likely to be saturated with water and therefore more conductive to a high-voltage strike.

A typical lightning strike can contain up to one billion volts which needs to find its way to earth along the shortest and most conductive route through a building.

The main hazards of a direct strike are fire, starting in roof timbers or melting cables along the conductor path, power surge damage to equipment and alarm systems, and shock wave damage, most often affecting chimneys and other masonry. Lightning damage may not be immediately obvious.

Basic measures to prevent or reduce damage

- If the building has some of the risk indicators, it would be advisable to have an assessment carried out and appropriate protection installed. The assessment should take into account the type of structure, height, construction, relative location, adjoining buildings and topography.
- The installation must be checked at regular intervals. The copper downtape used is vulnerable to theft and this must be borne in mind when designing the installation.
- Lightning protection, where installed, should comply with IS EN 62305.

The Browne-Clayton Monument, County Wexford where the force of a lightning strike dislodged masonry at the top (Image courtesy of Raineys, Swords)

The repaired Browne-Clayton Monument with the newly-fitted lightning conductor just visible at top to left of centre (Image courtesy of Raineys, Swords)

Building and repair works

Building alterations and essential repairs to historic buildings, even where carefully designed and fully specified, still involve significant risk for the building. The range of potential damage created by building work is extensive, the principal areas being fire, water damage and structural issues.

Working in an existing building is very different to a new-build site and the sequence of works is not as clear-cut. Experienced contractors will generally recognise potential failures before they occur and take remedial steps. Awareness of the differences and the ensuing risks may not be apparent to inexperienced construction workers. Where an existing building continues to be occupied during the building works or contents have not been removed, the risks increase dramatically.

Fire risks may arise from temporary power supplies and the voltage transformers used with such supplies, temporary lighting, especially from high temperature sources such as halogen, welding equipment, the use of blow torches and cigarette smoking by operatives. Many fires occur while building works are in progress, well-known examples being the devastating fires at England's Windsor Castle and more recently at Nôtre Dame Cathedral in Paris.

Water damage is an ever-present risk associated with building works and can happen easily. Hoses running through a building can be accidentally ruptured or joints pulled apart, releasing considerable volumes of water before being noticed and dealt with. Carelessness in the draining down of tanks and heating installations will have a similar result, damaging ceilings and contents. Fire caused by building works also brings with it the possible consequent damage caused by thousands of litres of fire-fighting water.

Other areas of risk are the overloading of floors, structural instability while damaged or rotten beams are being replaced.

Existing insurance cover may be compromised by a failure to inform insurers that building works are taking place. Generally, the owner carries the existing building risk and the contractor carries risks associated with the works being carried out. The owner should give written notice to insurers or brokers of building works taking place and also request that the contractor's insurance policies be checked and approved.

The owners should ensure that the building specification and tender documents refer to all necessary special measures and precautions to be taken during building or repair works. The need to take precautions and special care should form part of the simplest contract where an owner accepts an estimate from a contractor. Where a specification is used, ensure that suitable clauses are included to cover the precautions such as those listed under the headings below.

Failure by contractors, when preparing an estimate, to make proper provision for the precautions necessary in existing structures can cause problems on site.

Risks arise when building operatives, unfamiliar with the specific building or with older buildings in general, are handling materials and carrying out actions that are inherently hazardous. Such lack of awareness carries a risk of causing damage to historic structures.

The measures which follow in this section should be the responsibility of the contractors employed for the works rather than the owner.

Basic measures to prevent or reduce damage

- The contractors should hold an induction meeting at the outset to explain the significance of the building and its various elements to all operatives on site, listing the Dos and Don'ts and the reasons behind them. All new arrivals on site should be briefed.
- It is good practice, especially on larger projects, for the contractor to hold a morning meeting so that all foremen, general and trades, know what is being done that day and by whom.
- There should be a careful end-of-day check by a designated person and, in certain projects, a night watch.

FIRE DURING CONSTRUCTION WORKS

The use of equipment that are heat or spark sources (such as blow torches, welding, cutting by oxy-acetylene or powered cutting discs) are a serious risk factor. Other risk factors include lighting and power such as high temperature lights, faulty transformers. Cigarette smoking by operatives on site is a further risk.

Basic measures to prevent or reduce damage

- The use of equipment that are heat or spark sources (such as blow torches, welding, cutting by oxy-acetylene or powered cutting discs) should be banned from the interior of historic buildings. 'Hot work not permitted' should be stated in pricing documents. If there is no other option, the hot work permit system should be introduced. This lays down strict rules and controls, such as spark blankets and an observer not involved in the work. If welding does take place, a watch must be maintained at the location for one hour. The hot work permit should be accompanied by a safety statement and a schedule specific to each work location.
- Temporary lights should be fixed independently to tripods or protective casings and never directly to the building fabric. Avoid the high temperature halogen lights internally and use LED lamps instead. Have transformers tested at the outset.
- Ban cigarette-smoking inside the building.
- Maintain portable fire extinguishers at strategic points throughout the building, including a dry powder extinguisher beside the electrical distribution board.

WATER DAMAGE

Damage can result from the careless draining down of storage tanks and heating systems.

Hoses running through a building during construction works can be accidentally ruptured or joints pulled apart, releasing considerable volumes of water before being noticed and dealt with.

Basic measures to prevent or reduce damage

- It is preferable to drain systems totally rather than partially. Maintain a watch while system is draining and close all open valves after draining to guard against accidental release of water during refilling.
- Hoses should not be permitted internally and no mixing involving water should take place internally. Necessary wetting of surfaces, such as for plastering should be done by spray from portable containers.

STRUCTURAL DAMAGE

The overloading of suspended floors can happen easily during construction works. For example, if material removed is not taken away, the replacement material may be delivered and stacked in the same space resulting in double-loading of a floor.

Structural instability can occur during the replacement of elements of structure such as beams.

Basic measures to prevent or reduce damage

- All heavy material, such as failed plaster, should be taken out for disposal as soon as it removed. Do not let weight accumulate on floors. Materials for re-use should be stored elsewhere or carefully stored along walls, never at mid-span.
- Adequate propping should be in place to openings and the adjoining floors. Where works involving the structure are planned to happen adjacent to each other, one should be completed before commencing the next.

Human causes

VANDALISM

In recent years, the threat of damage to historic buildings from human action has come to public awareness through the deliberate destruction of significant heritage. Apart from such extremes, there is a range of potential threats to historic buildings arising directly from human actions such as theft, arson, vandalism and other malicious behaviour.

Most acts of vandalism occur when buildings appear to be unoccupied or neglected. At the lower end of the scale is the damage caused by spray-painted graffiti, which may permanently mark stone surfaces, or window glass breakage which if left unrepaired, can give rise to fabric damage including dry rot, damage to interiors and heightened security issues.

There is a growing risk of theft of lead and copper elements from roof coverings and gutter linings which, if undetected – even for a short while - may result in very significant internal water damage and the outbreak of dry rot.

Most serious is the risk of arson, easily carried out and with many possible motivations. This risk may be mitigated to some extent by reducing vulnerability at ground level. External security lighting and CCTV are deterrents and, where a building is unoccupied for a long period, ground-floor windows may need to be secured with external shuttering which, of course, must incorporate some method of ventilation for the interior.

Broken window glass leaves a building interior exposed to water ingress and will increase the risk of rot at floor level. If left unrepaired, it may attract further vandalism

Basic measures to prevent or reduce damage

- Ensure that the building appears to be cared for. If the building is unoccupied, make regular visits and carry out basic tasks such as clearing litter and cutting the grass.
- Deal with graffiti promptly to avoid permanent staining of stone or brick. This may require specialist advice. Do not consider sand-blasting.
- Repair broken glass to prevent water ingress as well as unauthorised entry.
- Check that windows and doors are locked when vacant. Use five-lever deadlocks on doors and sash locks on windows.
- Ensure that there is no access through upper level windows or from adjoining roofs.
- Seal letter plate if the building is vacant and use window shutters for additional security.
- Where contents are valuable or roof coverings incorporate lead or copper, enhanced security measures should be considered. These include intruder alarms, motion-sensitive lighting and camera monitoring.
- To reduce the risk of arson, increase security at ground level and ensure that flammable materials such as fuel containers, gas cylinders or paint tins are not left accessible in outbuildings or visible through windows or doors. Ensure there are no accumulations of flammable materials or debris nearby which could be set alight.
- Where a building is unoccupied for a long period, ground-floor windows may need to be secured with external shuttering which, of course, must incorporate some method of ventilation for the interior.

Decay and rot

Older buildings are vulnerable to undetected water ingress or minor leaks in services, which may raise the moisture content of affected timbers to the danger level for the development of dry rot. Those buildings that are unoccupied for long periods are particularly at risk.

The spores of the dry rot fungus are present in the atmosphere at various times throughout the year and may lie dormant on timbers for many years until activated by the optimal moisture content. The fungus requires a still air condition in order to flourish, and so buildings fully closed up for security purposes are particularly vulnerable. Other vulnerable spaces are floor voids and behind window linings.

Buildings where there has been a fire and much moisture from firefighting water or being open to the elements are very vulnerable to dry rot when they have been reroofed and are beginning to dry out.

Dry rot is caused by water ingress and lack of ventilation creating optimal conditions for fungal growth. Regular drips on to timber surfaces from condensation over an extended period can also cause rot.

Basic measures to prevent or reduce damage

- Maintain gutters and downpipes in good working order.
- Be vigilant for any water-marking internally particularly under roofs and valleys. Showers at upper levels or on timber ground floors can cause dry rot if not fully tanked.
- Ensure effective ventilation. This is particularly important where a building is drying out following a flooding or fire-fighting event.
- In the event of a dry rot outbreak, the source of water or moisture ingress needs to be identified and eliminated, following which it may be necessary to engage in a sterilisation process. Seek professional help.
- Buildings which are closed up for long periods should be provided with adequate ventilation. Window shutters should be left slightly open from the sash or casement, and attics should be checked to ensure that insulation does not block ventilation from the eaves. All plumbing systems should be drained down entirely and arrangements should be made for routine inspection of gutters and internal valleys, as well as the integrity of the roof covering.

Dry rot fruiting body with its source in the floor under choir stalls in a nineteenth church

The underside of a timber floor with a severe outbreak of dry rot

Catastrophic collapse

Collapse, whether total or partial, may occur because of structural failure, dry rot and other factors such as flooding, fire, lightning and other storm damage mentioned elsewhere in this volume.

The structural integrity of many buildings may be impaired by alterations carried out over the course of their lifetime. Internal walls may have been removed to combine rooms into a larger space. A thick wall may have been mined out to make extra space, to form a bathroom, for example. The cumulative effect of previous works may have seriously impaired the stability of a building and all that is required to cause collapse is one further ill-considered intervention - which may be quite minor. The most vulnerable buildings in this regard are those with a full or partial commercial use where loadings might be higher and which, because of their more frequent change of ownership, the knowledge of previous interventions has been lost.

Alterations including the use of inappropriate materials such as cement render on a historic building trap moisture within the structure behind, causing decay and in some cases can lead to catastrophic failure

Flooding is also a significant risk factor for catastrophic collapse. Recurring floods greatly increase the risk of damaging building foundations. Rising flood waters will find weaknesses in the surrounding soils on which a building stands, either as the route of services or because of natural variability. Rising and falling flood waters can alter the composition of those soils, resulting in significant settlement as the flood abates, and sometimes partial collapse. Very severe floods where rushing water is obstructed by the building may result in quite deep erosion resulting from the locally increased speed of the flood water. Old buildings may become either so distorted that they are no longer viable or collapse in the course of the flood.

Fire that is well advanced in a building can create conditions of catastrophic collapse while the fire is raging. This may be the result of either the collapse of floors or the loss of restraint for roofs as collars and joists are lost, causing the walls to be pushed out. The risk to firefighters arising from these conditions may require the effort to extinguish the fire to be abandoned.

Storms can cause catastrophic collapse, particularly in buildings whose structural integrity has been weakened as a result of modifications or rot in timbers which would have provided bracing for walls. Most vulnerable in this regard are gable walls where the floors span from front to back and, in particular, gable triangles.

The risk of impact from vehicles, especially heavy vehicles, is increased where historic structures front on to 'T' junctions, or where footpaths are absent in very narrow streets and towns. Impact by a heavy truck, either directly or as a result of side sway in a narrow street, can cause very significant damage, in many cases sufficient to precipitate a collapse. Protection in the form of standard crash barriers is visually very intrusive and may be unacceptable close to a historic structure. Axle weight is a major factor in causing vibration to a structure.

The need to integrate traffic management with the protection of historic structures is outside the scope of this report.

Damage from earthquake is unusual in Ireland and the risk is very small. Minor earthquakes do occur occasionally in the Irish Sea and there is also a risk of mining-induced earthquakes. Collapse, as occurs in earthquake-prone countries, is not considered a risk in Ireland.

The corner of a small eighteenth-century building immediately after being struck by a truck

The damage to the gable after the vehicle was removed. The wall was rebuilt using the salvaged material from the mid-point of the gable to the windows on the front wall. A simple bollard would offer protection here. In previous centuries, jostle stones were used to prevent impact from horse-drawn vehicles

An important twelfth-century Hiberno-Romanesque portal very close to a busy street corner. The risk of impact damage was high as the railings were positioned very close to the doorway, the junction was busy and there was often illegal parking on the footpath. Planning permission was granted to move the railings further out from the building, to widen the footpath and to place bollards to prevent parking on the footpath. The bollards facing the church doorway are removable to allow for funerals

RISK FACTORS FOR CATASTROPHIC COLLAPSE

Catastrophic collapse can occur due to poor structural condition caused by alterations, flooding, or dry rot. It can also be the result of lightning strike or impact, for example by vehicles.

Basic measures to prevent or reduce damage

- If there is any reason to be concerned, such as the building history or evidence of cracking, have the building inspected structurally and implement the recommendations. Use a professional who is a conservation specialist and likely to propose more restrained measures if any action is needed.
- Where a lighting strike has occurred, it is advisable to commission a risk assessment and follow the recommendations.
- Where a building has been struck, or is in danger of being struck by a vehicle, the problem should be discussed with the local authority. The use of flexible parking posts or removable metal bollards could be considered depending on the situation. All such markers are visually intrusive but have the advantage of being reversible.

