Institution of Fire Engineers
Special Interest Group for Heritage Buildings

Fire Safety for Traditional Church Buildings

of Small and Medium Size

Historic England

SUPPORTED BY Ecclesiastical Insuring, Investing and Protecting

Foreword

Church buildings of traditional construction usually have a low fire risk and do not have a history of injuries and deaths caused by fire. However arson attacks and accidental fires do occur and when churches are unoccupied there is a potential for serious fires to develop. Incidents of arson attacks whilst the church is occupied, whilst rare, have also been known to take place.

This guide is intended for churches with congregations of up to 300, to help decide if any fire safety improvements are necessary to protect them, and what improvements can be made to give added protection to the building.

It is recognised that small churches have limited numbers of people to manage the requirements of Fire and Health and Safety Legislation, so this guide gives some simple suggestions and templates to enable the management of fire safety to be undertaken in-house.

This approach has the advantage of giving ownership to the people who manage the church and are in a position to identify, reduce or manage the risks. The Home Office fire safety guide for churches is contained in the publication “Fire Safety Risk Assessment; Small and Medium Places of Assembly” which is intended for premises where the main use includes: public houses; clubs; dance halls/schools; village halls; community centres; churches; other places of religious worship or study and associated premises; temporary structures and marquees/tents. The fire risks associated with this range of premises is very varied and the guidance is particularly concerned with life safety.

The Home Office Guides also acknowledge that older buildings may not be easily modified and that the management of any known risk may be needed to compensate for this factor.
In Scotland the full impact of fire legislation on heritage buildings can be found in the Practitioners guide published by Historic Environment Scotland.

Contents

Illustrations and photographs

Cover Page

The Church of St. Michael de Rupe **(Brentor church) Dartmoor external, Brentor church internal, St Peters Church, Ropely, Hampshire, Church of Ascension, Salford.**

LEGISLATION

The Building Regulations

The Building Regulations, only apply to existing churches when alterations are made or there is a change of use. However, when they do apply, the Approved Documents allow some variation to the guidance for historic buildings and buildings of special architectural interest.

Listed Building Consent and Ecclesiastical Exemption

Many churches and chapels are Listed Buildings because of their special architectural and historic interest. Proposed works, whether internal or external, which will affect the character of the building, are subject to control to ensure that heritage values are preserved.

When considering fire safety interventions, which may affect what makes the building important, it is a good idea to discuss the proposals with the appropriate church authorities, Historic England and the local planning authority at an early stage.

Many places of worship are not subject to the usual controls over listed buildings. Six major Christian denominations are exempt - the Church of England, the Church in Wales, the Roman Catholic Church, the Methodist Church, the United Reformed Church and the Baptist Union. These denominations each operate their own systems of control. (Guidance on the operation of ecclesiastical exemption and related planning matters is available from the Department of Culture Media and Sport, via Historic England).
https://historicengland.org.uk/advice/hpg/consent/ecclesiasticalexemptions/

All other religious denominations and faith groups are subject to the normal secular statutory controls which are administered by local planning authorities.
In Scotland there is a voluntary scheme of self-regulation for exterior works – more information about this may be obtained from Historic Environment Scotland.

Ecclesiastical exemption does not apply to development control. Where proposals require planning permission an application has to be made to the local planning authority in the normal way, in addition to listed building consent or the ecclesiastical equivalent.

The Regulatory Reform (Fire Safety) Order 2005 (The Fire Safety Order)

The Fire Safety Order came into effect in October 2006 and for the first time fire safety legislation was unambiguously applied to churches.
The Fire Safety Order applies to most premises with the exception of dwellings and places the responsibility for fire safety on the ‘Responsible Person’.

The Responsible Person

Meaning of "responsible person"

In the Fire Safety Order "responsible person" means the employer or the person who has control of the premises—

In practice the people managing the Church must identify the Responsible Person or People.
e.g. In Anglican churches the ‘Body Corporate’ – the Parochial Church Council – is the ‘Responsible Person’ and ‘Boards of Trustees’ in some of the non-conformist churches may also be in a similar position.

What the Responsible Person needs to do

The Responsible Person needs to implement a Fire Safety Management System which entails:

- Undertaking a Fire Risk Assessment
- Providing information, training, instruction and supervision
- Providing an Emergency Plan
- Reviewing and updating all of the above as necessary
- Implementing procedures or actions arising from the risk assessment

The Responsible Person should appoint other "Competent Persons" to help with their responsibilities; these could be Churchwardens, Vergers, Sidemen/women, Stewards or members of the congregation who have the requisite skills.
The Responsible Person can also be a "Competent Person".

A record should be kept identifying the Responsible Person and the Competent Persons and their contact details.

Fire Risk Assessment

The fire risk assessment should be undertaken by a person regarded as competent, which is defined in the legislation as having sufficient training and experience **or** knowledge and other qualities to enable them to properly implement it. They will therefore need to have an understanding of

- the reaction to an emergency by the congregation
- the triangle of fire
- what is needed for a fire to spread
- potential ignition sources
- what constitutes combustible materials, or fire load
- the appropriate extinguisher to use for the various risks.

An explanation of these is detailed in the next section 'Understanding Fire Risks' and a simple fire risk assessment and hazard spotting checklist can be found as appendix 1

It is an advantage to involve a member of the church in undertaking the fire risk assessments as they know the building better than anyone from outside the church.

The fire risk assessment should be shown to all the 'Competent Persons' and other people who have a role to play in the procedures or other findings of the risk assessment. It may be useful to involve all user groups in its production as this is a good way of helping them to understand the risks.

A checklist of potential hazards is shown in appendix 1. Where there are hazards that are not controlled, they should be noted in the record of significant findings in appendix 2 with a date for actions to be taken to reduce or eliminate the hazard.

Implementation of procedures or actions arising from the risk assessment

The procedures arising from the fire risk assessment should be recorded in the emergency strategy. A template for this can be found in appendix 5 and 6. (Emergency rather than Fire because it is a good place to record other threats such as floods).

If the procedures involve actions before certain events, such as the unlocking of doors or providing extra exit signs, then a system of checks needs to be implemented to ensure these procedures have been carried out, before the event begins.

It is no good having procedures and then ignoring them.

Warning notice being ignored

Providing Information instruction training and supervision

The provision of information and instruction may be in the form of the emergency plan, which in simple premises may be just the written evacuation notice shown in appendix 3 & 4.

Where procedures for evacuating the church rely on stewards to perform particular functions in an emergency, such as opening doors or helping disabled persons, they should receive instruction on their exact roles, which should be reinforced at regular intervals.

When a congregation is unusually large, as may happen for weddings, funerals or other special services, the Responsible Person should ensure that a person trained in the evacuation procedures supervises the stewards and congregation to ensure that in an emergency the building can be evacuated safely.

Reviewing and Updating

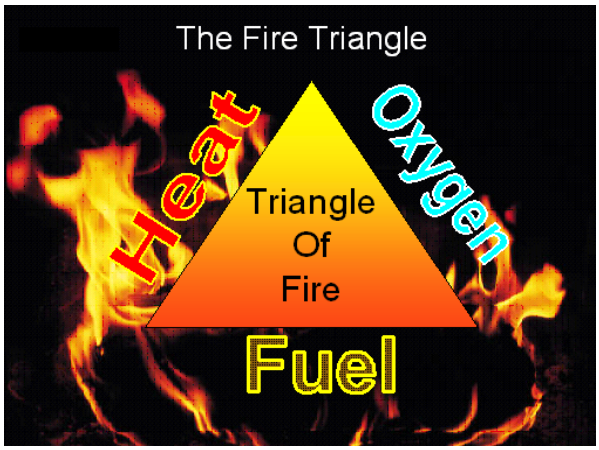
The fire risk assessment and emergency strategy should be reviewed periodically and whenever changes occur that may impact upon their validity. It may be worth adding an agenda item of 'Health and Safety, Fire and Security' to annual meetings so that the risk assessments or significant findings can be reviewed alongside other agenda items.

UNDERSTANDING FIRE RISKS

Triangle of Fire

Fire is a chemical process, which needs three constituents to exist; Fuel, Oxygen and Heat (or ignition source). These constituents must be present to sustain a fire and are known as the Triangle of Fire

Diagram 1 Triangle of fire



This diagram is often used to show how fire extinguishers work; removal of any one of these constituents will cause the fire to be extinguished. However separation or removal of one side of the fire triangle will prevent fire from starting, so is the most effective fire prevention method.

Oxygen

Generally we can ignore the oxygen side of the triangle for fire prevention purposes as oxygen is all around us in the air. It is unlikely that pure oxygen such as in medical oxygen cylinders used by emphysema sufferers, or substances that contain oxygen such as peroxides and nitrates would be stored in church

buildings, but if they are further advice should be sought.

Sources of Ignition

The heat side of the triangle can be controlled by making sure that ignition sources are eliminated or kept away from combustibles. The most obvious ignition source is of course the naked flame. Candles, when in use, must be carefully monitored at all times. 'Night-light' type candles should always be placed on a heat-resistant surface and spaced away from each other.

Fuel

The easiest part of the fire triangle to control is the fuel side; the structural timbers, floors and pews obviously cannot be removed but should not pose a risk as they will not burn readily unless they are continually exposed to flame.

However, kindling will burn readily and this can take the form of rubbish, paper, old candle ends or supplies of candle oil, vestments, altar cloths, stacked chairs, kneelers and the like. Reducing the amount of kindling and storing it in a secure place away from the reach of an arsonist and away from sources of ignition will considerably reduce the probability of a fire starting and spreading.

