

# PROTECTING OXFORDSHIRE'S HERITAGE



Blenheim Palace Woodstock

Within Oxfordshire we have some of the most historic buildings within the country. This historic environment enriches our quality of life, and contributes to local character and a sense of place; some historic buildings, monuments, landscapes and areas are of special importance nationally and internationally. The loss of any historical building or article represents a loss which can never be replaced. Due to their age, these buildings have not been constructed to present day fire safety building design standards and many are constructed from materials that are often highly contributory to the development of a fire and which can be easily ignited and consumed.

Oxfordshire County Council's Fire and Rescue Service Chief Officer, David Etheridge, is keen to support custodians of such properties, either as owner or occupier, in protecting heritage buildings and their contents from the ravages of fire.

To assist protecting our heritage for today and for the generations to come, Oxfordshire Fire and Rescue Service have created this site specifically designed to provide information and assistance.

# PROTECTING OXFORDSHIRE'S HERITAGE GUIDANCE NOTE



Wardington Manor 2004

## 1. INTRODUCTION

This document not only covers historic buildings themselves, but also their contents such as artefacts of cultural and historic significance. By following the advice contained in this document, you as custodians of our national heritage can greatly reduce the risk posed by fire to your property.

This guide is based upon a document originally prepared by Steve Emery, Fire Safety Advisor for English Heritage and has been reproduced with their kind permission.

Fire Risk Assessments (FRAs) are mandatory in all but domestic premises under the Regulatory Reform (Fire Safety) Order 2005 (FSO). Many buildings including heritage and historic properties will be required to undertake a fire risk assessment.

There exists a series of guides to assist employers and owners to produce such risk assessments, each of which contain an appendix specifically designed for heritage buildings. These are available, free of charge, on ([Fire safety in the workplace - www.gov.uk](#)).

Another document, published by Chilton International Fire "Historic buildings and fire safety", covers both the subject of fire risk assessment and fire safety precautions needed in historic buildings.

**Historic Buildings & Fire Safety - [www.chilternfire.co.uk](http://www.chilternfire.co.uk)**

There are numerous listed heritage buildings within the County of Oxfordshire, all of which and their contents are at risk from fire.

Tragic examples such as Windsor Castle (1992) and Cutty Sark (2007) show that fire can strike at anytime and anywhere. Costs were reported as £37m and £10m respectively, however the structure and the artefacts that were destroyed are lost forever. In part these fires are memorable for affecting structures where it may be assumed the fire precautions and procedures were in place (as they were) and a fire would be unlikely; however the unexpected does and will occur. Following investigations the probable respective causes were conservators lamps left switched on behind heavy curtains and an industrial vacuum left running overnight. There are many heritage fires that do not make national news.

It has been reported that, on average, seven UK heritage buildings per month were lost or damaged as a result of fire. Therefore too much care cannot be taken to protect your heritage building and artefacts.



*Radcliffe Camera Oxford*

## 2. PREVENTION & PROTECTION ADVICE

Whilst it is the fire and the destruction wrought that captures the headlines, the damage caused to the building and contents from collapse, smoke and water often prove just as fatal to our heritage. After the incident the building may be structurally unstable, open to wind, weather and vandalism, and susceptible to natural events caused by high residual moisture content in the fabric (e.g. exfoliation, cracking, production of efflorescence, rot and decay). The nature of historic buildings, with voids and cavities provides pathways for unseen fire and smoke. Other incidents caused by flooding, structural failure or weather can have similar catastrophic outcomes that can likewise affect the building and artefacts over time.

Fires that develop into major incidents are most likely to occur during the night or when the building is empty. By planning for these types of incidents, the likelihood of retaining heritage buildings and artefacts can be increased.

Prevention is better than cure (or damage limitation), indeed in many cases heritage is unique and 'cure' is not an option.

When considering a suitable location to contain or store heritage valuables within a building, the longer the storage area is safe from the fire the better.

This can include the time that passes before a fire is discovered, the time for the Fire and rescue service to be called, their arrival, set up, fighting the fire and reaching the store.

If a room is chosen for storing heritage artefacts, thought needs to be given to the fire resistance offered by walls, floors, ceilings, doors, service openings, etc. In addressing these issues, should fire threaten to consume your structure and salvage is not possible, you may have enabled sufficient time for the Fire and rescue service to save your valuable heritage.



Oxford Castle

### 3. EMERGENCY PLANNING

#### a) Introduction

When a fire occurs it is too late to make a plan, planning for the actions you and others will take in case of a fire or other emergency should be made, practised and refined before the event. Emergency planning should work on the basis of not "if" a fire should occur but "when" the fire occurs. Bearing in mind the age of historic buildings such a consideration will become increasingly statistically true over time.