Catastrophic collapse of historically important but vacant building in which the entire internal structure fell in because a spine wall collapsed at a lower level (Images courtesy of Cork City Council)

The almost total collapse of a floor where the joists were affected by dry rot

A church porch projecting slightly from the line of the side wall was struck by a construction vehicle moving along the adjacent laneway. It survived without collapse and was able to be partially rebuilt (Image courtesy of Dublin City Council)

A distinctive eighteenth-century house, unique in its oval plan with curved end-bows, was destroyed by fire. The collapse of a chimney stack during the fire took down the rear wall. It now requires stabilisation to prevent further collapse, pending decisions regarding its future

Conservation Principles

The primary aim of conservation is to prolong the life of something of value, and to do so in a way that protects what is valuable about it. The built heritage enriches our lives and provides a connection with, and a means of understanding, a shared past. Historic buildings have incalculable value as tangible records of those who have gone before us, of the lives they lived and of their aspirations and achievements. Each structure provides unique and irreplaceable evidence of the past and should be passed on to future generations with that evidence intact.

As each historic building is unique, each requires an individual assessment of its significance, its condition and a solution to the particular conservation issues that have arisen. Building conservation requires highly specialised skills in all aspects of the works. Expert advice is needed in assessing the extent of works required, designing and specifying those works, and overseeing the project on site. Skills are required of the contractors, craftworkers and others who carry out the works to the building.

An aim of good conservation is that there should be minimal intervention into the historic fabric of a structure. Conservation works should do as much as necessary, yet as little as possible to the structure to ensure its future. This means that elements, including windows, doors, roof details and the like, should be repaired rather than replaced. Conjectural reconstruction of any part of the structure should be avoided and only undertaken where there is good reason and where the works can be based on reliable documentary or other evidence. Appreciation is needed of the various phases of construction. Later additions or alterations may be of equal, or in some cases more, interest than the original built fabric.

CARRYING OUT MAINTENANCE OR REPAIR WORKS TO A HISTORIC BUILDING

- DO use the experts – get independent advice from the right people
- DO record the materials and construction details of the historic building before altering it
- DO establish and understand the reasons for failure before undertaking repairs
- DO repair the parts of the structure that need it - do not replace them unless they can no longer do the job they were designed to do
- DO make sure the right materials and repair techniques are used and that even the smallest changes made to the structure 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 structure
- DO record all repair works for the benefit of yourself and future owners
- DON'T overdo it – only do as much work to the structure as is necessary, and as little as possible
- DON'T look at problems in isolation – consider them in the context of the structure as a whole
- DON'T use architectural salvage from elsewhere unless certain that the taking of the materials has not caused the destruction of other old buildings or been the result of theft

2. The Disaster Plan

The key to prevention and preparedness is the **Disaster Plan** – a risk management plan that can be immediately implemented in an emergency. A Disaster Plan is a written document setting out sensible measures which would minimise or avoid the likelihood of the emergency and reduce the extent of damage and loss caused should it occur. It is tailor-made for each situation - identifying the risks, taking sensible measures to reduce them, making advance preparations and setting out how best to respond to and recover from an incident.

Who prepares the Disaster Plan?

The Disaster Plan is best prepared by the person who is most familiar with the building, its functions and contents. This person, working with basic guidelines such as these and using their own detailed knowledge of the building and a lot of common sense, will follow the advice as it relates to their specific situation. Each Plan is devised for the individual building in its setting and takes into account its specific needs. While many specialist skills may be involved in dealing with disasters and their aftermath, the preparation of a Disaster Plan is a simple, straightforward matter. Initially, it will take time to set up but, once prepared, it need only be reviewed on an annual basis and updated as necessary. For private owners, the arrival of the insurance renewal notice could serve as a reminder for the review.

In a large building or complex, the Disaster Plan should ideally be prepared by the person responsible for management, with the assistance of a team.

Why is it important?

The Disaster Plan does three essential things

1. It assembles and keeps safe all that is known about a place in one accessible document - the contact numbers, the location of precious contents to be saved, what the firefighters need to know, the location of cut-off switches and valves and so on. Remember that in certain emergencies there is little or no time to think, and having details to hand will save precious time. Also, important knowledge of a place can be lost through death or incapacity, change of ownership or personnel, so making the Disaster Plan reduces dependence on the availability of any one person. For this reason, it should become part of the documentation of the building, as much as its title deeds or the Safety File for recently completed buildings.

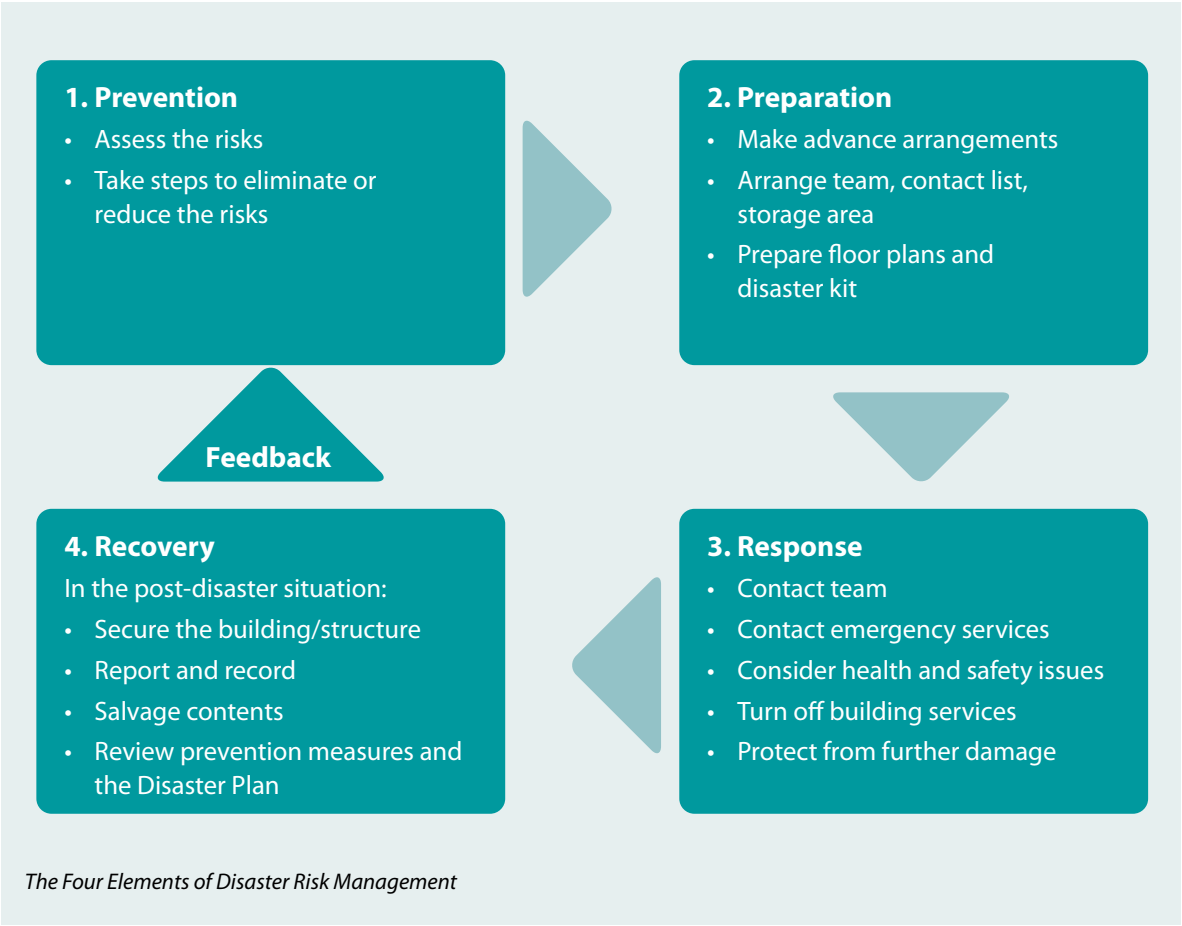
2. The act of preparing the Disaster Plan will bring about a review of the existing risks including matters that may never have been considered previously; the steps that can be taken to guard against them and how loss and damage can be reduced, should the worst happen. The very process of preparation will almost certainly lead to long-overdue checks and essential action being taken on items that may otherwise be put on the long finger.

3. The Disaster Plan will encourage an assessment of what is truly important about the property; what features contribute to its unique character; and where its significance lies. This assessment will be reflected in the Building Record and in the Disaster Plan.

The Building Record

Before setting about preparing the Disaster Plan, it is important to make as full a record as possible of the site, the building and its contents and to recognise what is important and special about them, to list the significant elements and items and identify where these are located within the site. This Building Record will inform the Disaster Plan, probably with extracts included, but will not be part of it. It is important to have this record to be able to protect the character and significance of the building when recovering from damage.

- At a minimum, take general photographs externally and of each space internally. Take detailed photographs of features such as fireplaces, entrance doors, doors and architraves and decorative plasterwork.
- If it is a small building, such as a family house, and there are no drawings, a simple layout can be made by pacing out and using graph paper to draw the plan. Use this to cross-refer to the photographs.
- Make a numbered list of contents of significance (for example, items of furniture, paintings, archives and the like) and take photographs of each using the numbers as a reference.
- Larger buildings will be more likely to have survey drawings. If there is very elaborate detailing such as ornate plasterwork and fine joinery, it may be advisable to have a 3D laser scan carried out which will record all the detail. This technique has become more affordable in recent years and surveys can be undertaken with mobiles phones using commercially available software.
- The Building Record should be kept in duplicate hard copy as well as in digital format. One hard copy should be kept safely in another building and a digital copy kept in the 'cloud' from where it can be readily emailed or downloaded.



The Four Elements of Disaster Risk Management

Preparing a Disaster Plan

Disaster Plans fall naturally into two types:

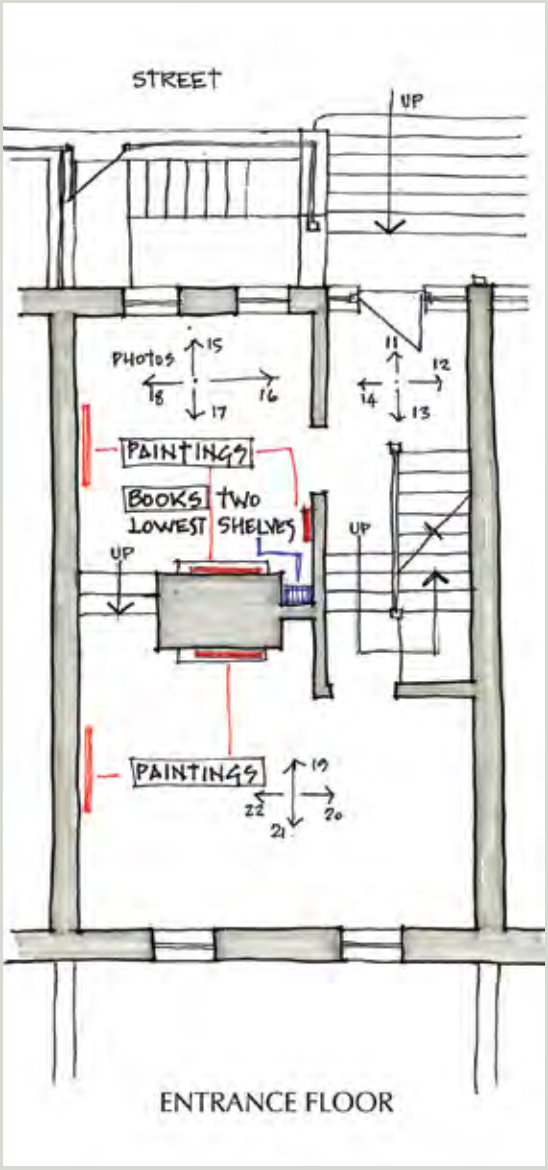
- Those for small and simple buildings and structures and
- Those for larger and more complex places.

They differ only in scale and detail, the principles remain constant.

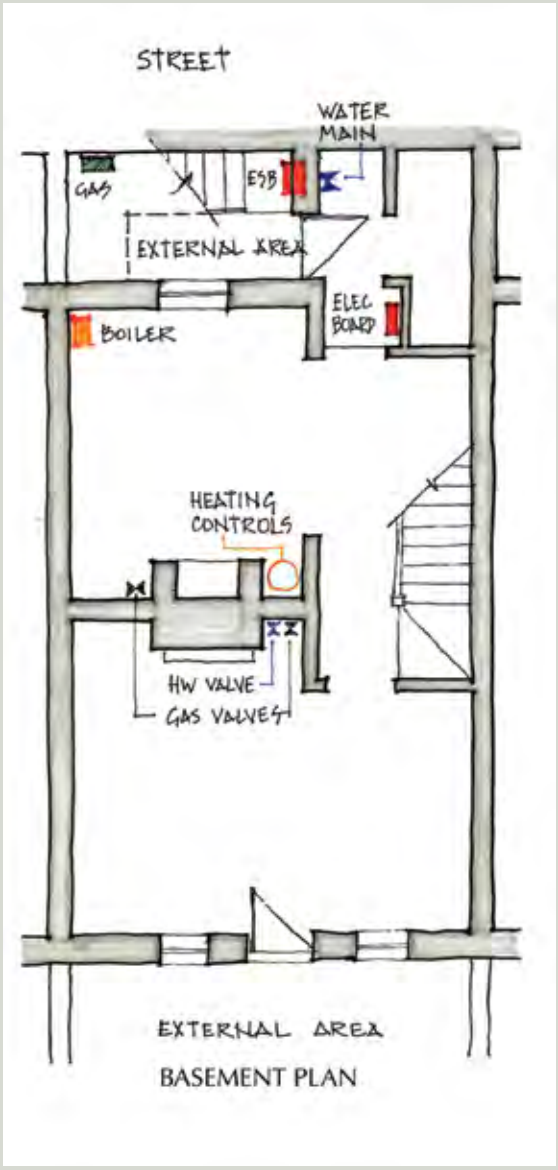
Disaster Plan 1: Simple

This type of plan is prepared for relatively simple buildings of modest scale and without complex issues. Examples would be standard-size dwellings, small churches or parish halls where those preparing and implementing the plan are familiar with all aspects of the building. Shops and small commercial premises may be more complex, depending on the type of use, stock held and storage facilities.