Fire Spread

Heat travels in three ways; conduction, convection and radiation. Fire may spread from any one of these and also from the direct impingement of flames.

- **Conduction**

This occurs when heat travels through a solid material. Metals can transfer heat efficiently because they are good conductors, but wood, stone and plastic are insulators, so heat transfer is restricted. If a fire were to occurr in a boiler room for instance the walls would probably prevent the fire spreading into an adjacent space, but any steel pipes passing through the walls would transfer heat. This could ignite combustibles touching the pipes.

- **Radiation**

This is the transfer of heat by electro magnetic waves. Radiated heat does not heat the air it passes through, just the object or person it strikes. The further away from the heat source, the more the heat diminishes. Separating 'packets of fuel' from each other will prevent fire spread due to radiated heat.

- **Convection**

Convection is the main cause of fire and smoke spread in buildings and smoke movement provides a very good visual indication of convection currents. When air is heated it will expand, making it is less dense and thus lighter than the surrounding air which allows it to rise.

Smoke rising in a convection current and then falling as it cools.

Fire Growth

The rate of growth of a fire is dependent on a number of factors, which include;

- **The amount of combustibles and their relationship with adjacent combustibles:**

If you separate the combustible items, fire will not spread as readily as it would when the items are stored together or stacked.

- **The position of the combustibles within the room**:

A fire in the corner of a room will have less cooling air mixed into the rising plume of smoke so the smoke layer will be much hotter than if the fire were in the middle of the room.

- **The amount of oxygen available:**

A fire in a small enclosed room may use up all the oxygen and self extinguish, but if it is a large space or the doors and windows are open the supply will be unlimited.

- **The geometry of the room:**

A fire in a room with a very high ceiling will take much longer to spread than in a room with a low ceiling. The rising smoke plume will have more opportunity to cool, so other packets of fuel will not be subjected to radiated heat from the smoke layer.

The dangers of smoke

Smoke is extremely dangerous because it causes burns, it is an asphyxiant, is toxic and it reduces visibility. It can also cause property damage by depositing soot on all surfaces, which may run with condensation from the steam generated by fire fighting operations or heat from the smoke meeting the cooler walls.

Fire fighters *always* wear breathing apparatus in smoky conditions and unprotected people should not expose themselves to it.

If the Fire Risk Assessment has been carried out correctly, and the emergency plan initiated, then the occupants of the church should all be in a place of safety long before the smoke has had the opportunity to put people at risk.

Remember, if you need to ecape from a smoke filled area there is always fresh air at floor level, so get down and crawl to the exit.

REDUCING THE RISK OF FIRE

Fire Hazards

The following precautions can help prevent the possibility of combustibles coming into contact with ignition sources and becoming uncontrolled fires.

Electrical systems should be tested 5 yearly by a competent contractor in accordance with the IEE regulations (BS7671).

Portable appliances should be tested and a record made of the next due date, the interval being decided by an assessment of the risk.

The Christingle service is a good example of when careful management of candles is required to prevent mishap. The use of battery operated candles is the ultimate solution, but if their use cannot be contemplated, stewards should be appointed to brief participants, light the candles, watch each stage of the procession and finally to ensure that the candles have been extinguished. Dangers can arise where there is insufficient space for the number of participants and the candles are held too close to the clothes and hair of the person in front. The stewards should keep an eye on the spacing of participants and be prepared to intervene where necessary. They should also know where the location of the fire blanket and extinguishers and how to use them safely.

Under pew heaters are in close proximity to the underside of the pews. These heaters should be installed by a competent contractor and be thermostatically controlled to avoid overheating of the wood. They should be guarded to prevent contact by children or hassocks/kneelers. They should be inspected in the spring to check that there is no apparent overheating of the adjacent wood.

Supplementary heating is often used in rural churches which are not in regular use. An electric fan heater for the organist would not pose a risk as long as the heater and cable is in good condition, it is correctly fused and there is no danger of it being covered.

Portable LPG heaters, hot air blowers or patio heaters should not be used, as rapid heating can damage the fabric of the church and causes condensation. In addition the flames can scorch or ignite adjacent flammables and burn people who get too close. They can also topple over and are especially dangerous where there are children running around or people who are unsteady on their feet.

Matches and candles are frequently found in churches; they should be kept locked away when the church is unsupervised.

Organ blowers need to be serviced regularly to guard against moving parts overheating.

Sheds and External Bins, particularly plastic ones, are a target for arsonists, so should be sited away from windows, doors or eaves to prevent fire spread into the church. They should be locked closed and chained in position, if possible to stop them being moved.

Damage caused by shed on fire

Petrol lawn mowers and petrol cans should not be kept inside the church. Petrol vapours are highly flammable and heavier than air, so a leak may allow the vapours to flow along the ground until they come into contact with an ignition source. The resulting fire will be severe and possibly explosive.

The tower should be kept clear of bird droppings and nests by regular inspection and removal. If possible openings in the tower should be netted over internally to keep birds out of the building altogether. Jackdaws have a tendency to pick up all sorts of nesting material including discarded cigarette ends which, if still burning, can ignite debris from nests in bell chambers and other spaces in the tower.

Nesting material removed from bell chamber

Christmas trees should not be introduced into a historic church without very careful consideration of the ignition sources present.

If ignited the heat release would place anyone in the vicinity at extreme risk and would greatly increase the potential for fire spread to other combustible items.

Christmas tree ablaze

Some of these considerations are:

- Christmas trees must not be positioned next to the exit door or external porch, they are much better placed remotely from exit routes.
- If 'Christmas tree festivals' take place, trees should be spaced at least their own height apart.
- Any electric lights used should be very carefully checked and correctly fused and the trees kept out of public reach by suitable temporary barriers.
- Where possible the tree/s should be kept moist by placing the trunk in a water filled container.
- Before the needles dry out the trees should be removed from the church.

Chairs, when placed in rows will not cause fire spread readily from one to another. However when they are stacked they become a bonfire, ready for an arsonist to place a candle or other ignition source between them. Store stacked chairs in a supervised location, or locked store. Better still, replace combustible chairs with non-combustible ones.

Combustible chairs

Non-combustible chairs

Pew runners or cushions, kneelers or hassocks; should ideally be distributed around the church rather than stored together in bulk.

- **Lightning Strikes** are often mitigated by the provision of lightning conductors; these should be tested for continuity and earthing at least within every 13 months period, in accordance with the manufacturer's instructions. Surge protection is just as important as the lightning conductor because a strike anywhere in the vicinity of the church will cause an electrical current to travel through the ground, which could damage the electrical or electronic circuits. *BSEN62305 provides more guidance on this subject.*

Contractors and Building Works

Where building works are taking place additional fire hazards will present themselves, so additional precautions will need to be taken. These hazards 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 risks due to 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 banning hot work altogether, or if this is not possible a system of Hot Work Permits should be introduced. (See Appendix 5)
- Poor water supplies because hydrants have been covered or have not yet been fitted.
- Poor access because of temporary hoarding or site huts.
- Fire precautions not yet in place.
- Scaffolding which hinders getting in or out of the building is both a risk to those using the church and the fabric of the building itself. Insurance companies should always be informed if it is to be erected as it is likely to affect insurance cover.
- Temporary sheds placed too close to the church.

Small works, such as decorating or plumbing can cause the biggest problems as they are commonly sub-contracted to smaller companies or individuals without proper safeguards in place.

Do NOT rely on contractors or expect them to take full responsibility for the building. Make sure that someone from the church is keeping an eye on them during the works and have a last minute check each evening before locking up. However, contractors also have their own duty of care, so do not allow them to rely on the church's responsible behaviour to absolve them from their own vigilance.

FIRE PRECAUTIONS

Compartmentation

Compartmentation is where a space is divided with a fire resisting partition to limit the spread of fire. This can occur naturally, for instance where a masonry wall surrounds a staircase or a tower separates two roof voids. Many churches have two compartments; the tower and the nave, whilst other churches have a single compartment.
There are three areas that should be fire separated; the boiler room from the church, roof voids from the tower and kitchens or other higher risk areas built as extensions. These areas should be protected with 30 minute fire resisting construction.

Where holes have been formed through fire compartments for the passage of pipes or cables they should be effectively fire stopped. In sensitive areas this may be achieved by filling holes with lime plaster, but in hidden areas the use of intumescent pillows could be used. The emergency strategy should have a plan showing the compartment lines within the church.

Hidden voids, both vertical and horizontal, are common in older properties; they can lead to unseen fire spread and even encourage the growth of fire if they are of combustible construction or have discarded combustibles within them. Whilst these voids may prove useful as hidden routes to run cables and pipes, they should not be used to hide potential sources of ignition such as battery packs or transformers.

If the voids run through compartment walls or ceilings and are either of combustible construction or have openings into them they should be fire stopped at the compartment boundary or should be made fire- resisting.

Means of Escape

The means of escape is how people will escape in an emergency. There are various uses of the church which need consideration;

- Full capacity for special services, Baptisms, Weddings and Funerals
- Special Events e.g. concerts, exhibitions
- Normal occupation for regular services, choir practice etc.
- Unsupervised opening for visitors and prayer
- Bell ringing practice
- Tower tours
- The particular needs of people with disabilities, whether physical, mental or behavioral.

The means of escape should be adequate for each situation, so there should be enough exit doors of sufficient width (exit capacity) to allow all the occupants to evacuate quickly.

Aisles and other exit routes, both internal and external should be kept clear of obstructions so that their width is maintained to avoid blockages in an emergency.