That is not to say that the risk of a fire starting and the damage it causes cannot be substantially reduced by the application of a suitable risk assessment to produce an emergency plan. Such a risk assessment will identify all potential fire safety problems and enabled actions to be taken and processes to be introduced to reduce the chances of a fire occurring and to mitigate its effects when it does.

If your premises' insurance is underwritten by the Government, it is a pre-requisite that you can demonstrate that an emergency plan is in place

#### b) Planning

Such planning will vary in scope depending upon the size and nature of the undertaking. In larger premises, such as museums, art galleries and houses containing collections, it should be a comprehensive manual covering everything including;

- routine preventative measures
- housekeeping action
- fire safety measures
- risk assessments
- emergency procedures
- contact and facilities lists
- Prioritised salvage plan
- Managing a salvage squad
- Business continuity planning

#### c) Who complies the plan

The staff of the building who intimately know their premises are best suited to produce the emergency plan with, where necessary, the help of technical experts. If composed by the people on site it can quickly and easily updated as the situation within the building changes.

The plan should be easy to understand and should be accessible to any authorised person who needs to use it. The sections devoted to emergency actions such as contact lists, salvage priorities etc. may need to be read in adverse conditions, so this should be in large print and preferably encapsulated so that they are not unreadable when they get wet. Diagrams, plans and pictures are a concise way to convey messages.

#### d) Fire Risks

At first glance large historic buildings such as museums and art galleries appear to have a low fire risk; large rooms with low fire loadings, few sources of ignition and a high security presence. However often at the periphery of these building on the upper floors and basements are located small rooms use as offices, storerooms and plant areas. All these tend to have higher fire loadings and less maintenance than the public areas.

It is in these areas that the real dangers lie;

- The highest concentrations of combustibles are kept here
- More ignition sources are found in these areas than the public rooms
- The ceilings are lower which will hasten the spread of fire
- Housekeeping should not be less vigorous in these areas because they are out of the public eye
- Valuable collections are often stored here when not on public view
- These areas are more likely to have had holes made in fire resisting walls, for the passage of services

These rooms together with roof spaces and hidden voids require particular attention.

#### e) Other Fire Hazards

Whenever there are contractors on site, for whatever reason, from catering for an event, to displaying a new collection or where building works are taking place, there will be additional hazards. A new risk assessment should be undertaken to address each situation.

#### CATERING

Where caterers are used for events the contract should be clear about what operations can and cannot be carried out, what areas can be used and who has the authority (preferably site staff) to make sure that the conditions of contract are being adhered to. Menus should be agreed to in advance so that additional hazards such as deep fat frying or the use of blowtorches can be anticipated.

Additional safeguards can then be put into place, or if necessary the menu can be changed to eliminate the hazard. By making these conditions clear in advance, problems arising in the middle of an event can be avoided.

#### BUILDING WORKS

The additional threats which building works pose can include:-

- Loss of fire separation caused by the removal of doors or repair of partitions or ceilings.
- Temporary isolation of fire detectors to avoid false alarms caused by dust.
- Additional fire loading caused by the temporary storage of building materials and packaging.
- Additional sources of ignition caused by temporary lighting, plumbing works, sparks from cutting gear, burning paint and lead burning. These ignition sources should be controlled by a system of Hot Work Permits, or better still banning hot work altogether.

- Poor water supplies because hydrants have been covered or have not yet been fitted.
- Poor fire and rescue service access because of temporary hoarding or site huts.

#### f) Will the Building Survive a Fire?

One way of determining the likely effect of fire on a building and its contents is to use the 'Building Fire Performance Evaluation Methodology', otherwise known as the 'Method'.

This involves looking for the room that seems to be the highest fire risk.



Cuxham, Oxfordshire

#### FIRE IN THE ROOM OF ORIGIN

It is then assumed that a fire occurs which has enough energy to spread and involve the whole room (flashover). Whether this occurs or whether it just burns out will depend on the amount of combustibles, how close they are to each other, the available ventilation, the volume of the room and the ceiling height. These factors and the flammability of the contents of the room will also give an indication of how quickly it will reach full room involvement.

#### SUBSEQUENT FIRE SPREAD

A judgement is then made as to the probability that the fire will spread to an adjacent space and then the probability that it will involve the whole floor and then the whole building. This can be judged by looking at the fire resistance of the partitions ceilings and doors. The time taken for fire to spread from the room of origin will also depend on the fire rating of these various elements of structure.