Small, simple buildings such as a single family house or this parish hall will be suitable for Disaster Plan 1: Simple



Simple layout showing the photograph locations and items to be saved in an emergency



Simple layout of a basement floor plan shows the location of access doors, stairs and cut-off points for electric, gas, water and heating services

Go through the steps below and fill out the template at Appendix 1 as you go or make notes to help filling it out later.

The first and most important act in disaster management is to carry out a **risk assessment** for the particular building, its site and its contents.

The simplest way to **determine what the risks are** is to read carefully through Chapter 1. From your knowledge of the building, assess the likely risks and identify the measures necessary to remove or reduce them. Then plan to implement the necessary measures on a prioritised basis, dealing first with the most urgent.

Make a **contact list** for emergency services (fire services, Gardaí, etc.) and utilities such as gas, water and electricity.

Make a short **list of people who agree to be called on to help** – family, neighbours, friends who know the building and who are trusted keyholders. You probably need three or four in case your first choice is away or unavailable. Add these names to the contact list. Remember that in some cases, such as flooding, your neighbours may be undergoing a similar emergency and will not be available to help.

Prepare layout plans (see 'The Building Record' above). A plan of each floor of the building is of great assistance, both in the advance preparation and in the response to an incident. Plans can be very simple but should show the location of:

- External doors
- Circulation routes including stairs
- Evacuation routes
- Electrical distribution boards
- Stopcocks for incoming water
- Gas valves
- Storage areas
- Items on the priority salvage list described below.

Know what features and contents of significance are in the building; having a list of the items held, especially the important items, is most useful. This can range from a very simple list of items per room to full descriptions with a note of the location of items within rooms and accompanying photographs, and can be related to information that is provided for insurance purposes. This list of items can be used to develop a **priority salvage list** – a prioritised list of the most significant items, first to be removed in an emergency.

Identify a **storage site or holding area** where items could be placed in an emergency. It is good to choose this in advance. It should be as near as possible to the site of the likely damage but unaffected by it and large enough to accommodate the items that need to be relocated. It should be accessible, safe, secure, dry, clean and have power. A temporary area can be set up quickly (except in the case of flooding) by spreading a roll of polythene out on level ground nearby to take contents removed from building, running it back over the items as a cover and weighting it down. Polythene is cheap and light, comes in a handy roll size and opens out to approximately 4m wide x 12m long.

Create a **rescue or salvage kit** for disaster. This is a set of basic supplies that are likely to be useful in an emergency. Many items are generally available in a domestic house, but some items might not be easy to source at short notice. Prepare this kit in advance so that time is not lost during an emergency. The contents should be held together in a known location. Do not use a basement if flooding is a risk or anywhere else where the salvage kit could be damaged or be inaccessible. In general, a salvage kit should contain items for:

- General use, such as torches, hand tools and protective clothing
- Note-taking and keeping records
- Controlling water damage such as plastic bags and sheeting
- Assisting in recovery such as wrapping materials, containers

See the detailed salvage kit list at Appendix 3 to select from depending on the risk assessment.

Disaster Plan 2: Complex

This level of plan is relevant to more complex situations, for instance large buildings with multiple spaces or of large area, or containing valuable or important collections. Examples would include large country houses with landscaped gardens, schools, monasteries, libraries, large churches or other buildings.

In such cases, staff members are usually involved and larger disaster teams are necessary. The organisation and training of such teams require a rigorous, managed approach, especially as circumstances change such as trained staff leaving and being replaced by newcomers.

It is expected that museums and other repositories containing important collections will have their own independent advice and appropriate disaster risk management plans in place.

Go through the steps below and fill out the template at Appendix 2 as you go or make notes to help filling it out later.

A Disaster Plan 2: Complex. This type of plan will be suitable for a large building, or group of buildings, with many compartments and some contents of historic significance

Ortho-rectified photography based on a 3D laser scan. The scan produces what is known as a 'point cloud' from which fine detail can be retrieved if required at a future date (Image courtesy of Jeff Hott)

RISK ASSESSMENT

The first and most important act in disaster management is to carry out a **risk assessment** to identify what are the risks to the particular building and its contents. Each disaster event will have its own causes and, while there may be overlaps between them, there will certainly be common ground in the consequences.

The risk assessment will typically take into account the location, the structure and the state of security of the building. Special attention must be paid to the risk of flooding and any hazards that might arise when building or maintenance works are taking place.

Examine the overall environment in which the building is situated, including any danger of vandalism and theft.

Consider the **contents of the building** in terms of risks arising from the manner in which they are stored, from the acquisition of new items added to the collection or from their transportation in or out of the building. For instance, if the contents of the building include specialised items (such as ethnographic objects or magnetic tape), these should be noted in advance and the actions needed for their recovery in the event of an emergency should be identified, including professional assistance.

Fire control and suppression and building and systems management should also be checked for potential hazards.

Lastly, staff practices should be examined in relation to how the building is used.

For large and complex properties, the risk assessment is best carried out by creating a ranking of the potential impact of each disaster. Each potential cause of disaster is rated on a scale from low to high likelihood. The consequences are then rated on a scale of minor to major potential damage or loss. The two ratings are multiplied and the resulting score allows the impact of any incident to be evaluated in terms of risk of personal injury, financial loss and losses in relation to cultural significance. So, for instance, a 'negligible' impact would only involve minor monetary loss, whereas a 'disastrous' impact would involve major financial loss, almost complete loss of cultural significance and, most likely, the impossibility of recovery.

CONTACT LISTS

Make a **contact list** for emergency services and utilities such as gas, water and electricity. This section will include disaster team members, outside assistance agencies, local authority, Gardaí, suppliers of materials, expert advisors, etc.

LAYOUT DRAWINGS

Having floor plans of the building is one of the basic steps towards good management of a disaster and can also be used to provide advance information to the fire services or to assist emergency services.

It is likely that survey drawings will already have been prepared for many larger buildings. If not, a simple layout plan of each floor can be prepared using graph paper. If the building is complex, proper survey drawings may be required. Three-dimensional drawings of the structure provide excellent information; where possible, these should be prepared.

Plans of the building should be marked up to show the location of stairs, circulation routes and external doors. They should also show the location of electrical distribution boards (there may be multiple electrical boards throughout a group of buildings and all must be marked on the plans), stopcocks for incoming water and internal distribution of water, location of gas shut-off valves and storage areas. Locations of controls and keys for security, fire and local alarms on doors should be marked.

The building plans can be used to mark the location of items on the priority salvage list of most valuable contents.

The owner/manager must consider whether there are security and privacy issues involved in including information on valuables and where they are located.

CATALOGUE OR RECORD OF CONTENTS

Dealing with the aftermath of a disaster will be greatly assisted if it is known what items were held in the part of the building affected and where they were placed within rooms. This can vary from a simple list per room which sets out all the items held there to full detailed catalogues, complete with photographs and floor plans.

Photographs of the items and their placement are immensely helpful and if possible should be cross-referenced to the catalogue and the floor plans. The floor plan can be marked up to show the placement of individual items. Lists provided for insurance purposes may provide assistance or be used as the basis for making fuller lists.

A catalogue can be used as the basis of a salvage list which prioritises items for removal in an emergency. Catalogues, photographs and the copy of the floor plans used for this purpose should be stored securely in an off-site location. Having such a record of contents and placement will greatly facilitate the recovery from a disaster.

PRIORITY SALVAGE LIST

This is a list of the most important items in the building which will allow them to be removed first, if possible, in an emergency, either by members of the emergency services or the disaster team. Plans of the building, or layout plans, should be kept with the priority salvage list, showing the location of the rooms in question and the placement of the items within the rooms. Photographs of the items in question showing their placement in the room are of great assistance in their retrieval.

HOLDING AREA OR STORAGE SITE

Identify in advance an area where damaged items could be placed in an emergency. This should be a place where it is safe for staff to work and which can be secured when not in use. It should be as near as possible to the site of the likely damage but unaffected by it, accessible, large enough to accommodate the items moved, as well as some tables. If flooding is one of the identified risks, consider locating this on an upper floor. The holding area should be clean, dry, ventilated, cool and have a power source. The floor should have a hard surface; if not, it will need to be covered.

Holding area where salvage materials were held, after the St Mel's Cathedral, Longford fire disaster, before being moved to a safe storage area (Image courtesy of FKP Architects)

Disaster kits

A disaster kit contains basic supplies which are likely to be useful in an emergency. A non-exhaustive disaster kit is listed at Appendix 3.

Domestic type mini-kit kept in a plastic container with easily acquired items including bubblewrap, rolls of various sizes of plastic bags, sticky tape, string, large torch, wind-up small torch, measuring tape, scissors, hi-vis vest, hard hat, simple face mask, goggles, different types of gloves, first-aid kit, hammer, screwdriver, pliers, Stanley knife, notebook, pencils and waterproof markers

The disaster kit is intended to help those responding to the emergency to deal with the immediate problems and to start the recovery of wet or damaged items. The contents will vary with the risks assessed, but in broad terms they should provide items for:

- General use, such as torches, hand tools and protective clothing
- Note-taking and keeping records
- Controlling water damage such as plastic bags and sheeting
- Assisting in recovery of specific contents such as wrapping materials, containers

See the detailed salvage kit list at Appendix 3 to select from depending on the risk assessment.

It is useful to have some materials and equipment organised in advance and readily to hand so that precious time is not lost. The scale of the disaster kit should relate to the size of the collection or property. Many of the items in the kit would generally be available in a domestic house but unless their location is known with certainty, time could be lost rounding them up. Other items would need to be purchased specially, and specialised items such as spillage cushions (absorbent pillows for water or oil spills) need to be sourced from a conservation supplier. Some of these items might not be easy to source in an emergency or at short notice. Protective clothing and sized items (such as gloves) should be planned in relation to the persons likely to be involved in a recovery situation.

The contents of the disaster kit should be stored in a closed tamper-proof container. It is important that small items are not allowed to vanish casually. The kit should be placed in a safe and secure location known to all concerned. It should not be stored in a basement if there is risk of flooding. The disaster kit needs to be organised inside its container in a manner that allows specific items to be easily found. It may be helpful to fix a list of the contents inside the lid of the container. A list of the items in the disaster kit should be included in the Disaster Plan.

The disaster kit should be checked regularly to ensure the contents are intact. Following an incident, the usefulness of the contents should be reviewed and the kit should be replenished as necessary.

Large items such as dehumidifiers or generators can be hired as required.

For larger, more complex buildings trolleys can be supplied to contain the necessary disaster recovery kit (Image courtesy of the Council of National Cultural Institutions)

CULTURAL INSTITUTIONS

Public cultural institutions such as county libraries and museums may register with the Council of National Cultural Institutions (CNCI) which is a statutory body. The CNCI Conservation Committee can offer assistance to museums, libraries and archives in responding effectively following an emergency or incident involving water damage to collections. The assistance takes the form of kits of essential and highly specialised materials for use in disaster response. The kits are held at the National Museum's Collections Resource Centre. They are available to organisations that have registered as members and must be collected and replenished after use. These kits are limited stock and are not a substitute for the disaster kits held at the individual institutions but should be regarded as a specialist supplement to them.

Setting up a disaster team

The disaster team consists of volunteers who have received training in advance including on safety issues and are available to help out in an emergency situation. The disaster team needs to be set up in advance so that everyone involved knows what is expected of them. The advice set out below is for disaster teams in organisations or bodies where several persons are likely to be available and are willing to be involved.

The team must consist of able-bodied adults who are familiar with the building as well as the Disaster Plan. Vulnerable people, including children, those with respiratory or immune system problems or pregnant women, should not take part in this work.

A disaster team for large buildings or complexes needs to be thought about in advance, as the management of the people involved could be critical to the response in an emergency situation. The number of people in the disaster team will depend on the size and complexity of the building, the people available and the nature and volume of the contents.

The team leader should be a person who has the authority to take decisions and this person should have a nominated deputy.

The safety of team members is of paramount importance. Teams need training in advance to ensure each member's own safety and that of the team as a whole. Training also allows the team to learn what to do and what not to do, so that additional damage is not caused by unthinking action.

Members of the team should be familiar with the building and contents, should be suitable for the task, willing to take direction and available to work outside office hours. Strenuous and dirty work can be involved and disaster situations are known to be stressful. A high degree of co-operation and flexibility is required from team members. New members should be sought to replace departures from the team.

Depending on the situation, it may be necessary to limit people responding to a disaster to members of the team, since assistance from those who have not received training, or who are not familiar with the set-up, might not be efficient or safe.

The involvement of outside assistance should be anticipated as it may be difficult to summon up outside volunteer assistance at short notice (See 'Outside assistance' in Chapter 3 below).

WHAT IS EXPECTED OF THE DISASTER TEAM?

Team members need to provide out-of-hours contact details, which should be updated at regular intervals.

Team members should not be exposed to risks of any kind and should only be asked to act after a risk assessment of the location and other hazards has been carried out by a competent person.

If team members are called out in an emergency, they should await instructions from the team leader before taking any action.

Appropriate Personal Protective Equipment (PPE) must be worn by all team members. Hi-vis jackets can be marked on the back identifying what an individual team member's role is.

The work required of the disaster team will depend on what has happened. It can include preventive action such as removing items from the building before damage has occurred or taking measures in situ to prevent damage, for example by installing protective covering. It can also include the rescue of items which have been damaged by fire or water, such as removing them to a safe location where they can be dealt with or documenting items moved.

In cases where a disaster team is large (for example, more than six persons), it may be useful to appoint one of the members as co-ordinator.

The co-ordinator will be available to:

- Answer the phone and make calls
- Ensure supplies and PPE are available and keep account of money
- Arrange for outside assistance where necessary (using the lists of contact numbers or suppliers available in the Disaster Plan)
- Make catering and other arrangements for the team members
- Keep damage lists
- Keep a written log of what happens.

ADVANCE TRAINING OF THE DISASTER TEAM

- The training must be carried out in advance as part of the planning.
- The content of training must be specific to the location, its contents and the risks identified.
- The training should include background knowledge and practical exercises.
- Training can range from rehearsing what is set out in the Disaster Plan to bought-in training from specialised providers.
- Training should aim to ensure that team members are aware of the limitations of what they can do. It should enable them to act with confidence, without causing further damage, and with the ability to recognise when specialised technical assistance, such as conservation, is required.
- Team members need some understanding of the materials used in the building and its contents, how those materials react to fire or flood, and of the likely specialised requirements that may arise. In large organisations, it may be possible for curatorial staff to instruct the team, and in small bodies, the team leader informing his or herself.
- If possible, practical exercises should be carried out as they allow team members to experience working under constrained conditions and demonstrates what can be done and any weaknesses, as well as the orderly approach required.
- Refresher training should be carried out once a year. This can vary from reading through the Disaster Plan as a group to a practical exercise involving substitute materials.