Number of exits

Modern codes of practice recommend that there should be more than one exit door if more than 60 persons occupy the premises, so that if one door is impassable due to fire the other one will remain available. The reason for the 60 person limit is that if the premises are small enough to accommodate only this number then it is unlikely that a fire will develop without being noticed.

It is not usually practical or desirable to provide extra escape routes in an ancient church, or to alter the direction of opening of the doors, particularly in arched openings or when the doors are hung on pintles.

Church with very low fire loading and a single escape route

Arched door on pintles

Sometimes there are ways out of church buildings that are not normally considered as exit routes. These include exits through the vestry or tower and other areas of the church not usually used by the majority of the congregation. When these exits are brought into use for large services or special events they should be kept unlocked and, if necessary, indicated with green exit signs incorporating pictograms.

Exit Doors

The time taken for the evacuation will be dictated by the number of people who can pass through the exits in a given time. If the evacuation time is less than the time for a fire heat and smoke to become hazardous, with a margin of error, then the means of escape is satisfactory.

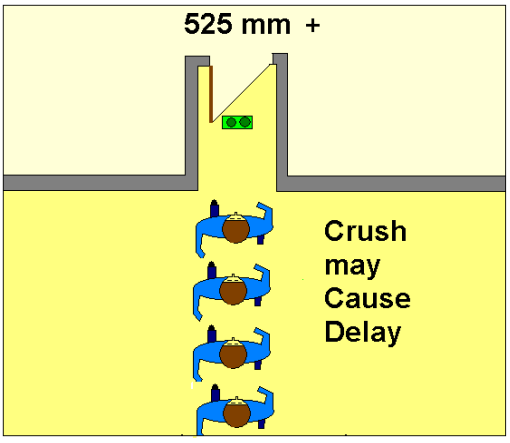
The generally accepted flow rate is 40 persons per minute in a single file. A 2.5 minute evacuation time is traditionally used and this would allow 100 people to escape in single file through an exit door of less than 1050mm.

If the doors are wide enough (over 1050mm) to allow people to walk in double file the flow rate will double. An additional person can be allowed for every extra 5mm door width over 1050mm.

These figures originated from The Post War Building Studies No 29 Part III Personal Safety. This took into account various tests including the American U.8. Bureau of Standards: Design and Construction of Buildings, the Paris tests of 1938 and 1945 and the guide to the Factories Act 1937.

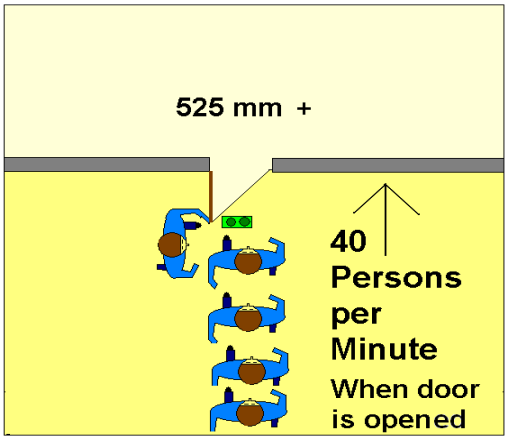
Inward opening doors usually have a restriction on their use for more than 60 persons because it takes longer to open than an outward opening door and if larger numbers are present crushing could occur. This is particularly dangerous when the door is at the end of a corridor as shown below. In this instance if the number of people who would use this door in an emergency exceeds 60 the door should be pinned in the open position. The use of stewards would not help as they would get in the way of people exiting.

Diagram 2. Recessed inward opening door: restrict to 60 persons



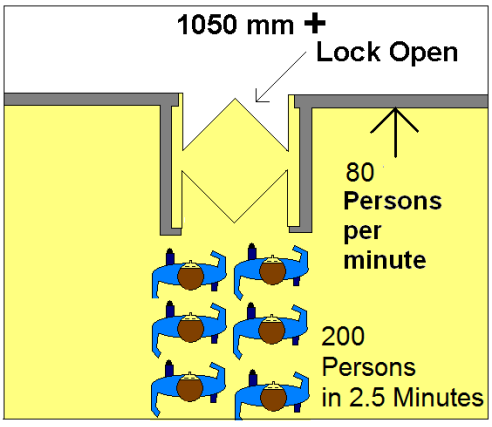
If the inward opening door is not recessed a steward could open it in an emergency to allow greater numbers through in safety.

Diagram 3. Inward opening door with steward



Double outward opening exit doors over 1050mm will allow two lines of people through, so the flow rate will be 80 people per minute or 200 people in 2.5 minutes or 240 people in 3 minutes. The outer doors are shown pinned open as they would otherwise pose the same problem as a door in a recess as shown in diagram 2 above.

Diagram 4. Inward opening double doors



Discounting of Exits

Home Office guidance recommends that the largest exit door should be discounted when calculating the exit capacity, as if it was affected by fire; this does not always reflect the most realistic scenario, which is that the door closest to the highest fire risk will be the one most likely to be affected.

Your risk assessment may show that the exit doors from the church are all in low risk areas with no fire loading adjacent to exits and no discounting is necessary, or it might show that the door through the Vestry, for instance is a higher risk and should be discounted. Higher risk in this context may be a combination of a high fire loading, the presence of ignition sources and low ceilings. This practical assessment may make a huge difference to the exit capacity as the choice of discounting a 3 metre wide entrance door as opposed to a 760mm wide vestry door is a difference of 300 persons. Before discounting the smaller exit it is recommended that professional advice should be sought; either from the local Fire and Rescue Service Fire Safety Officer or other competent person. The latest codes of practice, including Approved Document B and BS9999 give an exit width per person from 3.3mm to 6mm according to the risk.

Practice Evacuation to Determine Evacuation time

A timed practice evacuation of a pre-warned congregation should be held to ascertain the actual evacuation time. The congregation should be allowed to leave without any hindrance such as having hymn books collected or being greeted by the vicar. This time should be divided by the number in the congregation so that an extrapolation can be made to determine the evacuation time for larger or smaller numbers. (100 persons in 2 minutes = 50 persons per minute or 125 persons in 2.5 minutes). All available suitable doors should be used for this exercise. Do not use an extrapolation for congregations larger than 300 as crowd dynamics

change the flow of people and distort the flow rate.

Locking Mechanisms

Final exit doors not in normal use may require some sort of security to prevent access from outside and the possibility of an arson attack during services or bell ringing practice. As long as the locking mechanism can be easily unfastened, preferably with one hand, no special locks will be required.

A thumb latch which is disabled by removing the lever would be suitable, as would a single face mounted bolt, but not both at the same time. This may entail undertaking a check before the service starts or practice begins that the additional locking mechanism/s are removed or unlocked.

If a fixed leaf needs to be available to provide the requisite exit width then it is important that flush edge bolts are unfastened before the service.

Existing lock with opening directions

Full Capacity for Special Services or Events

If the congregation for the special service or event exceeds the exit capacity using a 2.5 minute evacuation time, it might be possible to extend the evacuation time to accommodate the extra people. The extended evacuation time can be calculated (by extrapolation of the figures gained in the practice evacuation or by dividing the number of occupants by the flow rate through the available exit width **note 1* and justification given to show that it is safe to fully occupy the church. This justification might include the following;

- The time for escape to be compromised in a church with a very high ceiling is longer than one with a low ceiling, because it takes longer for the smoke to fill down to head height and a fire is slower growing because there is less radiated heat from the smoke layer than in a building with a low ceiling. This is fortunate because larger churches with bigger congregations tend to have higher ceilings than smaller churches with smaller numbers.
- If a balcony or gallery is in use then this, being closer to the likely buildup of smoke in the body of the church, may need special consideration regarding its evacuation.
- A fire occurring in the main body of the church, which is the biggest threat to the congregation, would be discovered and tackled in its early stages because it would be instantly detected.
- The amount of combustibles, particularly kindling, is restricted and controlled, so the likelihood of a fire occurring and the size of fire is smaller so there is less smoke.
- The probability of a fire occurring during special services or events is low because of their infrequency.
- Inward opening doors are stewarded so can be opened immediately in case of emergency.

Note*
A door 1050mm wide will have a flow rate of 80 people per minute. If there are 240 people in the congregation it will take 240/80 = 3 minutes to evacuate the church.

Normal Occupation

Regular services do not normally attract as many worshippers as special services or events, so the exit doors may be sufficient to evacuate the church in 2.5 minutes, but an evacuation procedure should be in place to ensure that the person leading the service reacts in the correct way in an emergency. The probability of a fire occurring during a regular service is more likely than a special service because they occur more frequently, but it is still lower than in a building used all day every day.

Unsupervised Opening

Many churches open their doors to visitors who are free to come and go as they wish without supervision. There is an expectation that as they are able to access the church they will also be able to leave in an emergency. Video surveillance should be considered to discourage theft or arson attacks.

Bellringing Practice

Where the bell ringing chamber is above the ground floor a procedure needs to be in place to warn the bell ringers that an emergency has occurred and that they need to evacuate.

This may be an automatic system or someone who stays on the ground floor and raises the alarm by going up the tower. The noise of the church bells will sometimes make audible warnings ineffective, so visual indicator such as a strobe light may be needed where an automatic alarm is provided.

The access to the bell ringing chamber will normally be via a spiral stair in the corner of the tower, which will provide a relatively safe exit as it will enable the bell ringers to descend through any smoke layer to the clear air beneath. This stair should be kept free of combustibles and ignition sources.

Ignition sources in spiral stair should be relocated

Where the stairs are open or where a high level balcony approach is provided it should be ensured that a warning procedure is in place and combustibles in the area below are kept to a minimum.

