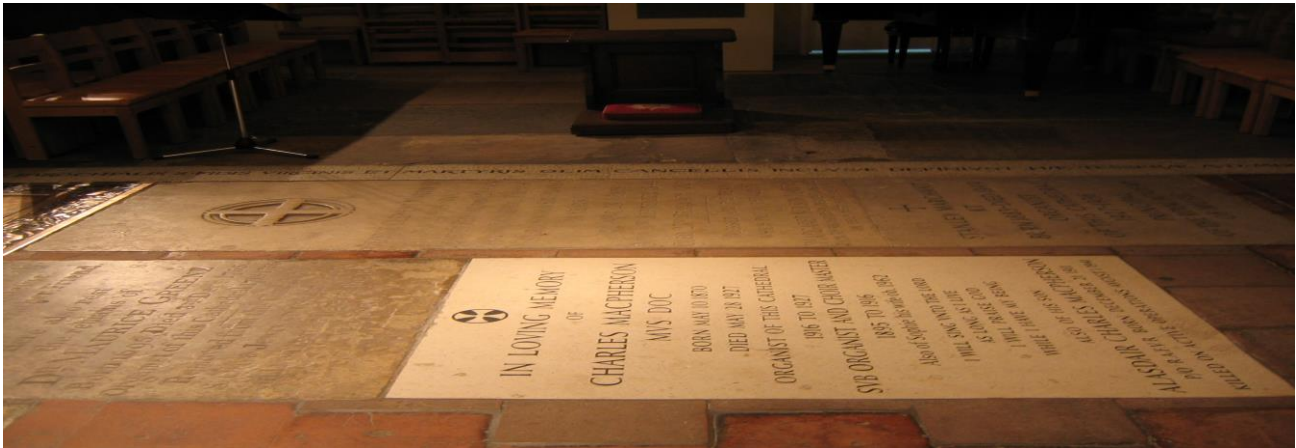


Historic Floors Guidance Note



In recognition of the increasing number of applications for alterations to listed places of worship that include the partial or complete replacement of an existing floor, the Society for the Protection of Ancient Buildings (SPAB) and the Church Buildings Council (CBC) have set out some general guidance about the care and maintenance of old floors, as well as the issues that should be considered when a congregation is considering altering or replacing a floor

This guidance note aims to ensure that those considering works to an existing floor understand the issues involved so that their final decision is well informed and supported and the needs of the building or congregation have been balanced against the interest of the existing floor and the contribution it makes to the character and significance of the building.

The development of life in a church, or just wear and tear, may lead to proposals for a new floor. When a building is listed there is a general presumption in favour of retaining the existing floor, especially where the floor is a significant feature of the building's architecture or

character, or is archaeologically or historically important. However, we recognise that there are some factors that might support a change of material, design or specification of an existing floor.

Why floors are important

The floor of any building plays an important role in providing the background to its character. It contributes to the overall appearance of the building and can complement the building's architecture. Some medieval churches may still have their original floor, but later floors may also be interesting and attractive additions that are worthy of retention: the collection of surfaces

accumulated over time all contribute to the character and significance of a church.

Where floors are of considerable age they will have archaeological value which needs to be fully understood. More recent churches of the Georgian and Victorian eras as well as those from the twentieth century may also retain their original floors, which should therefore be considered holistically, as a fundamental element in the overall architectural design. Highly patterned floors may be decorative in their own right and may be made of high quality materials – Cosmati pavements or rich Victorian encaustic tiled floors are good



examples of this. Consideration should also be given to the fact that any historic repairs to an existing floor can contribute to the floor's interest and significance. Historic repairs speak of a building's history and use, and may represent an interesting method of construction themselves.

Floors also serve to demarcate and differentiate spaces and areas that serve different purposes within ecclesiastical buildings. This aspect is strengthened by the changes of level that are found in many places of worship, with the level of the floor gradually stepping up towards the most sacred spaces. Changes in level and floor finishes speak of the history of liturgical practice, the importance of sanctuary and the hierarchy of sacred spaces. With older floors the surface may have developed an attractive patina that speaks of the age of the building and the many thousands of feet that have passed across its surface over the centuries, and in all cases there is the possibility that the floor contains ledger stones, memorials and brasses that need to be retained and protected. In some cases such stones may mark the location of vaults beneath the floor, adding to their significance and raising further archaeological and ethical issues.