ADVANCE CONTACT WITH EMERGENCY SERVICES AND MAINTENANCE CONTRACTORS

The first priority of the emergency services (Gardaí and other first responders) is human safety. No person should put themselves in danger.

Advance contact with the local services is important as it informs the services about the building and its contents, and helps to develop understanding of potential difficulties in an emergency.

While buildings in private ownership are not the responsibility of the local authority, services provided by the local authority may be involved in an emergency situation.

Building maintenance contractors who are already engaged with the building should be consulted about emergency measures and may be in a position to provide technical services, such as pumps for removal of standing water, or assistance in making areas safe. They may also be able to provide and install emergency lighting where needed.

All lists of liaison persons in emergency services or maintenance contractors should be updated at regular intervals.

DISASTER RECOVERY SERVICE CONTRACT

It is possible to obtain a commercial specialised recovery service, either when required or by subscribing annually (which gives priority access).

It is important that those offering such a service be experienced and knowledgeable about the recovery of cultural artefacts, and that their staff members have the handling skills required.

This service should include the following areas of work: decontamination of biohazards, freeze-drying of water-damaged materials and refrigerated storage. Contact information for such services should be included in the Disaster Plan.

LOCAL SOURCES OF SUPPLIES OR HIRE

A list of likely needs in terms of equipment and materials should be made, based on the risk assessment.

This list may include large items of equipment such as standby generators or pumps.

Other items could include trestle tables (for the recovery of small items), de-humidifiers or fans, crates and services such as security, haulage, lifting, cleaning and pest control. The needs of the situation will relate to the building and its contents.

Local suppliers of these items should be identified and contacted to check exactly what they are in a position to provide. A list of their names, addresses and contact information should be included in the Disaster Plan, with details of services or materials provided.

Details of suppliers need to be checked and updated at regular intervals and at least annually, at the review of the Disaster Plan.

MAINTAINING SERVICES TO THE PUBLIC

Some property owners or managers may have to consider how or whether it is safe to stay open or otherwise maintain services to the public.

REGULAR UPDATING OF THE DISASTER PLAN

The Disaster Plan should be reviewed at least once a year and the arrival of the insurance renewal notice could be a useful reminder. Members of the disaster team should be involved in the review. The review should cover:

- Changes in the buildings or access which affect the original risk assessment
- Changes in membership of the Disaster Team and their contact information.
- Contact with emergency services
- Emergency numbers
- Maintenance contractors
- Sources of hire or supplies
- Checking of disaster kits and renewal of items as necessary
- Checking of warning systems

Getting the Right Advice

When dealing with a historic 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 when preparing a Disaster Plan or before undertaking any works in the event of a disaster. This may help in reducing the damage to the historic building and minimise the loss of important features and fabric should a disaster occur and should inform the repair and recovery.

Many owners of historic properties will have professional advisors in place, such as an architect, engineer or surveyor. However, owners should be satisfied that their advisors have the expertise required to deal with the range of issues that arise when major damage has been suffered. In preparing a Disaster Plan it may be necessary to supplement existing professional advice with respect to the assessment of risk, the extent of damage and the possibilities for repair and reinstatement. Experience in conservation is essential to inform the approach to be taken. Poor repair works can be difficult and expensive to undo, can result in the loss of important fabric or features and can damage a building in the long-term.

Expert advice is also necessary when designing measures to prevent the recurrence of damage, for example repeated flooding events. While such measures may involve adaptation works beyond the boundaries of the properties affected, short-term measures that take the character of the historic building or landscape into account must be developed with expert advice. These works may require planning permission and the architectural conservation officer in the local authority should be contacted to advise.

The approach to repair and reinstatement should be developed in consultation with the local authority. Remedial works may require planning permission and the architectural conservation officer should be able to assist the owner or conservation advisor in establishing the best approach to take.

The Royal Institute of the Architects of Ireland has an accreditation system for architects trained in building conservation and can provide a list of those architects that are accredited at the appropriate grade. Engineers Ireland and the Society of Chartered Surveyors Ireland also have lists of conservation-accredited structural engineers and building surveyors. The Construction Industry Federation maintains a Register of Heritage Contractors working in the field of building conservation. The local authority can provide general advice including the availability of suitable professionals, craft workers and suppliers in the area.

3. Responding to a disaster

Initial response

No person at the scene should put themselves in danger.

The scale of an incident cannot be known in advance but will determine the type of response needed.

The person who first discovers the incident should immediately contact the team leader or their deputy who will decide the next course of action.

- Assess the situation – is this a major or minor incident? If major, call the emergency services immediately. A minor incident can be dealt with by the mini-team
- Decide what needs to be done
- Make sure it is safe to enter an area
- Turn off services if necessary and if safe to do so
- Always turn off electricity in case of flooding
- Deal with immediate problems
- Where possible, protect areas from further damage
- Take photographs to record the visible damage

Response to a minor incident

A minor incident is one which can be dealt with by the building owner or by the disaster team where one is in place. Emergency services and building maintenance should be called if necessary. The team leader should be called and should assess the risks and the damage to contents before deciding what is to be done. Actions could include the following:

- Call disaster team
- Deal with immediate problems
- Protect areas from further damage
- Ensure undamaged areas will not suffer further (for example, from mould)
- Hire in help if necessary
- Take photographs
- Follow guidelines for salvage

Response to a major incident

A major incident is one that the disaster team cannot manage alone and intervention by emergency services is required. The local authority, contractors and others may be involved with the emergency services.

In such an incident, the emergency services will be in charge and it may be several days before the site of the incident can be entered. The disaster team may not be needed in the immediate aftermath of the incident.

The team leader or deputy will need to liaise with emergency services and will carry out an assessment as described below. The team leader will decide what needs to be done before calling out the disaster team and will establish the facts about the situation, including the following:

- The scale of the incident
- The location of the incident
- What happened?
- Are contents affected?
- Is the area safe?
- Are other areas, other floors or adjacent buildings affected?
- Are other areas likely to be affected in the aftermath?
- Is the disaster team to be called out?

If, after the initial assessment, it is decided that the disaster team is needed, the call-out of team members should be activated. One person should phone through the contact list, and note the response on the list.

When members of the disaster team arrive at the location, they should await further instructions from the team leader on what is to be done. The opportunity can be taken to refresh the knowledge of the Disaster Plan while the team is awaiting instructions.

Team members should, if possible, wear robust and warm clothes in addition to their Personal Protection Equipment.

BRIEFING THE DISASTER TEAM

The team should assemble for a briefing by the team leader on what has happened and how the situation is to be dealt with. The team leader should:

- Describe what has happened and what is known about damage
- Outline the work required of the team
- Explain the physical arrangements for the holding area and the team co-ordination
- Remind the team about the location of disaster kits and their contents
- Remind the team about what they learned in the training and have copies of the Disaster Plan at hand

If there is a catalogue of building contents, it should be available to the team leader.

SETTING UP A CO-ORDINATION DESK

A desk or place in the salvage area should be used for co-ordination by one person from the team. The co-ordination desk must be in a location away from immediate damage and, where possible, on a separate power circuit from that of the affected building. This person will be responsible for co-ordinating:

- Staff (breaks, catering, phones)
- Assistance from outside
- Additional supplies
- Hire-in of equipment
- Outside contractors or specialist help.

OUTSIDE ASSISTANCE

It may be necessary to seek assistance if overwhelmed by the extent of the disaster. The type of assistance will depend immediately on the stage of the response or recovery when assistance is required.

For example, if a large number of people are needed to create a carrying chain to evacuate contents during the immediate response, local volunteers may be available.

The disaster team may find it difficult to cope with the work required in a timely manner, and professional disaster recovery may be needed in that case.

Assistance or advice may be available from local organisations, such as a local museum or library. If the building is a protected structure the local authority's architectural conservation officer should be contacted.

At the salvage/recovery stage, assistance may be required from professional conservators. A list of accredited conservators in a number of specialised areas is available from the Institute of Conservator-Restorers Ireland.

EMERGENCY NUMBERS

Contact numbers should be at hand (in the Disaster Plan) for Gardaí, fire service and building maintenance contractors and other contractors such as security and fire alarms, alarm monitoring, lift maintenance, fire suppression system, heating or ventilation, telephone systems and security.

TURNING OFF GAS, POWER, WATER AND ALARMS

The Disaster Plan should include sketch plans showing the location of the controls for gas, power, water and alarms.

All personnel and disaster teams must be aware of their role with regard to turning off utilities.

Gas: No persons other than emergency services, Bord Gais or authorised contractors are permitted to deal with gas, other than turning off the supply.

Power: No persons other than the emergency services, the ESB or an authorised contractor are to do anything to the power supply, other than turning it off.

Mains Water: The main valves at inlet points can be turned off.

Internal Distribution of Water: Stopcocks can be turned off.

Drains: Local authority to be contacted.

Alarms: Security, fire or local alarms on doors to be de-activated.

RISK ASSESSMENT BEFORE ENTERING THE AREA

The emergency services, if involved, will have the final decision about when it is safe to enter the area and no-one should enter the area until authorised to do so.

In circumstances where the emergency services are not involved, the team leader needs to assess the risks to the team in the area, including what might be under water (power cables, trip hazards from items that have fallen) and items that might fall from a height, or might collapse.

Any danger from electrical cables must first be made safe by an electrician.

It is likely that power will be cut, and torches may be required.

Photographs should be taken at every stage of the risk assessment by nominated members of the disaster team where safe to do so.

SALVAGE OF CONTENTS

The Disaster Plan contains a salvage plan prepared on a room-by-room or area-by- area basis including plans that indicate the order of priority for removal of items. The disaster team needs to know what items are to be removed, how to remove the items, how to handle them and where they are to be taken for temporary storage so that they are safe from further damage or theft.

Disaster team in action responding to flood damage (Image courtesy of The Glucksman)

Those engaged in the salvage operation need to be able to work with their hands free and need protective clothing, possibly including helmets incorporating a torch. It may also be necessary to have a further source of light available. In addition, all corridors and stairways should be provided with emergency lighting with several hours of battery life.

HEALTH AND SAFETY CONSIDERATIONS

Health and safety are the first considerations at all times. The question 'Is it safe?' should be asked before undertaking any action. Difficult working conditions require additional vigilance.

Damaged areas should not be entered until the all-clear is given by professionals or the emergency services. Standing water may be contaminated by sewage and should be checked by the local authority.

The risk assessment described above must be carried out before anyone enters the area. The area should only be entered with the agreement of the team leader. PPE must be worn at all times. The risk assessment should note who might be harmed and what needs to be done to control risks.

Lifting heavy loads should be minimised by using trolleys or other aids. Assistance with lifting and carrying should be hired in if necessary. Specialists should be called in if necessary (cleaning, de-contamination or pest control).

The team leader should look out for signs of fatigue or strain in team members. No lone working should be permitted and teams should have access to mobile phones.

MAINTAINING SECURITY

Ensure that the perimeter of the building is secured and that temporary works respect the security conditions.

Legal protection of historic buildings

When preparing a Disaster Plan, it is important to establish at an early stage whether a building or structure is protected by legislation and what types of notifications, permissions and/or consents it may be necessary to obtain before undertaking any works. This section is intended as guidance only and is not a legal interpretation of the legislation referred to below.

PLANNING AND DEVELOPMENT ACTS

A building may be protected under the Planning and Development Acts by being included in the record of protected structures (RPS) of a particular planning authority or by being located within an architectural conservation area (ACA). Where a building is a protected structure, proposed for protection, or is located within an ACA, the usual exemptions from requirements for planning permission may not apply. In the case of a protected structure any works, including works to the interior of the building, which would materially affect its character will require planning permission. Legal protection also extends to other structures and features within the curtilage of a protected structure such as outbuildings, boundary walls, paving, railings and the like. In an ACA, 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 is sent to every owner and occupier of a protected structure when the building first becomes protected. The RPS can be consulted in the development plan for the area. If a building is a protected structure, or if it is located in an ACA, the planning authority will be able to advise what this means for a particular property.

The owners or occupiers of a protected structure are entitled to ask the planning authority in writing to issue a declaration under section 57 of the Planning and Development Act 2000 which will give guidance on 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 publication, may not require planning permission. If an owner or occupier is in any doubt about particular proposed works, the architectural conservation officer in the relevant local authority should be consulted. The section 57 declaration may also be helpful in guiding the preparation of the Disaster Plan by establishing the elements and features of the building that are considered significant and which it should be a priority to safeguard in the event of a disaster and when recovering from damage.

During, or in the immediate aftermath of a disaster, it may be necessary to take urgent steps to mitigate damage to a protected structure by ensuring the stability of the remaining fabric and protecting the building from further damage by weather or decay. Wherever possible, the architectural conservation officer should be notified of the works proposed and the agreement of the local authority received in writing. If it is felt that the proposed works are not urgent and necessary, the local authority may advise that a declaration be sought or, where relevant, planning permission before any works proceed. Alternatively a local authority may issue a notice to the owner and occupier of the structure setting out the steps it believes are necessary to prevent the protected structure from becoming or continuing to be endangered.

For general advice on planning issues relating to architectural heritage, a publication entitled *Architectural Heritage Protection Guidelines for Planning Authorities* (2011) is available to download from www.chg.gov.ie

NATIONAL MONUMENTS ACTS

A structure or site may be protected under the National Monuments Acts 1930-2004. In such cases, anyone proposing to carry out works must comply with the provisions of those Acts.

4. Recovery

For many people who are affected by disastrous events, the difficulties do not end when the emergency services complete their work. Apart from dealing with the personal impacts, practical steps need to be taken to create conditions that will support recovery to the greatest degree possible. This involves dealing with issues of stability, the repair of historic fabric, the salvage of contents, the importance of getting the right advice and looking to the longer term. Reviews should be conducted at intervals as the situation is returning to normal and the Disaster Plan revised and updated where necessary.