Tower Tours

Tower tours for members of the public should only be undertaken if the systems in place for bellringers outlined above are in place. In addition the tours should either be small enough to be led by a guide, or if a free flow system is in place there should be enough stewards to ensure that everyone can be effectively evacuated in case of emergency.

People with disabilities and those with young children in pushchairs or prams

Sufficient stewards or companions should be present to help people with disabilities or those with young children to escape in an emergency. Those using wheelchairs or pushchairs should ideally be seated in a place that does not obstruct aisles and from which exit is as simple as possible. If this is not possible they must be moved to a safe place within the building, which does not obstruct exits. They can then be helped out properly without impeding the flow of people leaving.

Fire Alarm and Detection System

Fire detection systems are only required for life safety in spaces where a fire would not be immediately discovered. However they are invaluable for property protection in unoccupied buildings when connected to an alarm receiving centre or to pagers held by church wardens. When detectors are fitted for property protection it may not be necessary to comply with all the recommendations of the latest edition of BS5839 Part 1, as long as the church insurers are happy with what has been provided. Fire detection in the main body of the church may provide a solution to the procedures required for ensuring the safety of bell ringers or tower tours. Flashing lights should be used for bell ringing chambers to overcome the problems of audibility.

Keyholders

To be effective the fire alarm system should automatically notify an alarm receiving centre and/or the key holders, so that the fire and rescue service can be called and given access without delay. Check what local fire and rescue do Unfortunately some fire and rescue services may not respond to automatic alarms so an investigation by a key holder to see if it is a fire, followed by a 999 call will be required.

Installation

Installation of fire alarm systems should always follow conservation principles, so cables should be installed using existing pipe and cable runs in floor voids to ensure minimum intervention and loss of historic fabric. When surface fixing cables the fixings of the cables and equipment should be into the mortar joints rather than the stone so that on removal the holes can be filled in a satisfactory manner. Advice should be sought on this and, in the Church of England, it will often be a condition of the permission to make an installation that the church's architect or surveyor must supervise, or at least agree, the cable routes, locations and fixing of equipment.

It must be borne in mind that fire and security systems have a maximum life of less than twenty years. Installing them should not spoil or damage the historic fabric of the building which the system itself is designed to protect.

Radio linked systems should be considered where there is difficulty in installing a hard wired system; a radio survey will be needed to ensure that the signals will be effective.

Siting of Detectors

Smoke detectors should be provided in spaces that are higher risk such as the vestry and storage spaces. Heat detectors should be provided in the boiler room and kitchens, to avoid false alarms caused by dust or fumes.

Providing effective detection in the main body of the church where there is a high ceiling is difficult because the movement of the smoke is not predictable,
The smoke from fires will rise because it is warmer than the surrounding air and thus less dense. The surrounding air is entrained into the hot smoke, causing it to cool as it rises. With higher ceilings the cooling effect is increased because the cool air is mixed into the smoke for longer. When the smoke temperature matches the ambient temperature the smoke will stratify and start to diffuse throughout the cleaner air beneath it.The height of stratification will vary according to the temperature of the rising smoke and the ambient temperature.
If the detectors are sited at the apex the smoke may not rise to activate them so a judgement needs to be made as to what height the detectors should be provided.

Expert advice should be sought regarding the type of detection that is most suitable for these spaces - the main choice being between point detectors, an air sampling system, or beam detectors. The ease of servicing and avoidance of false alarms should be considered as well as the sensitivity of the system when making this decision. Optical Beam detectors are prone to false alarms when the beam is interrupted by birds, bats or ladders, so a system that only reacts to smoke should be chosen.

Testing of Fire Alarm System

The fire alarm system should be checked weekly to ensure that it is functioning. If break glass call points are provided they should be tested by numbering them and activating a different one each week, to ensure that the sounders and other devices activated by the system are functioning correctly; including automatic hold-open devices fitted to fire doors and magnetic locks. The tests should take place at the same time and day each week so that people get used to them. Before the test the call receiving centre should be notified so that the call does not get passed on to the fire and rescue service. Detectors should be checked periodically by a competent contractor in accordance with the manufacturer's guidance.

Emergency Lighting

The provision of emergency lighting is to ensure that in the event of power or lighting failure during the hours of darkness, or where there are no windows; people can see the exit routes and negotiate stairs or steps safely. Where churches are not used after dusk and all areas have natural light, emergency lighting may not be required.

In some villages without street lighting many of the congregation will be carrying torches and this would be a satisfactory alternative to the provision of emergency lighting.

Temporary emergency lights may be used for occasional evening events, but if they are a regular feature a permanent emergency lighting system should be installed. This will ensure that the recommendations of the latest edition of BS5266 can be met (temporary lighting systems are not catered for in the British Standard for emergency lighting).

Emergency lights designed for large spaces

The activation of emergency lighting is designed to occur on failure of the electricity supply, when batteries take over. The lights will not come on when the fire alarm system is activated. For this reason, during evening events, escape routes should be lit by artificial lighting in addition to having emergency lights. Maintained systems are where the emergency lights are illuminated at all times.

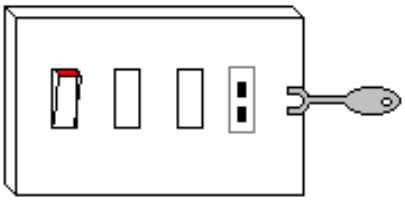
The responsible person should ensure that the emergency lighting system is checked by simulated power failure;

- monthly to ensure illumination.
- yearly for its full duration

This will ensure that they work and it will prolong the life of the batteries. The emergency lighting units are found in a variety of forms, commonly as stand-alone fittings, or in fluorescent fittings

fitted with battery packs. The latter type of emergency light should be identifiable because there should be a red or green Light Emitting Diode *(LED),* which indicates that the battery is being charged. The LED being illuminated does not mean that the emergency light works (the battery or bulb could have failed), so the test is designed to simulate a power failure.
The method of test is usually by test key which is inserted into a key switch, which is commonly found next to, or incorporated into the light switch; this isolates the electricity supply to the lighting circuit, which allows the battery to take over. It is important to remember to switch the circuit back on after the test otherwise the battery will run down and the lights cannot be switched on.

Diagram 5. *Test key used to check emergency lights.*



Monthly Test

A nominated person should be made responsible for the monthly tests; this ensures that they are familiar with the location of the emergency lights and how they work. The duration of the monthly test is just long enough to ensure that the lights provide illumination for a few minutes, while the lights throughout the building are tested. If any of the emergency lighting units fail to illuminate, it should be reported to the electrical contractor so that they can be repaired or replaced.
Every year the emergency lights should be tested for their full duration

Extinguishers

Every church should be provided with fire fighting equipment to enable any outbreak of fire to be tackled in its early stages and to comply with the Fire Safety Order.

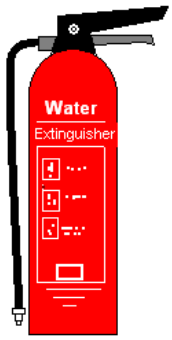
In historic properties water and CO2 extinguishers cater for most situations and are the type mainly used as they cause the least amount of damage if they are discharged accidentally.

Dry powder extinguishers are not suitable for historic properties (except boiler rooms with oil fired boilers) because they will cause extensive damage if discharged, as the powder is corrosive when damp.

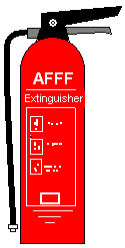
The type of fuel that is burning is divided into classes of fire, which dictate the type of extinguisher suitable for the risk as described below.

Diagram 6. Choosing the correct Fire Extinguishers

For Class A Fires; involving solid materials, usually of an organic nature, in which the combustion normally takes place with the formation of glowing embers



One **9 litre water extinguisher** should be provided for around each 200 square metres of floor space with a minimum of two per floor. It will not be necessary to provide extinguishers in unoccupied towers.



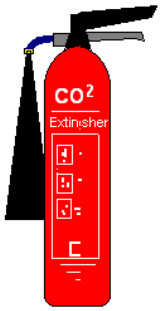
6 litre hydro-spray and AFFF (Aqueous Film-Forming Foam) extinguishers have the same fire extinguishing capacity as 9 litres of water and are only two thirds the weight

Class C.
Fires involving gases

Burning gas should not be extinguished as this will result in unburned gas leaking with the accompanying risk of explosion.

These fires should only be extinguished by turning off the gas supply.

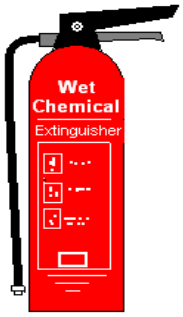
Fires involving electrical equipment are not covered by these classifications as the electricity is the source of ignition rather than the burning material.



2 Kg Carbon Dioxide extinguishers should be provided where there is a significant risk of fires involving electrical equipment but they should not be used in confined spaces where there is a possibility of asphyxiation.

Some types of water or foam spray extinguishers may be used on electrical equipment, provided the electricity supply is turned off. Beware of residual stored energy.

Class F for fires involving cooking fats



6 litre Wet Chemical extinguishers **or AFFF** (aqueous film forming foam) are recommended for this type of fire although carbon dioxide may also be effective. Water must **not** be used.

Fire Blankets

In kitchens where cooking takes place or there is a possibility of clothing catching fire, a fire blanket not less than 1.2m by 1.2m in size should be provided.

Outdoor firefighting equipment

With the increase in natural areas in some churchyards, it is important that suitable equipment is provided to deal with a fire involving grass, trees, furze and undergrowth. Where water supplies are limited fire beaters are considered the best method of attack. Firebeaters normally consist of a flexible paddle securely fixed to the end of a long handle to ensure the safety of the user.