### TIME TAKEN UNTIL THE FIRE IS FOUGHT

The time taken before an intervention, such as first aid fire fighting, or tackling by the fire and rescue service is then assessed by looking at the following factors;

- How quickly will the fire be detected?
- Is automatic detection provided and is it heat or smoke activated?
- How long will it take before first aid fire fighting commences?
- Is there a 24-hour presence so that first aid fire fighting can be instigated?
- If there is not a 24-hour presence is the fire alarm monitored so the fire and rescue service can be called automatically?

How long will it take for the fire and rescue service to attend? This will vary according to the time of day, how close the nearest fire appliance is, the distance from the fire station, the traffic conditions and the ease of access

- When the fire and rescue service arrives, how long will it take before water can be applied to the fire? This will depend on how close the fire engines can get to the building, the available water supplies, the distance that hoses will need to be laid between the water supplies and the fire engine and between the fire engine and the fire.

If the total time taken from a fire starting to the point that fire fighting begins is longer than the time taken for the fire to spread beyond the room of origin, then some remedial action needs to be taken.

### g) Remedial action and listed buildings

There will probably be a whole range of possible actions to take to improve the building fire performance. Not all of them may be possible because of listed building constraints, cost or desirability. The following questions may help decide on which course of action to take;

- What factors have been identified as the biggest threats to the building and contents?
- Can these threats be reduced to an acceptable level that does not involve any upgrading, such as reducing the fire load, or changing the use of the building or parts of the building
- If improvements are necessary, are they reversible, sympathetic to the appearance of the building and avoid damage to the historic fabric?
- Will the improvements be effective? For instance, the provision of a fire alarm and detection system, which is not monitored, will not provide any protection when the building is unoccupied.
- The provision of an automatic detection system may cut down the time before a fire is discovered, but is it reduced sufficiently so that it is unlikely that fire will spread to adjoining spaces. If not, another layer of improvements, such as a sprinkler system or local water mist system may be necessary.

Will the improvements be affordable and if not is there a more cost-effective alternative?

### h) Flooding Emergency



Charlbury, Oxford - 2014

### SOURCES OF FLOODING

All possible sources of flooding should be considered, including burst pipes, tidal surges, riverbanks bursting, and runoff from hillsides during rainstorms or melting snow.

After discounting the events that are impossible, the volume of water that could be expected from any of the remaining sources should be estimated.

As with the 'Building fire performance evaluation methodology', the time from the start of the flooding to discovery together with the volume and the likely course that the water takes will determine the damage caused.

### LOCAL FLOODING

The position of stopcocks should of course be noted on the emergency plan. However the route of water pipes, position of tanks, cisterns, ball cocks, valves, hose reels and overflow pipes can give an indication of where local flooding could occur. If a Rembrandt is sited below a bathroom, for example, but is in the best place, for presentation reasons it might be wise to decommission the bathroom.

When work is being carried out on water or heating systems there is a higher risk of leaks occurring, so it would be prudent to carry out post work checks before locking up the premises for the evening.

Where there is the possibility of flooding from natural causes such as water run-off or rivers rising, it would be worthwhile looking at the reasons that it is not occurring regularly. This may be because of efficient road drainage or the edge of the basement area has a raised course of bricks around it. Now we need to look at what would happen if the drain becomes blocked or the river rises an extra 2 metres. If these eventualities result in the flooding of the basement, would it constitute a disaster? It may be that simply moving the picture store to a higher floor may alleviate the problem

## FIRE FIGHTING RUN-OFF WATER

Fire and rescue services try to cause as little water damage as possible when fighting fires, but at serious high level incidents the water from their hoses will pour into the rooms below. A large fire may typically require the use of 6 jets, each discharging over 500 litres per minute. The hydraulic platform may well discharge 1800 litres a minute. This is a total of 4.8 tonnes of contaminated water a minute. The weight of water may well cause further structural damage and will certainly cause debris to cascade onto lower floors.

It may be possible to cover objects to minimise water damage, but the best course of action would be to divert as much as possible to the outside, using waterproof sheets and hoppers if available.

Removal of objects before the water reaches them is another option, but relies on there being enough people and time to remove them safely. Collections of books are a particular problem because of the number and weight of them. If the collection is on upper floors a book chute may be required to get them to ground level quickly.

### i) Salvage Plan



An emergency plan should be drawn up and the plan should identify;

- The personnel responsible for salvage operations, including the Salvage officer and their deputy
- Site and building plans
- Salvage priorities
- Salvage procedures
- Emergency first aid conservation
- Further treatment procedures

### TRAINING OF THE SALVAGE TEAMS

Salvage teams may need to enter a building which has suffered fire or other damage. They will only be allowed in those areas which the officer in charge of the fire and rescue service gives permission for.