A fire in a nineteenth-century school building destroyed much of the roof. The exposed wall tops, gables and junctions with the surviving roof were temporarily protected against further water damage by fixing a membrane

Inappropriate remedial work is a common cause of damage to historic buildings which should be avoided. It is essential that those involved in the design, specification and carrying out of remedial works fully understand the architectural and historical significance of the building, the nature of the materials used in its construction. There may also be particular considerations when there are statutory protections applying to the building or site. Well-intentioned but ill-informed repair and reinstatement works can cause additional damage to buildings already made more vulnerable than before. Common errors such as unduly accelerated drying out, the unnecessary removal of damaged historic materials and their replacement with inappropriate modern materials can be avoided, and disruption and expense can be minimised with the appropriate expert guidance.

Not all damage is immediately apparent and it may be necessary to put monitoring measures in place: flooding and drying out may affect foundations or ground conditions so as to reduce bearing capacity, for example. Building fabric, even where not directly affected, should be monitored to record new cracks or changes in existing crack patterns, or to identify the appearance of salts as building fabric dries out. Concealed timbers may have been affected and the effects may take some time to appear.

At the same time, the process of reinstatement can be used to tackle existing defects, and in the process, make the property less susceptible to damage. The process may, for example, provide an opportunity to replace defective rainwater goods, re-route services or to replace earlier repairs that had used inappropriate materials such as cement renders, temporary roof coverings to replace hard wall plasters or other impervious materials applied to interior surfaces with breathable ones.

Structural cracking can be monitored most effectively by applying finely-calibrated gauges which will indicate if movement has ceased or is ongoing over a period of time. The special monitors, often called tell-tales, consist of two sliding parts, each part being fixed to the structure on either side of a crack, usually with a two-part epoxy adhesive. The amount of movement is recorded. A more basic tell-tale can made from a strip of light picture glass fixed as above or a dab of lime mortar bridging the crack. Once fixed properly, both will crack if movement is ongoing

Expert advice sought by the owners should set out short-term, medium/longer-term works which will include the condition of the building fabric and the approach taken to repair and replacement. It will include monitoring of moisture levels and structural movement and could involve works/coping with recovery of the fabric over an extended period of time.

Conservation of contents will depend on their significance and value. There is highly specialised expertise available in this area and advice should be sought after the immediate salvage. Such work is painstaking and likely to be expensive. The issue of insurance cover for contents will arise.

Figure with its associated fragments numbered and boxed (Image courtesy of FKP Architects)

Figure undergoing repair in conservation workshop (Image courtesy of FKP Architects)

Many of the images in this section are of St Mel's Cathedral, Longford which was severely damaged by fire in December 2009. They illustrate the detailed and comprehensive approach taken by architects, Fitzgerald Kavanagh and Partners, to the project including the recording, salvage and storage of surviving fabric and artefacts pending repair.

The immediate aftermath – the structure

A first step in the immediate aftermath of a disaster is to ensure that the situation has been stabilised. There are several elements to this and, in the event of major disasters, the emergency services will ensure that the causes of the events are no longer present and that safe conditions are in place for an assessment of damage – this is an initial assessment of risk. In the case of minor events, the building owners and their advisors will devise a plan for immediate action.

ASSESSMENT OF DAMAGE TO THE BUILDING

Dealing with the aftermath of a serious incident involving fire, flood or water damage from any source requires specialised, professional assessment. The focus of the effort is to make the building safe and to retain viable fabric of significance to the greatest degree possible. The material from which a historic building is made is part of its character and, as such, is irreplaceable.

A damaged structure may need to be stabilised before access is attempted. In severe cases of damage, controlled demolition may be necessary as well as propping where there is a risk of collapse. A serious fire may leave a building structurally unstable. The support provided by a floor or floors may have been lost in the catastrophe. One floor collapsing on to another with consequent overloading may result in great outward forces being applied to external walls. Similarly, the possible loss of structural integrity of parts of the roof structure which may exert overturning forces on external walls. A structural assessment requires specialist input and possibly indicate the need to design temporary support works.

Following a fire, vulnerable openings were braced against movement to avoid further loss of fabric

Potentially unstable features such as chimney stacks being made safe following a fire to prevent further collapse and damage

A priority is to establish evidence of damage. A visual inspection of the external and internal building structure is essential and appropriate action must be taken. This includes a detailed survey and schedule of the damage supported by a photographic record.

A further priority will be the protection of areas or contents that have not been affected, to reduce the possibility that further damage may occur. It includes salvage work and the provision of secure storage for retrieved contents.

Collapsed structure in the immediate aftermath of the major fire at St Mel's Cathedral (Images courtesy of ARC Consultants)

Urgent temporary works carried out included installing props to the floor structure and bracing between walls at high level as well as covering artefacts with plastic sheeting

Once the structure has been made safe, a survey of the extent of damage can begin (Images courtesy of ARC Consultants)

RECORDING

It is important have the necessary skills to hand to record surviving material in location and detail. At St Mel's Cathedral, a numbered grid was set out on the floor to assist the recording process. It should be borne in mind that the remains of decorative ceilings, joinery or other finishes may be lost in a rush to clear out the building, particularly if its significance is not recognised or appreciated. If it is not feasible to leave surviving material in place for a time, it should be carefully removed to secure storage. Other important fragments or artefacts may also survive within the collapsed material, and so a careful sifting is necessary. This should be done in conjunction with consulting the records in the Disaster Plan.

Next steps

Once immediate safeguarding measures have been taken, attention should turn to the retention and repair of historic fabric. The extent of damage will determine to a great extent what is possible. Thus, while the effectiveness of salvage provisions comes into focus in reinstatement, the issues involved necessarily go beyond direct replacement and repair. The principles of conservation should be followed when devising a scheme for reinstatement works: one of the central aims of architectural conservation is the maximum retention of authentic historic fabric and its appropriate repair. The following paragraphs indicate some of the more important elements when looking to the longer term.

The expert assessment of the building following a major incident of damage by either fire, storm or flood, should concentrate in the first instance on the safety issues related to recovery, together with the need to secure the building against further damage. In the case of very extensive damage (such as fire or collapse), the issue will be whether the building can be reinstated and whether the financial resources are available to do so; can it be stabilised as a ruin; or must it be demolished. If the building is a protected structure or located in an architectural conservation area, the advice of the local authority's architectural conservation officer should be sought and followed. Where the fire damage is partial but water damage extensive, the short-term need will be to provide a temporary roof, where necessary, or to secure window openings, but critically to prop all floors, cushioned to prevent further damage to ceilings. Storm damage recovery may follow a similar pattern.

An industrial-type temporary roof was fitted to St Mel's Cathedral to facilitate the programme of conservation works and also to prevent further damage (Images courtesy of FKP Architects)

Best conservation practice in all of the repair and restoration work requires retaining original materials and finishes in-situ wherever possible. For example, structural timbers may have been damaged but may be still capable of repair and reuse; historic finishes may be recoverable with the appropriate expertise.

These timber trusses were left exposed to the weather for five years following a serious fire. On examination, they were found to be generally sound and were retained in the re-roofing works supplemented by the addition of new timber members. Detached wall and ceiling plaster can be re-secured; damaged structural timbers can be repaired in-situ

EFFECTS OF FIRE

Most historic buildings contain materials such as lime plaster and render. Fire reaching a temperature of 850°C or higher will convert at least some of the lime plaster to quick lime, which presents a safety hazard for handling. Plaster that survives in situ after such a fire may also contain lime which has become 'quick' in the fire, but has been hydrated by the firefighting water and, in the process, will have become detached from its base.

A secondary issue which arises following a fire is saturation of the building from water used during firefighting. This should be dealt with as set out in the sections on flood. Ceilings in parts of the building not directly affected by the fire, may be vulnerable to collapse due to saturation. The fire service's normal procedure is to saturate the building, even where not alight, to reduce temperature and prevent spread. Puncturing of the plaster at close intervals will release water ponding over the ceilings and early propping in that situation may help to preserve them.

A fire being fought in a nineteenth-century outbuilding close to a national monument

The high temperatures reached during a fire followed by the rapid cooling effect of the firefighting water can shatter stone (Image courtesy of ARC consultants)

Most of this significant rococo ceiling was saved in the immediate aftermath of a fire by drilling holes to release fire-fighting water trapped above and by providing propping

EFFECTS OF FLOOD

Flood damage will necessitate a stability assessment of the building and some temporary works could allow time for permanent repairs to be made. A substantial flood, especially one over 1 metre deep or accompanied by fast flowing water, may cause structural damage leading to instability. Flood water may remain trapped below suspended ground floors and in basements and will have to be pumped out. Flood leaves behind a very wet building and one which may have been contaminated by sewage.

DECONTAMINATION

Where the building has been contaminated, decontamination is a priority to make it safe for people to work within the space, both for salvage and repair. In most cases, decontamination will be required while recovery is in progress, and repeated as the building fabric is exposed.

Additional cleaning may be required by contract cleaners, including cleaning of holding area. Debris and materials used in salvage will need to be removed. Bio-decontamination and pest control by specialist providers may be required.

DRYING OUT THE BUILDING

Following decontamination, the process of drying out may begin. As old masonry buildings can absorb large quantities of water it may be necessary to remove some linings such as wainscots or panelling to facilitate drying out. Drying in place, wherever possible, should always be the preferred option. Dismantling should be kept to the absolute minimum necessary to protect the historic fabric and can be undertaken, after recording, with the intention of re-assembling and re-installation. It requires the services of skilled personnel, not only for the dismantling process but also for the subsequent storage and drying out of timber elements to prevent their warping and cracking.

Once all loose water has been mopped up, drying out is best done naturally by good ventilation. Air movement may be assisted by the installation of temporary fans. The use of dehumidifiers is of little value in such circumstances and may have undesirable effects. Their use may be justified in some cases, especially where the control of moulds is essential for the preservation of sensitive finishes. Dehumidifiers require sealed spaces in which to operate and need to achieve 40% to 50% Relative Humidity at 18°C to 25°C.

A simple temporary roof of plastic sheeting on the surviving portion of a thatched cottage. Note that the chimney in the foreground had been rebuilt before the fire (Image courtesy of Limerick County Council)

The effect of saturation on mortar-based finishes depends on the composition of the binder. Portland cement-based finishes, whether in floors or wall plasters, are, for the most part, unaffected because Portland cement, once fully hydrated, is no longer soluble. Fully hardened lime-based finishes are also insoluble. Gypsum-based plasters, while not basically soluble, are very hygroscopic and clay-based binders, mostly in the form of mortar, will soften and expand. Buildings with masonry bedded in clay mortar are vulnerable to premature collapse as a result of flood, whereas those incorporating the other forms of mortar will, for the most part, only have the rate of drying out affected by the particular mortar involved.

At the start of drying out, it may be wise to remove all gypsum and salt-sensitive materials. The likelihood of their recovery is very low and, in most pre-twentieth century buildings, gypsum-based material is unlikely to be original and so may be of little architectural heritage significance. Lime-based plasters have anti-bacterial properties and so should be left in place.

As drying out progresses, there are additional risks. Soluble salts may crystallise within and behind plaster layers and so detach them. There is a risk of mould growths in unventilated spaces and, most significant of all, the risk of an outbreak of rot, especially dry rot, in embedded timbers. The drying out of timber elements has to be monitored for a considerable period of time as the risk is greatest when timber dries out to a moisture content of 30%. Door and window casements may need to be partially opened up to provide ventilation; floor boards may have to be lifted and stacked with spacers to dry while joists are being repaired and/or the ceiling beneath is being secured and electrical services are renewed.

Water damage from other sources will cause similar damage to flood water but it is unlikely to be as severe.

The rate of drying out will depend on the thickness of the walls and floors and also their composition. Drying out is always a slow process, even with modern materials, and in traditionally built buildings will likely take at least a year. The time taken for the building to dry out may be used to source necessary replacement doors, windows and other fittings damaged beyond repair and to arrange for specialist contractors for ceiling and wall plaster repair, for joinery, for metalwork and for stonework, all supported and supplemented by a general contractor, accustomed to working in protected and historic structures.

The decision to commence the reinstatement must be preceded by a period of moisture level monitoring to ensure that the structure has dried out and that moisture has stabilised at a safe level to joinery to be reinstated in the building.

Moisture meters are used to measure water content in a material or structure. They vary in type and efficacy. This type is based on microwave technology and measures moisture at a depth of 300mm within brick or masonry

An outbreak of dry rot in the floor became obvious a few years after the building had been reroofed following a period when it was open to the elements after a fire

The immediate aftermath – the contents

The advice below is given in relation to contents and collections that have become wet, as this is the most common form of disaster. Collections that have suffered fire damage may also be wet as a result of fire-fighting activities.

The health and safety of persons involved in the salvage need to be protected at all times. The salvage/recovery operation should be headed by a person with knowledge of the collections and with the authority to make decisions. The manner in which out the recovery/salvage is carried out depends on the situation, including what has happened, the nature of the building and contents and the extent of the damage. It also depends on the advance planning, whether personnel are prepared and trained, whether disaster kits are in place and whether a holding area has been designated. Recovery of damaged items is time-critical. A rule of thumb is that damaged items should be drying or stabilised within 72 hours. If it is decided that this timetable cannot be met, additional assistance should be sought.

It is important to take a little time to plan the salvage/recovery operation carefully. If possible, this plan should be written down in relation to the places from which the items are to be moved and the manner of moving them. When drawing up the Disaster Plan, a holding area was identified to be used for interim storage of recovered items. Removal of items to the holding area should begin as soon as it is safe to do so. An estimate should be made of the length of time that will be needed to carry out the recovery, the amount of space that will be used in the holding area to store the items needing recovery and how they will be arranged and stored there. The following are broad guidelines.

ASSESSMENT OF DAMAGE TO CONTENTS

An assessment of the damage should be carried out addressing the following questions:

- Is the source of disaster removed or stopped?
- What are the effects on contents?
- Is there damage beyond that to contents (for example to fittings or finishes)?
- What immediate action is needed to protect undamaged areas (providing a protective covering or removing items)?
- What immediate salvage can be carried out?
- How will salvage be organised and what are the responsibilities of each team member?
- Where will the salvaged items will be worked on?