Position of Extinguishers

Fire extinguishers should normally be positioned on exit routes preferably near to exit doors, and at regular intervals throughout the church, such that it is not necessary to travel more than 30 metres to reach one. Where possible fire extinguishers should be arranged in a "fire point" adjacent to an exit door.

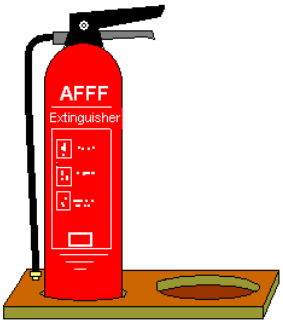
Fire Signage

Notices indicating the location of fire-fighting equipment need only be displayed where the location of the equipment is not obvious.

Mounting

The British Standard recommends that extinguishers should be wall mounted. However, in historically sensitive areas extinguishers should be mounted on floor plinths.

Diagram 7. Extinguisher plinth



Weekly Check

The responsible Person should ensure that a weekly inspection of all fire extinguishers is carried out to check

- that they are in the proper positions, (using the Fire Plan)
- that they have not been discharged or lost pressure;
- that they have not suffered any obvious damage.

Annual Service

All extinguishers should receive an annual service or check by an engineer from the fire extinguisher company. They should make a note of the date of the service.
Any extinguishers not available for use should be removed from the public area and serviced by a recognized fire extinguisher servicing company.

Signs and Notices

It should be ensured that the church is provided with any signs and notices necessary to ensure the safety from fire of occupants. However too many signs can spoil the enjoyment of historic interiors, so the greatest discrimination in their provision should be encouraged.

Where the provision of signs cannot be avoided then the requirements of The Health and Safety (Safety Signs and Signals) Regulations 1996 (S.I. 1996/341) set out the required standards to be used. In many cases the mounting of fire safety signs on fixed floor pedestals will obviate the need for fixing to the historic fabric. Where it is necessary to fix signs to historic fabric, reversible methods should be used, such as low tack adhesive or hanging from existing fixings or features.

Safety Signage is divided into four colour groups as set out below:

Diagram 8. Colour Coding of Signs

Emergency Escape or First-Aid sign

a sign giving information on emergency, first-aid, or rescue facilities (eg emergency exit/escape door).

Mandatory Instruction sign

a sign prescribing specific behaviour (e.g. wear hard hat)

Prohibition sign

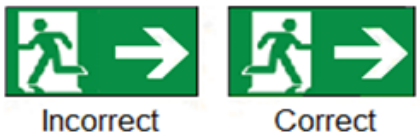
a sign prohibiting behaviour likely to increase or cause danger (e.g. no smoking)

Warning sign

a sign giving warning of a hazard or danger (e.g. danger: electricity)

When planning signs it must be ensured that the running man pictogram is going in the same direction as the directional arrow.

Diagram 9. Directional arrows



The maximum distance the sign will be viewed from dictates the size of the sign and it must be remembered that fire safety signs can include wording as well as the pictogram if considered necessary. The Pictograms are mandatory, while the wording is optional.

From the example overleaf, it can be seen how pictogram size relates to letter size.

If this format is used the table for letter height related to viewing distance is set out below:-

Diagram 10 Size of exit signs

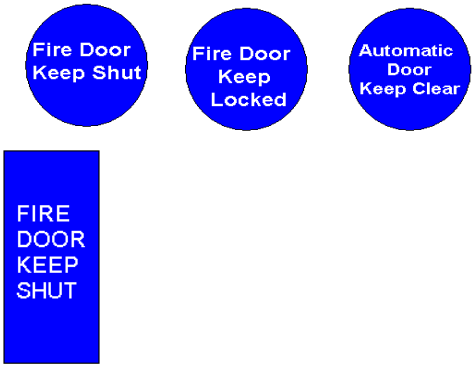
Viewing distance	Letter height
Up to 20m.	50mm
Up to 30m.	75mm
Up to 40m.	100mm
Up to 50m.	125mm

Fire Procedure Notices

These are provided to give guidance in case of fire or alarm activating and in simple buildings constitute the Emergency Plan. They should be sited adjacent to the fire points, as a focal point in case of emergency. The colours are white on blue and for mandatory sections and white on red for prohibition instructions; a template can be found as appendix 2

In historic interiors the need to indicate historic fire doors and whether they are to be maintained locked or self-closing can normally omitted to avoid detraction from the historic setting. However where fire authorities insist and in non-historic settings all fire doors should be provided with one of the following signs on one or both sides of the door as appropriate. The required letter size for these door signs is 5 mm.

Diagram 11. Fire door signs



It may be possible to fix rectangular signs on the leading edge of a door, so they can only be seen when the door is in the open position. This may interfere with the cold smoke seal so should be carefully assessed in terms of additional smoke leakage in the case of centrally fixed seals and the effect on the means of escape.

Special events

It must be remembered that a fire risk assessment carried out prior to a special event will often identify the need for additional safety signs. Again these may be mounted on stands for the event rather than fixing to the building fabric.

Evacuation Procedures

It is a requirement of the Fire Safety Order that written procedures should be provided to ensure the safe evacuation of all occupiers in case of fire. The template found as appendix 2 can be used for this purpose.

The procedures for all areas should be considered and noted in the emergency strategy.

Training

All persons involved in ensuring the safety of occupants will be better prepared for an emergency if they receive training in evacuation procedures and tackling a fire.
The priest, minister or other leader holding the service should be aware of their responsibilities in instigating an evacuation of the church in an emergency.

Fire extinguisher training could be carried out when they are due for their annual service, or joint training with a nearby commercial enterprise, such as a hotel or school, could be arranged to share the costs.

Record of Tests

The responsible person should ensure that the results of the checking and testing of all fire safety provisions and training are recorded in a log book, which should act as a prompt as to the frequency of the tests.

These should include

- Fire training
- Fire drills
- Fire Alarm Systems where fitted
- Emergency Lighting where provided
- Fire fighting equipment
- Visits by Fire and Rescue Service Officers

.
A check is a visual method of ensuring the object of the check is in place; for instance the weekly fire extinguisher check ensures that the extinguisher is in its allocated place, the tamper tag is in place and, if fitted that the pressure has not fallen below the green section.

The difference between a test and a check is that the test involves physically doing something rather that a visual check

Records of training should state who received the training, its duration, the date and content.

RESPONSE TO EMERGENCIES

Integrated Risk Management Plans for Fire and Rescue Services

Fire and Rescue Services in the United Kingdom use Integrated Risk Management Plans (IRMPs) to determine how they will respond to emergencies and the guidance to them for heritage buildings and structures can be found on the Communities website http://www.communities.gov.uk/documents/fire/doc/940468.doc

This guidance encourages the fire service to liaise with the owners and occupiers of historic buildings and to plan in advance for emergencies.

The opportunity to liaise with local fire and rescue service should be taken if possible so that they become familiar with the church, the access routes, water supplies and important historic features,

Access for Fire Appliances

The first part of the journey from fire station to the church will normally be via public roads which should allow a rapid straightforward route. However there may be obstacles such as bridges with weight

restrictions, fords, narrow lanes and height restrictions etc.

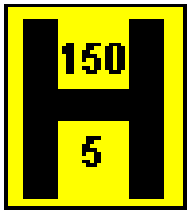
The closer to the church that the fire appliances can get the quicker and easier it will be for fire fighters to tackle a blaze. However many churches have restricted access with lych gates, narrow paths or steps forming effective barriers. If there is more than one access to the church, it should be noted on a plan.

Allowing fire service access into the church should be part of the emergency strategy, particularly if the church is in an isolated position with remote key holders. (see further guidance under Fire Detection)

Water Supplies for Fire Fighting

Fire fighting water is usually obtained from the mains water supply (service mains) via hydrants. These are often found at road junctions and indicated with a black H on a rectangular yellow sign. The figures on the sign relate to the size of the water main and the distance from the sign to the hydrant. New signs are indicated in millimetres and metres, older ones in inches and feet.

Diagram 12. Hydrant 5 metres from sign on a 150 mm water main



The water pressure has an effect on the flow from the hydrant. If it is known that the water supply from the service mains are poor or the main is less less than 100mm (4”) in diameter the hydrant water supply may not be sufficient for tackling a large fire and may need to be supplemented from streams rivers or lakes. The location of the hydrants and any open water supplies should be shown on a plan.

Allocated parking spaces should not be located above the hydrant outlet, neither should skips or portable cabins be placed where they would obstruct access to a hydrant.

Important Historic Features

Most historic churches have remained in their present form for many years with previous alterations reflecting the changing styles of worship and size of the congregation; these changes are part of the character of the building.
Modern technology is changing at an ever increasing rate with an inevitably shorter life before obsolescence and as a transient feature it will not become part of the character of the church. An example of damage caused by transient technology can be seen in many churches and cathedrals where obsolete electrical cables have been removed leaving behind holes, often containing the remains of wooden or plastic fixing plugs. When fixing cables or conduit the holes should be drilled into the mortar joints rather than the ashlar blocks so that on removal the plugs can be removed and the holes filled so that there is no permanent damage.

Any fire safety intervention involving alterations or additions will need consent from the appropriate ecclesiastical advisory body and should;

- be justified by a realistic fire risk assessment and
- be sympathetic to the character and historic fabric of the building and
- be reversible.

Poor installation where cables are fixed into the blocks rather than the joints

so that efforts can be made to avoid damaging them, both in an emergency and when undertaking building and electrical or mechanical works.