Understanding an historic floor

Whilst historic floor surfaces are often worn, discoloured and out of true level, these imperfections can make a very important contribution to the interest, beauty and historic value of a building. The worn surfaces of an historic floor are often formed over decades, if not centuries and, while they may require care in order to ensure the safety of the user, they have a character that cannot be replicated. Yet original solid floors are sometimes altered or replaced with little thought to the resulting problems and aesthetic effect.

Problems occur with solid floor construction when modern materials and construction methods are introduced or they are a result of an inherent defect in the building's original construction. Before disturbing an original floor, it is essential to understand how it works and to consider what, if anything needs to be done: actions taken today may result in difficult-to-resolve problems in the future. The primary aim in caring for an old floor should be to maintain its appearance and prolong its life; the 'do nothing' option has a long track record of being cheap, pragmatic and effective as a conservation approach and so should not be ignored as an option.

For example, the moisture content of solid floors tends to change seasonally; a little moisture in winter should not be an immediate cause for concern. The churches in which solid floors are laid, indeed as in all historic buildings of traditional construction, had no damp-proof courses either in the walls or floors and moisture is free to evaporate within the structure. Provided the internal floor level is raised a few inches above the external ground level, and so long as the ground is not permanently saturated or marshy, the floor may remain acceptably dry.

However, localised damp can occur when underground drain pipes fracture; where there is a defect at the base of the wall such as a leaking down pipe or where drains and soakaways have become damaged or blocked; where there is a build-up of earth outside the building, raising the external ground level above the internal floor level; where water and heating pipes bedded below the floor have failed; and can be caused by condensation, particularly on cold floors in unheated buildings and rooms. This dampness can lead to a church feeling cold. It is advisable, therefore, that regular maintenance work is undertaken making sure that drains and pipes are





functioning properly and that, before a heating solution is sought, any problems of damp are addressed.

As another example, voids can sometimes appear under solid floors due to the collapse of buried features or remains, or the shrinkage of clay under a floor. Historic floor surfaces may then be forced to act as a beam spanning the void until the point at which it fails and cracks and dips in the floor will form.

Given the number of different issues that may be at play in an historic floor and the potential for unintended harm in altering the status quo, it is crucial that the floor's construction is understood prior to any proposals for change.

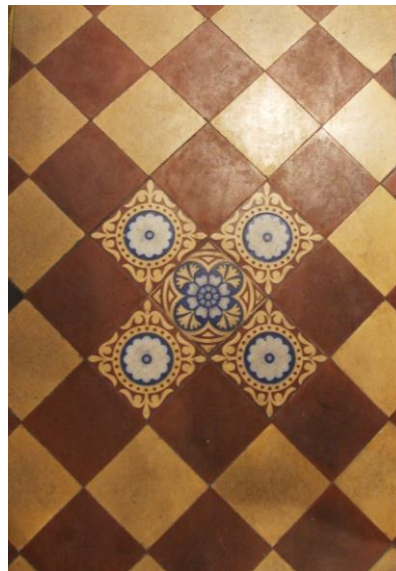
Maintenance and repair of historic floors

Once those caring for a church have gained an understanding of the construction of the historic floor they will be able to maintain it in the appropriate way. Proper maintenance is fundamental and may negate or reverse the need for replacement.

Natural stone floors

Flagstones were produced from hard, dense and durable stone that could be readily split along the bedding plane. Although generally riven, some were sawn or dressed. Stone types include a wide range of sandstones, hard limestones,

marbles, slates and granites and other igneous rocks. Thickness will vary according to the type of stone and most were bedded directly onto well rammed earth or chalk. Most flagstones were surface dressed and edged on one side only but occasionally it is possible to reverse a badly decayed slab and replace it worn side down.



Laminations in the stone will sometimes splinter, slabs may crack and an uneven bed is common. It is usually preferable to accept these defects rather than disturb the floor as they speak of the buildings age and construction. Cracks can be repaired with a soft and sacrificial lime mortar where really necessary.

Many flagstone floors have survived because the interstices between the slabs have never been pointed and moisture has been allowed to evaporate

freely through the open joints. Introducing dense mortar pointing should be avoided as it may change the harmonious pattern of moisture movement, trapping damp in the floor and speeding up its deterioration.