This may be when;

- Fire is at high level, entry into rooms below may be possible.
- When fire is in adjacent rooms and 'fire is surrounded'
- When fire is remote from collection rooms
- After fire has been extinguished

To allow access the salvage teams should have Personal Protective Equipment, which includes Identification, Hard Hats, Fluorescent jackets, Steel toed boots/shoes, torches.

More practical aspects of training should include reading plans, identifying objects on the salvage list, removing paintings from their fixings, object handling and first aid treatment of damaged objects. All these should be practiced in simulated conditions.

These practices could periodically include joint exercises with the fire and rescue service.

A log book should be provided so that a record of training can be kept.

One method of moving large numbers of objects is to form a human chain. This involves a line of people who pass objects from one to the other. To be effective the distance between each person in the chain should be such that the objects can be passed down the line without anyone needing to move.

The disadvantage of a chain is the number of times the objects are handled, but this should be weighed up against the speed of operations.

There should be a Check in/out procedure so that everyone can be accounted for if an evacuation takes place. Everyone should be aware of the evacuation procedure.

### j) Salvage Priorities (Snatch Lists)

These salvage lists are best in the form of photographs of the items to be rescued, their position in the room and building and any special measures needed to remove them. This may be the manual handling requirements, removal techniques, or equipment required. Value of the exhibits should not be included for security reasons. A description of the object is sometimes more useful than the title. (See appendix A)

### k) Salvage Procedures

If a room is completely filled with items of similar value, it is still worth sorting them into an order of removal. This could perhaps be by order of rarity, historic significance, ownership, or simply ease of removal rather than simply giving them all a priority 1 rating.

The procedures for salvage will vary according to the scale of the incident, but it makes sense to plan for the worst case scenario and for removal of all the objects.

Points to consider are;-

- Contacts
- Specialist facilities
- Floor plans
- Key to floor plans
- Salvage information
- Equipment
- Procedures for removal of items
- Response equipment
- Composition of salvage teams
- Safe areas to store objects
- Salvage store, fixed or mobile
- Maintenance of salvage equipment
- Arrangements for the longer term storage or treatment of objects

### l) Security

The probability of arson attacks can be reduced with good security measures, but the difficulties of removing secure objects during salvage operations need consideration. In addition the movement and storage of valuables after removal requires a degree of pre-planning. The security of the salvage priority list and the information it contains should also be considered because it also needs to be accessible in emergencies.

### m) Testing and Monitoring

Once a plan is written, it must remain fit for purpose, so it needs to be tested, maintained and those likely to use the plan need to be familiar with it and should be adequately trained.

- Write the Plan – Be Flexible
- Undertake a Paper Exercise
- Update the Plan
- Full Scale exercise
- Update Plan

### n) Contacts

One of the most difficult items in the plan to keep up to date is the contact lists, both for management teams, members of salvage teams and equipment suppliers. Try contacting people on the lists at different times of the day, in the evenings, at weekends and other unusual times to see if the existing method of making contact is still efficient.

When a disaster occurs the contacting of staff may take a long time and occupy the person who is first on the scene and has many tasks to perform. An alternative solution is to contract the task out to a third party, such as a call receiving centre. Part of the contract would involve the third party periodically checking the lists and making test calls.

### o) Incident Reporting

Learning from experience is a very useful tool. All incidents even if they are relatively minor should be reported to management, so that a record can be made of their nature, size and potential threat.

These reports can then be used to take action before the incident is repeated, which could be more serious the second time around.

### p) First Aid Treatment of Objects

The first few hours after a disaster are critical to the long term survival of fragile historic artefacts. If the condition of the objects can be stabilised as soon as possible the long term damage by mildew or rot can be avoided. The salvage plan should include the provision of first aid equipment and a suitable place, either permanent or temporary for treatment.

### q) Conclusion

It is important to understand and assess the risks to the property, so you can take action to minimise them. Prevention is better than cure and writing the plan is the right time to ensure that all preventative measures have been completed; the plan is produced to an acceptable level; it is maintained, tested and reviewed. Ensure users are adequately trained and the fire and rescue service are made aware of its content.

Example of a salvage card to provide in case of emergency (English Heritage)

**Salvage List**  
**Lounge Ground Floor**

**Lounge**

**Priority 1**

**Man with Blue Jacket; Poste by Van Gough**

← 450 mm →

650 mm

	<b>REMOVAL</b>
Weight: Medium	Wear Gloves Support base Do not touch painting surface
PTO	

Painting Poste by Van Gough					
Wall or	Contains	Screen	Weak	Cancerous	Moistly
Paint	rusted	to	to	to	to
Other	Other	Other	Other	Other	Other

Pack As Is	Dry and Pack	Keep Wet and Preserve	Wash then Dry	Other
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Appendix A