In the event of a fire it may be necessary for the fire and rescue service to vent the hot smoke by breaking windows. Where stained glass is present it would be useful for fire fighters to know the significant and valuable windows that should be preserved, as this may not be obvious. Photographic records of these should be made so that if they are damaged they can be repaired.

The indiscriminate use of large volumes of water may cause damage to fine surfaces including carved stonework or wall paintings. If the presence of these is known it may be possible to use alternative techniques which use water more sparingly. Again, good quality photographs should be taken and stored safely so that any conservation work can be done properly.

Valuable or Important Contents

Churches often contain important paintings, manuscripts, silverware or other artefacts which merit every effort to save in case of fire or other emergency. A salvage or damage limitation plan should be prepared which shows which objects are the most important. This plan should be kept in a secure place in the church with a copy in the vicarage or church office so that it can be accessed if the one in the church cannot be retrieved.

The plan should contain contact details of people who would be required to respond to an emergency and the details of outside contractors. These contractors should include glaziers, locksmiths, plumbers, drainage specialists, electricians, masons, specialist removers, alarm companies, church architect and any other person or trade that it might be necessary to contact in an emergency. These details should be checked at least twice a year to ensure that they are kept up-to-date.

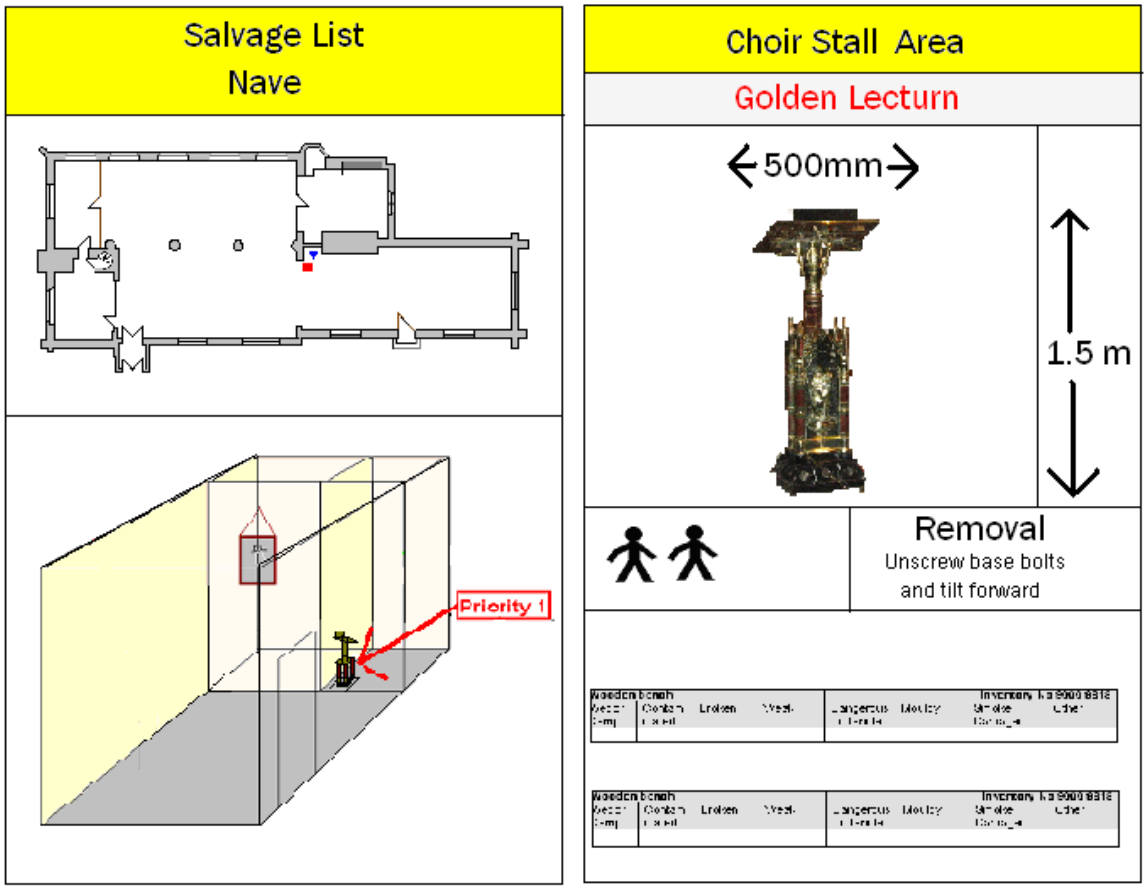
Deciding on which objects should be classified as priorities is difficult when faced with a church full of them, but it would be almost impossible when that church is smoke filled or water is threatening them. Ideally the priority objects should be limited to three in each area of the building. If an emergency threatens that part of the church and there is only a limited time for retrieval then the most important objects are saved first. Once these are safe, if there is time, the remaining objects can be removed.

The salvage or priority sheets should show where the priority object is, what it looks like, preferably with a photograph, how many people and what tools will be required to remove it. If a priority object is too heavy or large to remove it may be possible to protect it in situ with a tarpaulin or similar.

The pages of the salvage plan will stand up to wear and tear if laminated.

The security and short term storage of any salvaged objects should be considered at the planning stage.

Diagram 13. Sample Priority Sheet



Appendix 1 Hazard spotting check list

IGNITION SOURCES	**Tick if hazards are controlled**
Electrical Installation	
Electrical appliances	
Portable heaters	
Candles and naked flames	
Arson	
Cooking	
Hot works	
Other (please specify)	
COMBUSTIBLES	
Stock	
Waste	
Flammable liquids	
Flammable gases	
Chemicals	
Furniture, fittings & equipment	
Decorations	
Other	
PEOPLE AT RISK	
Lone workers and visitors	
Contractors	
People with disabilities	
Children	
Congregation	
Bell ringers	
Others	
MEANS OF ESCAPE	
Doors unlocked	
Exits enough for congregation	
Fire resisting doors in good condition	
Escape routes adequately lit	
Exits not in normal use signed	
TESTING AND MAINTENANCE	
Fire alarm where provided tested weekly and maintained quarterly	
Extinguishers in place and maintained annually	
Emergency lighting (where fitted) tested monthly	
INFORMATION AND TRAINING	
Sufficient people available to manage evacuation	
Sufficient people trained to use fire extinguishers	
Records of maintenance and training kept	

Appendix 2 Record of significant findings for simple buildings

RISK ASSESSMENT Record of Significant Findings		
Fire Risk Assessment for	Assessment Carried out by	
Church: Address:	Date: Completed by: Signature	
Floor Area:	Uses:	
Step 1 Fire Hazards		
Sources of Ignition	Sources of Fuel	
Step 2 People at Risk		
Step 3 Evaluate, remove, reduce and protect from risk		
What is the risk Who is at risk Actions taken to remove and reduce the hazards that may cause a fire Actions taken to remove and reduce the risk to people from a fire		
Assessment /review		
Assessment review date	Completed by	Signature

Appendix 3 Fire Plan for Church without fire alarm system

FIRE ACTION NOTICE

In Case of Fire

1. Raise the alarm by shouting ‘Fire! Fire!’
2. Evacuate the premises
3. tackle the fire, if safe to do so, without taking any risks
4. Call the Fire Brigade by dialling 999

On hearing shouts of ‘Fire! Fire!’:

1. Leave the premises by the quickest route
2. Ensure that any disabled persons are helped to safety
3. Report to the assembly point at

4.Do not stop to collect personal belongings

5.Do not Re-enter Church until authorised to do so

Appendix 4 Fire Plan for Church with fire alarm system

FIRE ACTION NOTICE

In Case of Fire

1. Raise the alarm by operating the nearest fire alarm call point.
2. Evacuate the premises
3. tackle the fire, if safe to do so, without taking any risks
4. Call the Fire Brigade by dialling 999

On hearing the Alarm

1. Leave the premises by the quickest route
2. Ensure that any disabled persons are helped to safety
3. Report to the assembly point at

1. Do not stop to collect personal belongings
2. Do not Re-enter building until authorised to do so

Appendix 5 Example emergency strategy

CHURCH EMERGENCY STRATEGY		
ADDRESS OF PREMISES **NAME OF RESPONSIBLE PERSON** **NAMES OF COMPETENT PERSONS**	*Insert the full address of the property, including the post code and 12 figure grid reference*	**DATE** *Insert the date of completion and any subsequent amendments*
PROVISION	**DESCRIPTION**	**IMPORTANT FACTORS**
SIGNIFICANT HISTORIC FEATURES	*Describe the premises & Identify what features are historically important, e.g. This is a grade 1 listed Medieval church approximately 40m x 16m with ground floor, tower and a part basement. The choir stalls are particularly fine and merit every effort to preserve them.*	*Detail any important relevant factors, e.g. The ornate ceilings are in a fragile state & contact with water may weaken or destroy them.*
SIGNIFICANT CONTENTS	*State whether there is a salvage plan & its location. Also identify rooms which contain items that are particularly important, i.e. The Vestry contains very rare books which should be saved as a priority.*	*If objects are fixed or too heavy to move, detail the precautions to mitigate damage to them*
FIRE RISKS	*Detail any special risks that cannot be eliminated, such as the location of storage of highly flammable materials, or flammable building construction, (e.g. matchboard partitions in the tower, thatched roof etc.)*	*Detail any mitigating factors such as whether a suppression system has been provided, or if the level of combustible storage is kept low.*
FLOOD & OTHER RISKS	*Detail any known risks, such as flooding from a tidal or flood prone river, run off from hills or roofs, internal water systems, mining or any other subsidence problems, approach to airport runways etc.*	*Detail any precautions taken to mitigate damage, such as precautionary sandbags or regular cleaning of gulleys.*
ACCESS FOR FIRE ENGINES	*Briefly detail the locations fire stations on the initial attendance & the travelling time they are away from the premises. What route will fire engines need to take to get from the nearest main road*	*Check with local fire & rescue service for the pre-determined attendance of fire*