Collecting and grouping components from damaged or disassembled items (Images courtesy of FKP Architects)

GENERAL GUIDANCE FOR ITEMS THAT CAN BE MOVED

- Do not throw anything away until it has first been assessed to establish whether the item is significant and needs to be kept or if it is acceptable to dispose of it
- Remove high priority items first or, if items have fallen on the floor and are in danger of being walked on, they should be removed first
- Remove as many items as possible
- Do not cause further damage: consideration should be given to the nature of the materials concerned and to the risks involved in recovery, for example, items made of paper will tear easily when wet and china is at risk of breakage
- Keep track of original location of items moved by labelling, taking notes and photographs and completing damage lists as soon as possible after moving (see 'Keeping records of damage' below).
- Try not to split up sets such as runs of volumes or china. If it is essential to separate parts, identify, label and photograph in a manner that will facilitate reconstitution
- Careful handling is essential as wet or fire-damaged items are vulnerable to further damage and items should be handled as little as possible
- Wet items are heavy and moving them presents a risk of further damage to the materials. The method of moving them needs to be thought out in advance, for example, it may be useful to use crates or sheeting to provide support. Moving wet items may require assistance from several persons
- If items were originally stored in boxes or drawers are now wet, try to move them in the original container. It may be necessary to pour water out of the container by tilting it carefully
- If crates are used, the items should not protrude over the edge
- Items now in fragments should be gathered together in a bag or box
- Items that have not been damaged but that are at risk of damage if left in situ should be moved to the holding area as soon as possible.

Plaster fragments from St Mel's Cathedral grouped together and salvaged (Image courtesy of FKP Architects)

Fragile item crated for removal (Image courtesy of FKP Architects)

ITEMS THAT CANNOT BE MOVED

As far as possible, these should be protected from further damage, for example, by covering with polythene sheeting or other protection or preventing water from entering the room.

Moving heavy items such as this statue could result in further damage and it may be better to leave them in place while providing protection (Image courtesy of ARC Consultants)

SORTING ITEMS

Tables should be set up in the holding area and covered with polythene sheeting. This should be covered with blotting paper which should be discarded as it becomes soaked.

Items need to be sorted into:

- Damaged items requiring immediate attention
- Damaged items that can wait
- Undamaged items that can be put aside

Decisions need to be made quickly about how to deal with the recovered items needing urgent attention: are there sufficient expertise, space and materials to deal with them internally or is assistance required from commercial recovery, for example, in freeze-drying?

It is important to monitor recovered items for mould growth. If signs of mould are found, help should be immediately sought from a professional conservator. In the meantime the holding area, or the area where items are situated, should be kept cool and well ventilated. If possible, the temperature and the relative humidity in the holding area should be monitored.

ITEMS FOR FREEZE DRYING

Freeze drying is a quick immediate solution but requires an outside contractor and will necessitate removal of the items from the premises. Items should be placed in crates and each item given an entry on a damage list numbered to correspond to the crate. The frozen items still have to be dried but this can be done over time when the immediate crisis has passed. The decision to freeze-dry might be made because the volume of material is too great to deal with quickly with available resources.

Waterford County Council Records Centre in Dungarvan was flooded in 2004 after a storm which coincided with spring tides. Boxes containing papers on the bottom rows of shelving were affected. Exemplary action was taken - the boxes were packed on pallets, sent to a local cold storage company and frozen to stop mould developing. They were then sent to a specialist unit in the UK for freeze drying and disinfection (Image courtesy of Waterford City and County Council)

ITEMS FOR AIR DRYING

Air drying can be carried out in-house but needs to be well organised. It requires large amounts of space, good documentation and monitoring for mould growth. Air drying can be assisted by the use of ventilators, but heat or dehumidifiers should not be used. Wet items should be spread out on blotting paper in a manner that is safe and does not damage their integrity. It is essential to record what each item is and where it belongs and not to lose its original sequence and context. Damage lists should be completed for every item removed for air drying.

Mould developing on a book after water damage (Image courtesy of Waterford City and County Council)

General guidance for the initial salvage of damaged items

While recovery is urgent, it needs to be carried out in an orderly and thoughtful manner in order to avoid further problems through loss of context or other information. If wetting of the items was caused by contaminated water, bio-decontamination by a specialist will be required in advance of treatment. In general, if only a small number of items have undergone minor damage, or for example can be dried quickly or have not been stained, it may be possible for the salvage/recovery work to be carried out by the Disaster Team. However, in a case where a large quantity of material has been damaged, where the items are fragile, of cultural significance or have a high valuation, or where the damage is extensive, it is likely that professional assistance will be required for the recovery.

Considerations for dealing with some of the damaged items likely to be encountered are summarised below. Specialised items require assistance from specialists in the area concerned and this should be included in the initial risk assessment.

DOCUMENTS, PAPERS AND BOOKS

The correct procedure depends on the materials and how wet or damaged the items are. These items can be freeze dried or air dried.

All of these items are fragile when wet and require physical support. Vellum is particularly fragile and requires advice from a specialist conservator. Albums of photographs and books or documents made of coated (shiny) papers need special treatment and require the advice of a conservator. Loose papers and files can be freeze dried or air dried flat (in single sheets), but this takes a lot of space and requires close attention. Wet books can be interleaved to about 20% of their volume with blotting paper which should be changed regularly. Large format books should be dried flat or freeze dried. Damp books can be fanned out and put standing upright. Prints should be laid on blotting paper, image side up. If framed, the frames should first be removed.

PAINTINGS

Excess water should be drained from paintings. The frame, but not the stretcher, should be removed. Paintings should be placed image-up on blotting paper to air dry. Do not touch the image surface.

PHOTOGRAPHS

Photographs must be dealt with very urgently and the image surface must not be touched. Old photographs are extremely fragile. Photographs can be frozen but the treatment depends on the medium from which they are made and specialist advice should always be sought.

Glass plate negatives must be air-dried lying the image side up on absorbent paper and should be frozen.

MICROFILM AND FILM

Film should be washed and reprocessed by a film processor. Avoid touching the surfaces.

AUDIO AND VIDEO TAPE

Tapes should be rinsed in clean water and air dried. Avoid scratching the surface.

TEXTILES

Wet textiles should be blotted to remove surface water and air dried. Textiles need to be supported when wet and can be very heavy. Textiles can be frozen, but specialist advice should be sought.

FURNITURE

Excess water should be removed and furniture should be allowed to air dry slowly in a cool place. The items should be monitored regularly to check for warping or splitting.

CERAMICS

Ceramics need to be handled carefully, and will require different treatments depending on their constituent materials. They should be dried carefully and, if broken, the parts should be tissue or paper-wrapped when dry and be placed together in a bag.

STONE, METAL ITEMS AND GLASS

Items made of these materials need to be blotted dry and air dried. Any broken parts should be collected together and placed in a bag or a box. Stained glass subjected to fire alone will survive, although the lead will melt. The rapid cooling of firefighting water may have shattered glass into tiny pieces which should be all collected and bagged regardless of size.

KEEPING RECORDS OF DAMAGE

It is very important to keep a record of the full extent of material salvaged, where is it being stored or conserved. The catalogue of contents will assist in identification. If items are in a set they should be kept together. All items should have as much identification as possible (reference number, location, place in room) as this will assist in reconstitution. Labels should be tied on to items, or if they are in a bag, an adhesive label should be attached to the outside.

Damage lists should be completed by members of the Disaster Team in relation to each item or group of items moved and given to the co-ordinator for filing. The damage lists will assist in keeping control of items removed from their original place of storage and in reconstituting the original arrangement.

The area or room from where the item was removed should be identified clearly on the damage lists. If crates are used to store damaged items they should be numbered and dated using tie-on labels. The co-ordinator needs to keep track of crates if they are moved around in the holding area.

The co-ordinator should file the damage lists in order and made a photocopy if possible. The co-ordinator should keep a log of events and of decisions taken.

A well-organised storage area for St Mel's with salvaged contents boxed and numbered (Image courtesy of FKP Architects)

Learning from the experience

The experience of disaster is traumatic, costly and disruptive. Those immediately involved will have had months or longer stolen from their lives and may have lost items of great personal value. The effects will be felt over a long time even as one attempts to recover and re-establish the conditions for the resumption of normality. The price is so high that it is vital that lessons are learned.

When matters are back under control, the Disaster Plan should be reviewed and updated for any shortcomings discovered in the course of the emergency. This should be shared with the team and the emergency services as well those in a similar situation, such as flood-prone districts.

In the case of public or community buildings, local authorities will be able to apply the experience to all the buildings in their care and to train staff accordingly. For museums, libraries, archives, the Conservation Committee of the Council of National Cultural Institutions offers a forum and runs workshops. The church bodies have similar networks of communications.

5. Insurance Issues

This chapter is a general guide only to inform policyholders of issues to consider when insuring their historic property.

What is insurance?

Insurance is a contract under which an insurance company undertakes to provide a guarantee of compensation for a specified loss or damage in return for payment of a premium. The underlying principle of insurance is indemnity – that is putting the person insured into the same financial position after a loss occurs as was enjoyed immediately before the loss.

Having adequate and properly-considered cover in place will enable an owner to recover fully from the loss suffered. When things go wrong – a fire breaks out or pipes burst – policyholders need to be sure that their insurance cover will be adequate to pay for repairs and for any related necessities.

Mortgage holders are required by their mortgage provider to carry buildings insurance.

Insuring historic properties

Most Irish historic buildings are built of solid masonry walls of brick and/or stone, with pitched slate or tile roofs incorporating lead or copper elements and cast iron rainwater goods. They usually contain hand-crafted timber joinery, plasterwork and high quality detailing; all combining to give each building its unique character. They differ from the standard construction of most insured properties which are of modern date. In many cases, the original construction materials are irreplaceable – stone quarries and brickworks will have closed; modern bricks are dimensionally different.

As with many policyholders, owners of protected structures and other historic buildings are faced with increasing premium costs and some with restrictions on cover. Scrutiny by insurance providers often increases when a structure is protected. The status, or construction date, of the building alerts the insurance provider to look more closely at the building sums insured because it will cost more to reinstate than a property of standard construction.

Many owners and occupiers consider that the protected status of their building has caused insurance providers to attach a loading or even to refuse to give a quotation. As with all non-standard services, it is best to deal with a specialist who is expert in the relevant sector of the market. Some insurance providers prefer to limit their activity to the online sector of the market which, almost certainly, will not offer sufficient cover for historic properties.

The scale and type of historic properties varies widely and this can affect insurance. Thatch is a major issue for owners seeking insurance. Full or partial reinstatement is an issue for providers and this is discussed later in this chapter.

In terms of cost, brokers who are experienced in dealing with historic buildings consider that premiums may be higher than for equivalent modern buildings. This is because they are often of larger volume, have more decorative features and require more specialist repair work following damage. Because of this, the sum insured is often greater and the higher sum insured leads to a higher premium. However, the underlying rate charged per €100,000 value of the building may be comparable to the rate for a modern building. Brokers report that claims are not more frequent than for modern buildings, but they generally take longer to process and can involve greater expense to put right as specialist skills and materials are often needed and these may be in short supply.

REDUCING THE PREMIUM

If the owner makes a Disaster Plan addressing the identified risks, as is recommended in this document, it should be brought to the attention of the specialist insurance provider or broker. As the Disaster Plan reduces the risk, it should help the insured to make a case for a reduction in premium. This process includes keeping a maintenance record which covers fabric and service repairs and serves as a reminder to carry out essential tasks. This will be of use to the insurance provider as well as the policyholder. A Disaster Plan and a maintenance record provide evidence of the long-term commitment of the owner/occupier to keeping their asset in good order which is a policy condition.

Most insurance policies have a small excess. If a policyholder agrees a much larger excess, a considerable difference can be made to the premium, as the insurance provider eliminates the administrative costs of dealing with small claims. To do so the policyholder must be in a position to fund the cost of repairing any damage done in such relatively small incidents.

It is recommended to seek advice from specialist insurers whose knowledge should help to work out a tailored policy; while it might not be less expensive it may well provide more appropriate cover.

Some insurance providers offer a discount where there are fire or intruder alarm systems in place. Household discounts can apply if a person over 50 applies for the cover or is living in the house; where there is someone usually resident in the house during the day; for non-smokers or where there are security locks on doors and windows. However, discounts usually apply only to standard household policies.

Owners of buildings with thatched roofs often find it difficult to insure as thatch is considered a major peril in insurance terms. However, they may benefit from cover if they have other property, such as a farm, where the risk is spread. The preparation of a Disaster Plan is particular important for thatched buildings especially those in fully or partly commercial use such as a public house.

This boiler room is fitted with a hanging dry powder fire extinguisher which will activate automatically in the event of a fire reducing the risk of fire spread (Image courtesy of ARC consultants)

Specialist advice

Insurance is a complex topic and it is essential to get the right advice. This begins when insurance cover is being sought and carries through the process, from ensuring that the correct cover is in place for the specific property to the process of dealing with a loss, making a claim and reinstating/repairing the property.

Insurers specialising in historic buildings offer advice and guidance on loss prevention in order to preserve fabric of a building and many provide valuations for reinstatement. Such providers are far more likely to engage an expert surveyor to assess each building and its services in advance or they may refer applicants to a surveyor. By doing this they can better estimate their exposure and tailor their advice to each owner. This level of service is invaluable to policyholders who can place a far greater reliance on the policy to fully compensate them, should an insurable incident occur. Policies are also specifically tailored for historic buildings.

Insurance providers who are expert in the historic buildings sector deal with policyholders or those seeking insurance through insurance brokers who specialise in this area. A broker's function is to advise the insured and to deal with the insurance providers on the insured's behalf. This service includes seeking alternative quotations from suitable providers, assessing and comparing the cover offered.

Expert professional advice is also required when assessing the building for insurance purposes, after loss or damage and in carrying out repairs.

The policyholder should also follow the advice of this document and draw up a Disaster Plan, addressing the identified risks and planning action in the event of an incident. Keeping a maintenance record which covers fabric and service repairs is part of this process. For further information, see *Maintenance, A Guide to the Care of Older Buildings* in this Advice Series which contains a checklist for maintenance inspections.

Insurance assessment

Insurers may not carry out a valuation for modest residential buildings. Irrespective of this, the onus is always on the insured person to make certain that the insured sum is adequate to reinstate the property in the event of serious loss or damage. Policyholders should be aware that their policy may include an 'average' or underinsurance clause if the policy sum insured is inadequate, and this could proportionally reduce any claims settlement.

The insurance provider – or the policyholder – should engage a specialist building or quantity surveyor familiar with historic construction methods and materials, who can give reliable estimates of repair and reinstatement costs. The insurance surveyor will assess the building to ascertain its condition. They should identify the parts of the building that are original (or early) and contribute to its character, and the parts or elements that may have been replaced in modern construction materials. This may need a room-by-room survey to produce an elemental cost analysis similar to a bill of quantities (other cost models may also be used). The assessment will be helped greatly if the policyholder has useful historical information to give to the surveyor.