	to the premises & how much of the perimeter can they reach? Detail any problem areas such as weak bridges, narrow gates, known parking problems etc. consult with local fire & rescue service as necessary.	*engines and any special appliances such as water bowsers or turntable ladders.*
WATER SUPPLIES	*Where are the nearest fire hydrants, identified by yellow marker plate & what size main are they on? This figure is found in the H on the marker plate, together with the distance to the hydrant. Are there open water supplies such as tanks, lakes rivers etc & how can they be accessed by fire & rescue service pumps?*	*If open water supplies are relied upon, the water needs to be at least 500 mm deep and the bank should be substantial enough to support the weight of the pump*
COMPARTMENTATION	*Describe & show on a plan the fire compartment lines or state that there are no compartments as applicable.*	*The roof spaces are the highest risk areas and the compartment separation needs to be in good condition*
MEANS OF ESCAPE	*Detail the number & width of exit doors & whether they are inward or outward opening, e.g. There are four single outward opening doors and one double inward opening door.*	
FIRE ALARM & DETECTION	*Describe what has been provided (e.g. A fire alarm and detection system conforming to BS5839 Part 1 type L1/P1)and if the system is connected to a call receiving centre*	*How will deaf or other people who have difficulty responding to a fire alarm be catered for. e.g. by a sweep if the fire alarm activates.*
EMERGENCY LIGHTING	*Detail the areas covered by emergency lighting, e.g. Emergency lighting of 3 hours duration has been provided in all staircases, outside exit doors and public areas*	*If emergency lighting has not been provided, detail the reasons, e.g. the church is closed at dusk, or street lights shine in the windows*

FIRE FIGHTING EQUIPMENT	*Detail how many fire extinguishers of each type are provided and where they are sited.*	*State reasons if extinguishers are not mounted etc.*
SIGNS & NOTICES	*Detail the size & positions of all signs, e.g. Exit signs with pictograms are provided above all final exit doors, except the entrance doors, which obviously lead to the outside area. Fire procedure notices are provided adjacent to fire alarm break-glass call points. Fire doors are signed with 'fire door keep shut' notices.*	*Detail reasons when signs are not in position, e.g. Extinguishers are in prominent positions so do not require signage.*
PROCEDURES	**DESCRIPTION**	**IMPORTANT FACTORS**
EVACUATION PROCEDURE	*Describe the evacuation procedures, e.g. All persons evacuate simultaneously on discovery of a fire or on hearing the alarm. Side persons will sweep the church to ensure complete evacuation and report to the assembly point at….. Members of the congregation will be free to leave the premises or to assemble on the lawn if they wish to continue their visit. Exits at ground level are available at the West End for disabled visitors or staff.*	
TRAINING	*Describe the training undertaken, e.g. All stewards are :- Familiar with the layout of the building Aware of the location of exit doors, Trained in the evacuation procedures. Trained in the safe use of first aid fire fighting equipment Aware of how to call the fire brigade*	
RECORD OF TESTS ETC	*A statement should be made about log book has been provided where all statutory tests on the fire alarm, emergency lighting and extinguishers are recorded, together with a record of fire training*	
FIRE RISK ASSESSMENT	*A statement should be made regarding the fire risk assessment, e.g. A fire risk assessment on the format is completed initially, when changes occur and then at regular intervals*	

Appendix 6 Blank emergency strategy

CHURCH EMERGENCY STRATEGY		
ADDRESS OF PREMISES **NAME OF RESPONSIBLE PERSON** **NAMES OF COMPETENT PERSONS**		**DATE** *Insert the date of completion and any subsequent amendments*
PROVISION	**DESCRIPTION**	**IMPORTANT FACTORS**
SIGNIFICANT HISTORIC FEATURES		
SIGNIFICANT CONTENTS		
FIRE RISKS		
FLOOD & OTHER RISKS		
ACCESS FOR FIRE ENGINES		

WATER SUPPLIES		
COMPARTMENTATION		
MEANS OF ESCAPE		
FIRE ALARM & DETECTION		
EMERGENCY LIGHTING		
FIRE FIGHTING EQUIPMENT		
SIGNS & NOTICES		

PROCEDURES	**DESCRIPTION**	**IMPORTANT FACTORS**
EVACUATION PROCEDURE		
TRAINING		
RECORD OF TESTS ETC		
FIRE RISK ASSESSMENT		

Appendix 7 Hot work Permit

AUTHORITY TO CARRY OUT HOT WORK

(Valid on day of issue only)

PART I: To be prepared by the Maintenance Manager in conjunction with the Contractor.

Why alternative methods avoiding hot work can not be used:	
Exact Location of Hot Works	
Person carrying out works	
Risks associated with the work:	
How risks will be managed	
Signed. Name printed Date	

Hot Work Risk Assessment & Method Statement

Part II: To be completed by the Maintenance Manager		Authority to Allow Hot Works
I am satisfied that there is no practical alternative to hot working in this case, and having examined the location, permission is granted to:	Name of Contractor	
to use	Specify hot work equipment	
in the	Specify exact location	
between the stated times and subject to the conditions of this Authority	Start Time Finish Time	
Signed Name printed Date		
Part III: To be completed by person carrying out the work		Acceptance
I certify that the work will be carried out in accordance with the requirements of this Authority, including all precautions listed overleaf.	Signed Name Printed Date	
Part IV: To be completed by responsible person on site		Auditingg
I have examined the work in progress and am satisfied that it is being carried out in accordance with the requirements of this Authority.	Signed Name printed Date	
Part V: to be signed by the person carrying out the work		On Completeion
The hot work has been completed and all sources of ignition removed. The work area and all adjacent areas to which sparks and heat might have spread, were thoroughly inspected on completion of the work, and again two hours later in order to ascertain that no smouldering fires had started.	Signed Name printed Date	
Part VI: To be completed by the responsible person on site		
I have examined the area and am satisfied that there are no signs of fire.		

Appendix 8 Widecombe Church, a tale

From an account written in 1638 by Masters Wykes and Rothwell, *"A true relation of those strange and lamentable accidents which happening in the Parish Church of Wydecombe, near the Dartmoors in Devonshire"*

"*Upon Sunday the 21st October last…*

… the extraordinary lightening came into the church so flaming, that the whole church was presently filled with fire and smoke, the smell whereof was very loathsome, much like unto the scent of brimstone; some say they saw at first a great fiery ball come in at the window, and pass through the church, which so affrighted the whole congregation, that the most part of them fell down in their seats, and some upon their knees, some on their faces, and some one upon another, with a great cry of burning and scalding...

The minister of the parish, Master George Lyde, being in the pulpit, had no harm at all in his body... The lightening seized upon his poor wife, fired her ruff, and linnen next to her body, and her clothes, to the burning of many parts of her body in a very pitiful manner. And one Mrs Ditford, sitting in the pew with the ministers wife, was also much scalded... Some other persons were then blasted and burnt, and so grievously scaled and wounded, that since that time they have died thereof, and many others not like to recover, not withstanding all the means that can be procured to help them.

Widecombe Church *(Watercolour by William Sprit, 1842)*

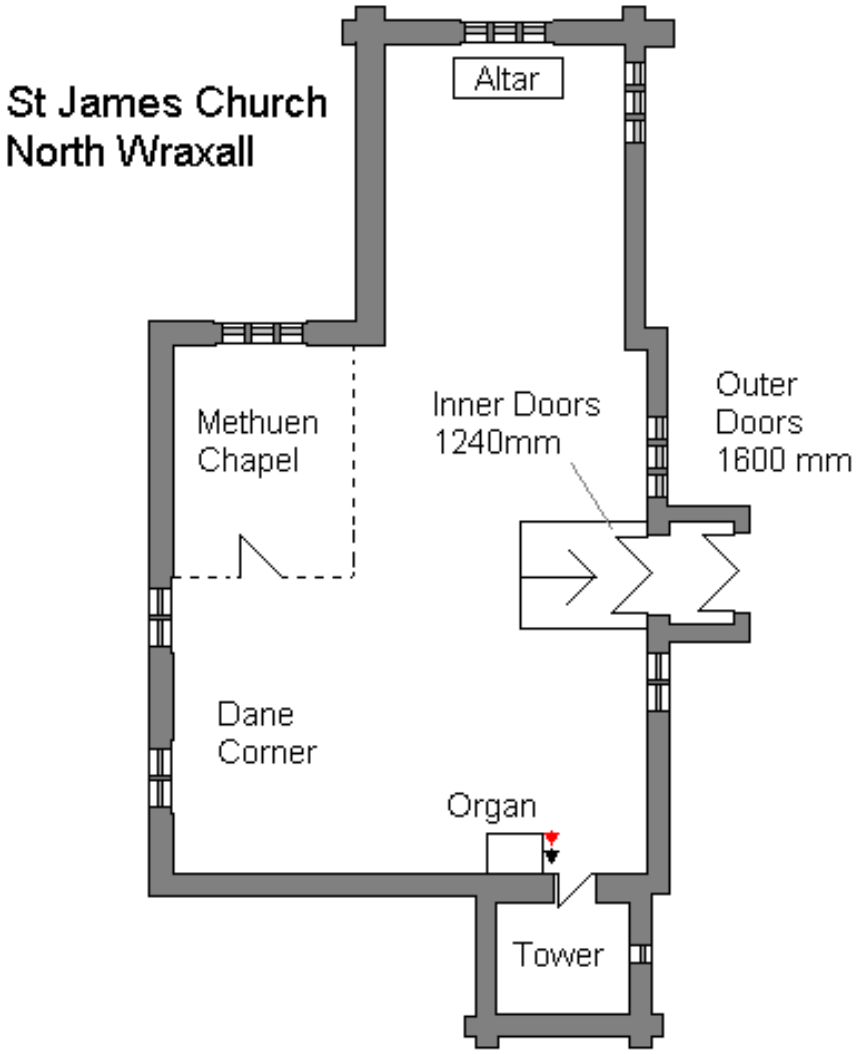
Also, the church itself was much torn and defaced by the thunder and lightening; and thereby, also, a beam was burst in the midst, and fell down between the minister and clark, and hurt neither; and a weighty great stone, near the foundation of the church, is torn out and removed, and the steeple itself is much rent… There were also stones thrown from the tower, and carried about, a great distance from the church, as thick as if a hundred men had been there throwing, and a number of them of such weight and bigness, that the strongest man cannot lift them, Also one pinnacle of the tower was torn down and broke through into the church…

The terrible lightening being past, all the people being in wonderful amaze, so that they spake not one word, by and by one Master Ralph Rowse, vintner in town, stood up saying these words: "Neighbours, in the name of God, shall we venture out of the church?"