A fire risk assessment may be warranted for especially valuable and important buildings, to advise on fire engineering solutions to address risks and reduce the flammable load in the building. Fire suppression systems or enhanced detection systems may be advised. Water supply in the event of a fire is of crucial importance, as is the distance from the nearest fire station.

Some providers may require certain maintenance or repair works to be carried out in order to provide cover, or seek to have fire and burglar alarms installed, with a requirement for alarms to be connected to a monitoring station. Where a building may be out of sight of its nearest neighbour, it is important to have a system of emergency notification of an unfolding incident. Remember that alarms are often ignored.

THE CORRECT LEVEL OF INSURANCE COVER

Policyholders should ensure that their historic building is not under-insured, or indeed over-insured. Insurance providers need to be sure of both the condition of a building and any particular or special features of the property before they can assess the perils and quote accordingly.

DUTY OF DISCLOSURE

It is essential that the proposer makes a full disclosure of all material facts when insuring or renewing. This "duty of utmost good faith" is a legal duty of disclosure so that an insurance provider can accurately assess the risk. If the policyholder does not disclose full information about the risk, the insurance policy may be voided or certain claims may be declined. The Consumer Insurance Contracts Bill 2017 (which is before the Dáil at the time of publication) seeks to replace the duty of utmost good faith by placing specific statutory duties on consumers and insurers. Common examples of this could include that the building is vacant, that building works are taking place, the alarm system is no longer working or that the building is open to the public for a number of days in a year. If the policyholder is in any doubt about whether a fact is material or not, it should be disclosed.

FULL OR PARTIAL REINSTATEMENT

Many policyholders and insurance providers are under the impression that they will be required by legislation to reinstate historic fabric in the event of disaster to a protected structure. In reality, the decision depends on the character of the structure and the degree and location of the loss. It will be taken in consultation with the local authority, who may require reinstatement of the damage or may require the exterior of the building to be reinstated to accord with the character of the area. The difficulty is that the policyholder may not know until after the disaster if reinstatement is required. Therefore, the full value should be insured on the basis that reinstatement is necessary. In most cases, this will not result in a substantially higher premium and will give peace of mind to the policyholder and the option to reinstate if desired. Many owners will want to reinstate the building with all its period features.

The extent of knowledge prior to the insurable event of the fabric, elements or features that contribute to the character of the building, and their condition following the event, will be prime considerations. If a policyholder wishes to insure for reinstatement 'in character' after major loss of fabric, the policy should provide for the necessary insured sum and the elements or features should have been adequately surveyed or recorded beforehand.

The information gathered during the survey will influence the provider's estimate of the insured sum and the risks attaching to the property. The cost of reinstating a loss will vary depending on a huge range of factors including the quality of the fabric that is to be repaired or restored. It is not sufficient to rely on a standard cost-per-square-metre table, such as calculators published by the Society of Chartered Surveyors Ireland and other organisations, as these tools rely on current prices for standard building materials and construction methods (except where use of such materials and methods will be acceptable).

There may be parts of the building that should be treated differently in the event of a loss occurring, such as where fabric has previously been totally rebuilt after a previous fire. In such a case, it may be beneficial to divide the building into notional zones, to differentiate between areas which have historic fixtures and fittings and perhaps elaborate interior features and those which are modern.

The valuation of the insured sum should allow for building cost inflation as there may be delays in commencing repair works to a historic building after an insured event (apart from emergency measures to protect the fabric). Ideally the policyholder or insurance provider would review the insured sum each year at renewal to take account of building cost inflation. In some cases the insurance provider will do this automatically. Some providers offer insurance on a 'day 1' basis (which may have a higher premium), meaning that the provider absorbs any inflation costs that occur between the insured event taking place and the completion of the work. It is essential that the declared value, that is the base sum insured, is correct.

Water damage – before and after repair and redecoration (Images courtesy of ARC Consultants)

Other factors

BUILDING USE

The type of use to which the building is put will influence the insurance premium. All providers treat owner-occupied dwellings differently to office or other commercial uses or houses which are open to the public. Some historic properties are a combination of both. Outdoor activities or children's play areas being offered as attractions would be most relevant to risk assessment and will attract higher premiums if cover can be obtained.

The existence of outbuildings or ruins on the property may be relevant to the choice of policy or cost of premium. Sub-let parts of a building or outbuildings will be a relevant factor for the insurance provider and must be compliant with fire safety regulations. If third parties are invited onto the property, unmaintained structures in the grounds may increase the risk. Many historic properties, including churches, are be used by local communities for a wide variety of functions. In such cases, insurers may insist on risk assessments being carried out and risk management measures being implemented.

VALUABLE CONTENTS

Fixtures and fittings are insured as part of the building. Contents are covered separately within the policy. Some historic properties have contents that are not replaceable as well as many that are. Advice should be sought from the broker on insuring the building contents.

POLICIES INCLUSIONS

Policies for historic buildings should cover the usual risks of fire, flood, lightning, theft, malicious damage, explosion, storm, earthquake, aircraft and most or all of the following:

- Making good damaged interior fixtures and features, such as cleaning of smoke or water damage
- Electrics, heating, plumbing and other services
- Water damage and tracing the source of burst pipes
- Architectural metalwork theft
- Garden structures and features which contribute to the character of the property
- Cover during renovation or extension works is not automatic. Insurers need to be informed of the works and there may be risk management procedures to be followed
- Temporary works (such as propping a wall or erecting a temporary roof)
- Collapse or instability arising from the incident
- Fire brigade call-out charges and the after-effects of fire-fighting activity, such as water saturation

The sum insured should be adequate for:

- Professional fees to include the employment of a loss assessor and, as necessary, a design team. In many cases repairs and reinstatement works may

Basements can be particularly prone to flooding (Image courtesy of ARC Consultants)

require preparation of a planning application and/or compliance with building regulations

- Debris removal and site clearance works, which may necessitate engaging an archaeologist
- The costs associated with asbestos removal including strict disposal conditions and specialist contractors
- Professional conservation services and craft skills to repair the structure and its fixtures and fittings, including VAT where applicable
- Public liability insurance appropriate to historic buildings which are open to the public, such as under section 482 of the Taxes Consolidation Act 1997
- Alternative accommodation in the eventuality of having to vacate the property while repairs are undertaken following an insurable incident
- Business interruption, if applicable
- Loss of rental income if a tenant has to vacate during repairs
- Employers' liability if the property owner has any employees or volunteers, or makes use of labour such as maintenance men or window cleaners
- Products liability if any goods are sold on the premises

OTHER POSSIBLE INCLUSIONS DEPENDING ON SPECIFIC CIRCUMSTANCE

It may be prudent to extend insurance cover to particular types of perils not generally included such as landslip, heave or subsidence, depending on the situation.

Periods of vacancy are a separate class of risk and are not usually be covered. Policyholders must always disclose vacancy to their insurance provider. They may be able to obtain reduced cover with certain restrictions such as frequent inspection, water to be turned off, the heating system drained, and electricity switched off except for power to any intruder and alarm systems.

CLARITY BY PROVIDER

Insurance providers should be clear that their policies require or allow for any or all of the following, and should explain any other conditions or clauses in the policy that might affect a claim:

- Allowance for fluctuation of the cost estimate as the extent of damage and necessary work becomes apparent (as long as the sum insured is adequate)
- Placing limitations on the parties allowed to tender (if the provider maintains a list of specified contractors, for example)
- A requirement to use or exclude a particular form of building contract to carry out repair or reinstatement
- Allowance for specialist contractors or specialists to be engaged (by nomination or tender)

All policies contain requirements and exclusions, which must be adhered to in order that the policy is valid in the event of a claim and may even contain warranties and/or conditions precedent to liability.

Carrying out repairs to a historic building requires an experienced contractor capable of undertaking specialist work such as running this plaster cornice in situ (Image courtesy of ARC Consultants)

INSURING A NEWLY PURCHASED HISTORIC BUILDING

Prospective purchasers of historic buildings should ideally commission a combined pre-purchase and insurance survey from a competent professional before completing the purchase. This will provide them with guidance on the condition of the fabric and give them advance notice of potential repairs and costs needed to bring the property up to the required standard. The survey should guide them as to fabric or parts of the building that might be modern, and advise on reinstatement costs, all in advance of concluding a purchase. Such purchasers will be empowered with the necessary information to inform the decision-making process.

A newly purchased building may need to be repaired and/or converted to a new use before occupation. The insurance policy may cover a realistic period of vacancy (reduced to fire, lightning, explosion and aircraft as noted above, which will be subject to strict requirements). Policies for remedial and/or upgrading work should be tailored appropriately and the building made secure to reduce risk, including public liability claims, malicious damage and theft.

Mortgage holders are required by their mortgage provider to carry buildings insurance. Purchasers do not have to accept the policy offered through the lending agency, and the usual policy offered may not be suitable for a historic building. Owners should consult a broker experienced in insuring historic buildings and should be aware of the 'cooling-off period' on policy cancellation.

BUILDING PROJECTS

The insurance provider must be notified when repairs or extensions are planned, as these are material facts and may have insurance implications. The insurance provider or brokers should be asked to check the contractor's insurance policies and ensure that they are adequate and appropriate for the specific job. The building insurance may be affected by the works and the broker is the best source of advice for a policyholder to ensure that adequate cover is in place between both policies.

Insurance policies which cover building works should contain conditions appropriate to the repair of historic buildings. Policies may impose requirements such as the use of Hot Work Permits by the contractor when using equipment which produces naked flames or sparks. Hot work is any construction or maintenance activity that might generate sufficient heat, sparks or flame to cause a fire. Hot work includes welding, flame cutting, soldering, brazing, grinding and other equipment incorporating a flame. Hot work can be dangerous and requires stringent conditions to be in place. Some contractors' insurance policies contain Hot Work Permit Warranties and, if these are breached, the contractor's insurers can refuse to deal with any ensuing claims. This could affect the property owner or prevent their insurer recovering costs against a negligent contractor.

When loss happens

The policyholder should be aware of the extent of the insurance cover and the procedure to follow when loss or damage occurs. Contact numbers and policy details should be logged in the Disaster Plan, a copy of which should be stored away from the property.

ACT WITHOUT DELAY

It is essential to act without delay as this will ensure that recovery is maximised and that no poor decisions are taken causing further damage. The policyholder should contact the insurer or broker immediately and inform them that the building is of architectural heritage value. They will arrange for a loss assessor or loss adjuster to visit and inspect the damage. Whilst the policy holder may carry out immediate and temporary repairs to prevent further loss or damage, no damaged property should be disposed of until the insurers, or the loss adjuster, have confirmed that this may be done. It should be remembered that some saturated material such as wood or plaster can dry out and should not be removed without knowledgeable assessment. If possible and without risk, photographs should be taken of the damage before starting temporary or immediate repairs.

THE LOSS ASSESSOR AND THE LOSS ADJUSTOR

The loss assessor acts on behalf of the policyholder to ensure that all aspects of the claim are dealt with and should be engaged without delay. The loss adjustor is an impartial advisor employed by the insurance provider. The choice of an experienced loss adjustor and loss assessor will make a difference to the expertise with which a claim for loss to a historic building is managed. They should provide a beneficial service, but will be constrained by the conditions attaching to the policy, whether or not these are appropriate to a historic building.

CHOOSING AN EXPERT BUILDING PROFESSIONAL AND CONTRACTOR

Suitable engineers, architects, surveyors and contractors with conservation expertise should be engaged by the insurance provider or policyholder, as employing a non-specialist building professional and contractor may result in poorly designed and executed repairs, and could cause building performance problems in the future. Architects, engineers and surveyors operate conservation accreditation schemes and there are heritage registration schemes for contractors (see 'Useful Contacts' below).

TOTAL AND PARTIAL LOSS

If there is total loss or catastrophic loss of character, the special interest of the building will likely be gone. In most circumstances, there will be no purpose to the planning authority keeping it on the record of protected structures. However, where the building formed part of a larger architectural design – if it was one of a formal square of terraced houses or an important landmark – it is likely that the planning authority will seek at least the exterior and roof profile to be reconstructed with good quality external finishes to match or complement those of its neighbours. In some cases, the planning authority will keep the structure in its record of protected structures to ensure the external aspect of the character is retained over the long term.

Some insurers may consider a certain level of loss to be the limit beyond which practical reinstatement is unwarranted in a standard building. However, a thick-walled stone building can structurally withstand a disaster that would collapse a modern building. The local authority, which covers planning and sanitary authority functions, should be consulted on the legal procedure they prefer to use to require damaged protected structures or structures within an architectural conservation area to be made safe.

Where there is partial loss, the policyholder or loss adjustor should discuss options for repair, restoration and/or rebuilding with the planning authority and seek a formal opinion for the chosen process. This could take the form of a section 57 Declaration (see 'Legal Protection of Historic Buildings') which itemises the types of work that do not affect the architectural heritage character of the structure, and, other restrictions permitting, do not require planning permission. A second option, depending on circumstances, may be for a planning authority to issue a notice under section 60 of the Planning and Development Act 2000 requiring the restoration of character of the protected structure. These options are an alternative to seeking planning permission and offer certainty for policyholders and insurance providers that the steps taken will not be challenged by the statutory authority and thus avoid delays in starting the repair process.

Appendix 1: Disaster Plan 1 Sample Template

Note: these templates are for guidance only.

Disaster Plan 1: Simple

This template is intended for use on a simple historic structure. Each building or place is different and the detail of the plan must be written based on the risks specific to the place. Contents of special value or importance will require particular provision.

The Team	Contact Numbers	
Name	Mobile	Landline/Other
Name	Mobile	Landline/Other
Name	Mobile	Landline/Other
Name	Mobile	Landline/Other
Name	Mobile	Landline/Other

Other Services	Contact Numbers	
Contractor Name	Mobile	Landline/Other
Roofer Name	Mobile	Landline/Other
Plumber Name	Mobile	Landline/Other
Electrician Name	Mobile	Landline/Other
Security Company Name	Mobile	Landline/Other
Locksmith Name	Mobile	Landline/Other

LEVEL 1: DISASTER PLAN TEMPLATE

RISK	Read through Chapter 1 before completing			
Fire				
Existing Controls in place				
Additional Controls List further actions needed to reduce risk				
Record when actions have been or will be carried out				
Next Inspection due				

LEVEL 1: DISASTER PLAN TEMPLATE

RISK	Read through Chapter 1 before completing			
Flood				
Existing Controls in place				
Additional Controls List further actions needed to reduce risk				
Record when actions have been or will be carried out				
Next Inspection due				

LEVEL 1: DISASTER PLAN TEMPLATE

RISK	Read through Chapter 1 before completing			
Human Causes				
Existing Controls in place				
Additional Controls List further actions needed to reduce risk				
Record when actions have been or will be carried out				
Next Inspection due				

LEVEL 1: DISASTER PLAN TEMPLATE

RISK	Read through Chapter 1 before completing			
Building Works				
Existing Controls in place				
Additional Controls List further actions needed to reduce risk				
Record when actions have been or will be carried out				
Next Inspection due				

LEVEL 1: DISASTER PLAN TEMPLATE

RISK	Read through Chapter 1 before completing			
Catastrophic collapse and other factors				
Existing Controls in place				
Additional Controls List further actions needed to reduce risk				
Record when actions have been or will be carried out				
Next Inspection due				

Appendix 2: Disaster Plan 2 Sample Template

Note: these templates are for guidance only.

Disaster Plan 2: Complex

This template is intended for use on larger or more complex places. The principal difference between this and Disaster Plan 1: Simple is the inclusion of a formal Risk Assessment.

Larger and more complex buildings may require a separate section of the Plan to be prepared for different parts of the building or place. Each place is different and the detail of the plan must be written based on the risks specific to the place. Contents of special value or importance will require particular provision. Also, such buildings may be managed by staff rather than by owners or families. This may lead to less detailed knowledge and continuity which makes the detail of the plan more important.

Template pages may be copied and completed as necessary for the relevant details and risks.

It is strongly recommended that the expertise available from government, local authorities and other agencies is used to assist the production of the Disaster Plan 2: Complex.

Typical additional sections for Disaster Plan 2: Complex include:

- Initial Situation Report
- Telephone tree
- Facilities information
- Priority salvage lists
- Emergency response and evacuation procedures
- Recovery Plan

LEVEL 2: DISASTER PLAN TEMPLATE

Disaster Plan						
Address						
Prepared by			Tel. No.			
Date	DD/MM/YY	Revised on	DD/MM/YY	DD/MM/YY	DD/MM/YY	DD/MM/YY

Plan kept at	

Other Copies (It is advisable to keep at least one other copy off-site but accessible)			
No.	Kept at	Contact Name	Tel. No.
1.			
2.			
3			

Emergency Services	**Contact Numbers**
Main Contact	**999 or 112**
Local council daytime	
Local council after-hours	
Doctor /Hospital	
Gardai	

Utilities	**Contact Numbers**
Electricity	
Gas	
Local Authority	
Water	
Telephone	

LEVEL 2: DISASTER PLAN TEMPLATE

The Team	Contact Numbers	
Name	Mobile	Landline/Other
Name	Mobile	Landline/Other
Name	Mobile	Landline/Other
Name	Mobile	Landline/Other
Name	Mobile	Landline/Other

Other Services	Contact Numbers	
Contractor Name	Mobile	Landline/Other
Roofer Name	Mobile	Landline/Other
Plumber Name	Mobile	Landline/Other
Electrician Name	Mobile	Landline/Other
Security Company Name	Mobile	Landline/Other
Locksmith Name		

For larger buildings or complexes, consider if individual spaces or buildings require to be assessed separately

LEVEL 2: DISASTER PLAN TEMPLATE

Risk Assessment form						
Property						
Address						
Assessed by						
Date	DD/MM/YY	Revised on	DD/MM/YY	DD/MM/YY	DD/MM/YY	DD/MM/YY

Risk Rating	**Multiply Risk by Severity to give Risk**	
Risk or likelihood	**Severity of dammage or loss**	**Risk Rating**
1 Low **Unlikely / Seldom**	**1 Low** **Minor damor damage**	**1-2 Low** **Unlikely / Seldom**
2 Medium **Quite possible**	**2 Medium** **Damage requiring professionional repair**	**3-4 Medium** **Quite possible**
3 High **Probable or near certain**	**3 High** **Damage beyond repair to irreplaceable objects**	**6-9 High** **Probable or near certain**

List the risks/hazards overleaf with the risk rating for each List the existing controls and any further actions necessary		
See Chapter 1 for the more usual risks and preventative measues that can be taken. Add for your own circumstances.		

LEVEL 2: DISASTER PLAN TEMPLATE

RISK	Read through Chapter 1 before completing		Risk Rating
Fire			
Existing Controls in place			
Additional Controls List further actions needed to reduce risk			
Record when actions have been or will be carried out			
Next Inspection due			

LEVEL 2: DISASTER PLAN TEMPLATE

RISK	Read through Chapter 1 before completing		Risk Rating
Human Cause			
Existing Controls in place			
Additional Controls List further actions needed to reduce risk			
Record when actions have been or will be carried out			
Next Inspection due			

LEVEL 2: DISASTER PLAN TEMPLATE

RISK	Read through Chapter 1 before completing		Risk Rating
Catastrophic collapse and other events			
Existing Controls in place			
Additional Controls List further actions needed to reduce risk			
Record when actions have been or will be carried out			
Next Inspection due			

Appendix 3: Checklist of useful items for a disaster kit

- Copies of Disaster Plan – laminated, if possible
- First-aid kit
- Personal Protective Equipment
- Torches (head torches may be particularly useful as they allow the hands to be kept free)
- Batteries
- Mobile phone/camera
- Disposable overalls
- Latex and nitrile gloves
- Rubber gloves (household type)
- Protective glasses
- Safety helmets
- Wellington boots with steel-toe caps with socks inside (in various sizes)
- Disposable aprons
- Face masks, for protection from dust and mould
- Hi-visibility vests
- Stanley knife
- Pliers
- Screwdriver
- Hammer
- Tape measure
- Camera
- Scissors
- Stapler and staples
- Clip board
- Copies of damage lists
- Notepads
- A4 paper
- Pens
- Pencils
- Pencil sharpeners
- Permanent marker
- Fine permanent marker
- Preventing ingress of water
- Buckets with mop wringers
- Mops
- Kitchen rolls
- Disposable or reusable absorbent cloths for mopping up
- Silicone release paper
- Spillage cushions
- Parcel tape and dispenser
- Black- and yellow striped tape to mark off closed areas
- Polythene bags in small, medium and large sizes
- Newsprint paper
- White blotting paper
- Perforated polythene sheeting for covering tables
- Silicone release paper
- Sheets of Mylar (for picking up wet sheets of paper)
- Plastic clothes pegs
- Packing
- Bin bags (black and white or clear)
- Bag ties
- Bubblewrap
- Tie-on waterproof labels
- Cotton tape
- String
- Dust pans
- Short-handled brushes

Larger equipment and other items

- Trestle tables (for the recovery of small items)
- Crates
- Wet and dry vacuum cleaner
- Extension lead
- Ladder or library steps
- Trolley or sack truck
- Roll of polythene sheeting (clear)
- Dehumidifier
- Electric fan

Further Reading

British Library, Preservation Advisory Centre, *Salvaging library and archive collections,* available on www.bl.uk/aboutus/stratpolprog/collectioncare/

British Standards Institute. *BS 5839 Part 6: Fire detection and alarm systems for buildings; Part 6: Code of practice for the design, installation, commissioning and maintenance of fire detection and fire alarm systems in domestic premises.* London: BSI (2019)

Council on Training in Architectural Conservation (COTAC). *Fire and Flood in the Built Environment: Keeping the Threat at Bay.* (2015)

Department of Arts, Heritage and the Gaeltacht. *Architectural Heritage Protection Guidelines for Planning Authorities.* In particular Chapter 16 'Making Good Disaster Damage'. (2011) Available to download from www.chg.gov.ie

Fire Protection Association (in partnership with NFU Mutual and Historic England). *New Guidance for Owners of Thatched Buildings with Wood-burning and Multi-fuelled Stoves.* (2019)

Hunt, Roger (ed.). *Disaster and Recovery.* London: Society for the Protection of Ancient Buildings (2017)

National Standards Authority of Ireland. *IS 3217 Emergency lighting.* Dublin: NSAI (2013)

National Standards Authority of Ireland. *IS 3218 Fire detection and alarm systems for buildings – system design, installation, servicing and maintenance.* Dublin: NSAI (2013)

National Standards Authority of Ireland. *IS EN 62305 Protection against lightning – Part 2 risk management.* Dublin NSAI (2012)

National Task Force on Emergency Response. *Emergency Response and Salvage Wheel.* Washington DC, USA (1997) – this is a useful tool setting out, on one side, the steps to be taken in the first 48 hours of a disaster occurring and, on the other side, how to stabilise contents and materials in the aftermath.

Office of Emergency Planning. *Be Winter-ready.* Dublin: Government of Ireland (2018)

Office of Public Works. *Flooding: plan, prepare, protect.* Trim: Office of Public Works (2014). See also http://www.flooding.ie

Tandon, Aparna. *First Aid to Cultural Heritage in Times of Crisis, 1. Handbook.* Rome: International Centre for the Study of the Preservation and Restoration of Cultural Property ICCROM (2018)

Tandon, Aparna. *First Aid to Cultural Heritage in Times of Crisis, 2. Toolkit.* Rome: International Centre for the Study of the Preservation and Restoration of Cultural Property ICCROM (2018)

Further information on producing Disaster Plans (or Disaster Risk Management Plans) is available on various websites. Those below are most relevant to historic structures:
https://www.ecclesiastical.ie/risk-management/
https://historicengland.org.uk/advice/technical-advice/emergency-and-fire/
https://www.historicenvironment.scot

Useful Contacts

If the building is a protected structure, the architectural conservation officer in the local authority should be the first person to contact with queries regarding works to it. Other useful contacts include:

Department of Culture, Heritage and the Gaeltacht,
Built Heritage Policy
Custom House, Dublin 1
Telephone: 01 888 2000
Web: www.chg.gov.ie

Engineers Ireland, 22 Clyde Road, Ballsbridge, Dublin 4
Telephone: 01 665 1300
Web: www.iei.ie

Heritage Council, Áras na hOidhreachta, Church Lane, Kilkenny
Telephone: 056 777 0777
Web: www.heritagecouncil.ie

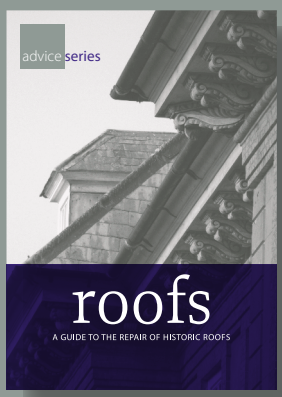
Irish Architectural Archive, 45 Merrion Square, Dublin 2
Telephone: 01 663 3040
Web: www.iarc.ie

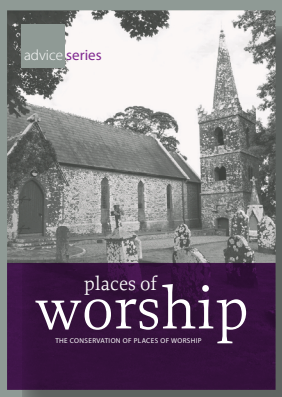
Irish Georgian Society, City Assembly House, 58 William Street South, Dublin 2
Telephone: 01 679 8675
Web: www.igs.ie

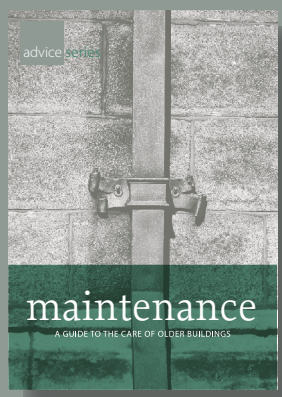
Royal Institute of the Architects of Ireland, 8 Merrion Square, Dublin 2
Telephone: 01 676 1703
Web: www.riai.ie

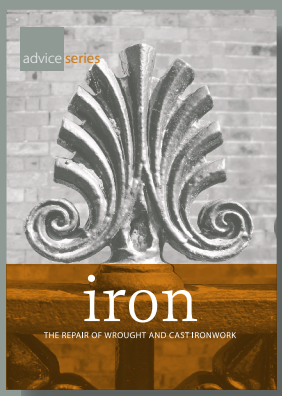
Society of Chartered Surveyors Ireland, 38 Merrion Square, Dublin 2
Telephone: (01) 644 5500
Web: www.scsi.ie

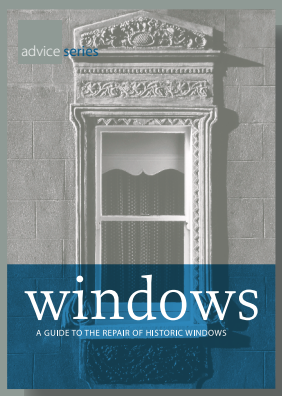
The Advice Series is a series of illustrated booklets published by the Architectural Heritage Advisory Unit of the Department of Culture, Heritage and the Gaeltacht. The booklets are designed to guide those responsible for historic buildings on how best to protect, repair and maintain their properties.

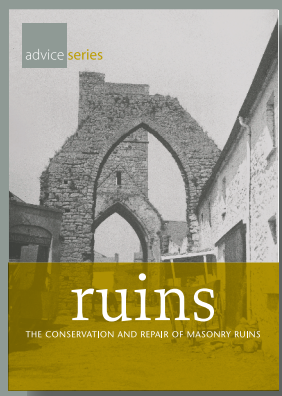


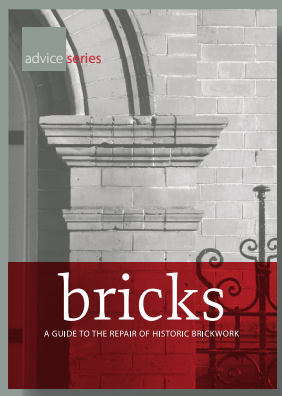












This guide seeks to advise those responsible for the care and conservation of a historic building or site on how to:

- Prevent disasters occurring by identifying risks and taking steps to eliminate or reduce them
- Prepare a disaster risk management plan that can be implemented in an emergency
- Respond to an unfolding emergency
- Deal with the aftermath and, as far as possible, return the historic building and its contents to normal

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