Appendix 8 case study St James church Upper Wraxall

Study St James Church, Upper Wraxall

This case study assesses the existing means of escape from St James Church Upper Wraxall.
The congregation size is usually less than 20 people, so the means of escape at these times is more than adequate. However during weddings and funerals the church could be filled to capacity and these are the occasions which are causing concern.



Capacity of Church

The comfortable capacity of the church is approximately 176 persons, with136 persons close seated in the nave pews and Dane Corner pews and 40 persons standing in the Methuen Chapel.

Factors to be considered

In a modern building with a capacity of 176 persons, two outward opening exit doors of at least 1050mm would be required to allow one exit to be discounted as if it was affected by fire and for occupants to escape in the opposite direction. (i.e..200 persons at a flow rate of 80 people per minute through 2 exit widths for 2.5 minutes)

St James Church has a single exit comprising double inward opening doors of 1240mm width, with an external set of inward opening doors of 1600mm width.

There are two main issues;

1. Will the single escape route remain sufficiently clear of heat and smoke long enough for people to escape without the need for an alternative exit?

2. Will the existing doors have sufficient capacity to evacuate all occupants in a reasonable time?

Exit Capacity

A flow rate of 40 persons per minute per exit width of .525 metres is the accepted norm when calculating exit capacities. Doors wider than 1050 mm will allow an extra person to pass for every 5mm. The inner doors at St James are the narrowest point in the exit route at 1240 mm wide, which is 2 exit widths plus 190mm. This would allow 238 persons to exit in 2.5 minutes or 283 persons in 3 minutes, when both leaves of both sets of doors are in the held in the open position.

Single Direction of Escape

There are a number of factors that need to be assessed when making a decision about whether the escape route will remain clear of smoke and heat during a fire evacuation, thus making the single direction of escape acceptable, including;-

- the anticipated rate of growth of the fire,
- the anticipated smoke movement,
- the awareness of the congregation that the fire has occurred,
- the evacuation time, which includes the time taken to decide on the need to evacuate..

The first two factors will determine the time taken for the exit route to become hazardous and the second two factors determine the time available to escape in safety. The difference between the two times will give the margin of safety.

Anticipated Rate of Fire Growth

Fire growth is expected to be slow in this church because the only fuel packets are the wooden pews and the wooden panels of the organ, books and hassocks. These are sufficiently spaced to prevent the spread of fire by radiation and spread by convection would be significantly delayed or inhibited altogether because of the high ceiling.

Three other sources of fuel have been considered:-

- The insulation of the electrical wiring is not expected to contribute significantly to the rate of growth because of the limited amounts involved.
- An arson attack using accelerants is thought extremely unlikely as they are very rare in occupied churches, particularly in rural areas.
- A vehicle fire at the entrance of the church is improbable because there is no vehicle access.

Awareness of Fire

The public area of the church is a single compartment of approximately 11m x 19m, therefore a fire would be immediately smelt or seen, so there would be no delay in warning.

Evacuation Time

As the fire would be in its incipient stages the perception of danger would not be immediate, so there may be an initial delay in getting people to evacuate. This time would be reduced if clear direction was given by the vicar or if the perceived threat was greater, such as that from a fire producing large amounts of smoke or one located next to the exit door.

After the initial delay the evacuation of a full congregation should not take more than 3 minutes, taking into account the limited travel distances involved and the flow rate through the doors.

This time should be used to tackle the fire using the extinguishers provided.

Probability of a Fire Occurring

In addition to the factors mentioned earlier, the spatial relationship of the combustibles to the ignition sources and the effectiveness of any preventative measures will affect the probability of a fire occurring.
At St James, the two main ignition sources are candles and the electrical circuits with the associated electrical apparatus.

The candles are sited on candlesticks remote from any combustibles, so the likelihood of them igniting anything is low.

The under pew heaters are individually protected with fused spurs and the whole electrical system is protected with circuit breakers. The electrical

system is tested every three years, so the probability of an electrical fault starting a fire is also low.

Conclusion

The probability of a fire occurring at any time is very low and because of the infrequent nature of services attracting large congregations the probability of a fire occurring at this time is even lower.

If a fire were to occur, it would not pose an immediate threat to the congregation because they could evacuate safely before the fire grows to dangerous proportions.

Recommendations

The escape capacity of the doors has been assessed with both sets of doors in the open position. These doors do not need to be in the open position at all times, so the following regime should be followed to match the escape capacity to the congregation size;

Up to 60 persons: Doors can be kept in the closed position, with one leaf bolted
Between 60 & 100 Persons: Doors can be kept closed with a steward alongside to open one leaf in case of emergency
Between 100 & 150 Persons: Doors can be kept closed, both leaves to be unbolted & two stewards should be in attendance to open doors.
Over 150 Persons: Both leaves on both sets of doors should be hooked in the open position throughout the service.

The church wardens and stewards should receive instructions on the above recommendations and to receive extinguisher training when the extinguishers are due for service.

If the church is to be used or adapted for functions other than religious services, further precautions may need to be put in place, particularly if the function involves increasing the fire loading or inhibits the ability of persons attending to escape.

Peterborough Cathedral Fire

In November 2001 an arsonist entered Peterborough Cathedral and placed a votive candle in a stack of plastic chairs, which eventually caught fire. A dense pall of smoke spread throughout the building, depositing soot on every surface. The fire was eventually spotted by the verger who called the fire brigade, and the blaze was quickly extinguished. The fire destroyed 200 of the plastic chairs part of the organ casing which was charred to a depth of 12mm, and the adjacent window which had lost most of its glass. Fire-fighting water also caused damage to the twelfth century stonework at the seat of the fire, by cooling it rapidly, destroying some fine carving.

The major problem was the soot, which coated every surface throughout the cathedral. A beautifully painted timber ceiling of the nave which dates from 1220 had just been cleaned, and all of it would need to be cleaned again.

A chemical analysis of the soot was made to see how much damage it could do. Luckily, the burnt chairs were made of polypropylene which produced soot with a neutral pH in the range of 6–8. Had it been other materials burning, the soot could have been acidic or alkaline which would have caused a lot of damage to the painted ceilings.

The most important lessons learnt from this fire are

- The preventative solution of good housekeeping; it is important that everything should have its place, preferably locked away, when not in use.
- The management of rubbish; all rubbish must be cleared at the end of each day and all waste paper bins should be emptied, as arson is the most likely cause of fire. The rubbish must then be kept well away from the building so that, if it is set on fire, it cannot do any harm.
- Contractors' rubbish and equipment should be monitored regularly to make sure it is not blocking exit doors or escape routes.

Peterborough Cathedral encouraged the fire and rescue service to carry out familiarisation exercises with all the different watches. These exercises proved very useful as members of the fire and rescue service knew exactly how to access the cathedral and how to vent the smoke when the fire occurred.

About the Institution of Fire Engineers Special Interest Group for Heritage Buildings

The Special Interest Group (SIG) for Heritage Buildings was set up by the Institution of Fire Engineers in September 2008. A steering group controls the work of the SIG and consists of specialists from Building Control, Fire and Rescue Services, English Heritage, Historic Scotland, National Trust, Insurance Companies, Fire Engineers, Academia, the Institution of Historic Buildings Conservation and representatives from the Fire Industry and Thatching Industry.

These specialists have a common interest in heritage buildings and a desire to reduce the damage and destruction which is caused by fire, whilst ensuring that any fire safety enhancements are carried out with minimum alterations to the character and appearance of the building and without damage to the historic fabric.

The steering group has determined the work of the group will be:

- To provide a focus for IFE activities in relation to heritage.
- To ensure that IFE members can be involved in these activities and that the Institution and its membership (as a whole) will benefit from the outcome of these activities.
- To identify and monitor existing research and guidance available.
- To develop strands of work related to the type and use of heritage and historic buildings that do not have the benefit of comprehensive guidance documents.
- To establish an annual work plan, to be agreed by the Technical Strategy and Advisory Committee of the IFE, that identifies the work to be undertaken during the course of each year.
- To raise awareness of issues affecting fire safety in heritage and historic buildings and providing guidance that addresses these issues.

For more information about the IFE and how to join, please see: http://www.ife.org.uk/About-IFE-Membership'