Where cracks have appeared in the floor this can be a result of voids forming in the deposit below the surface. Voids can often be filled with dry sands/aggregate or a weak lime based grout. This will ensure ground bearing is reinstated without damaging the floor or, particularly in the case of churches, damaging underlying archaeology. Where this defect is widespread and thought to be serious, the advice of a structural engineer, with experience in the repair of historic buildings, should be sought. Sometimes where a problem may seem to require a heavy intervention, it is worth trialling a simpler, more cost effective solution first. For example, slight undulations in areas of high foot traffic which have the potential to cause a trip hazard could be partially ironed out by the introduction of natural rush matting or other similar matting. In high density traffic areas free standing, ventilated timber boards/and or steps may be appropriate.

Most flagstones require little maintenance other than regular brushing. Washing, using minimal quantities of clean water, is best restricted to infrequent intervals. It is





essential to note that household soaps, alkaline cleaners, bleach and abrasives will cause harm to historic surfaces and must be avoided. Flagstones were rarely waxed in the past and most have developed a fine natural sheen which adds to the building's character. In a similar vein, sealing products will change the character and colour of a stone floor, they may also restrict the ability of the floor to breathe (allow moisture to evaporate). Rubber backed mats and carpets should also be avoided as they restrict moisture passing from the stone and may lead to the breakdown of the stone's surface and staining.



Marble

Marble is a vulnerable stone and great care should be taken before anything is done to it. Particular care needs to be taken when washing such floors, or marble ledgers within floors. Even clean water can damage marble and dirty water and oil can stain it. The least harmful way is to restrict the

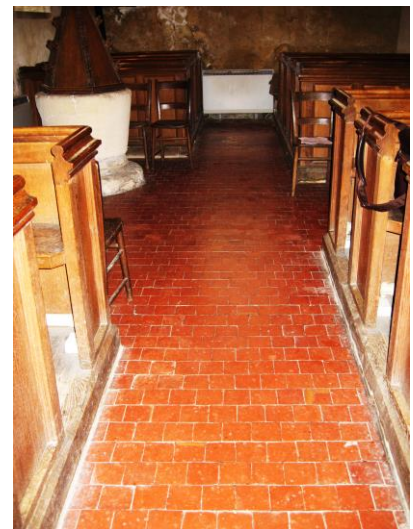
quantity of water and leather-dry the surface immediately after washing.

Tiles

- **Medieval floor tiles:** These tiles were developed in monasteries during the first quarter of the 13th century and were used regularly in churches and other major church buildings from the 14th century. Colours include an attractive range of brownish reds, yellows, and pale oranges depending on the source of the clay. Tiles became thinner and the patterns progressively more refined until the dissolution of the monasteries in the mid-16th century when production all but ceased.
- **Victorian encaustic tiles:** The intricate designs of these tiles were produced by a 'burning-in' process. Different coloured clays from many sources were skilfully blended by machine and fired under controlled conditions. The clay was pressed into shallow sinkings, bearing the patterns on the face of the tiles. Tiles were also hand-painted. These tiles are often hard and relatively impermeable with little ability to accommodate movement, especially when bedded into a hard mortar.
- **Geometric tiles:** These were manufactured in a variety of intricate shapes. The clays

were plain or pigmented and were fired at a high temperature and set in a floor in mosaic patterns.

- **Quarry tiles:** Common from the 18th century, are made of clay and water mixed into a plastic condition, moulded in presses by hand or machine and fired in a kiln. The wearing qualities and appearance of the tiles over time varies according to the composition of the clay and the firing temperature.



Tiled floors require little maintenance other than regular sweeping to remove dirt and grit that may scratch their surface. Patterned tiles are more susceptible to damage from cleaning than plain so this should not be undertaken too frequently. Surface dirt should be removed with minimal quantities of warm water. Cleaning agents such as household detergents, scouring





powder, caustic soda or acidic cleaners should all be avoided as they can remove glazing, or damage the fireskin. Linseed oil should also be avoided as it can spoil the appearance of a tiled floor; it yellows when exposed to light and absorbs dirt which dulls and darkens the tiles.

Tiles were traditionally laid on a thin bed of lime mortar, a practice which continued until the first quarter of the 20th century, with hydraulic lime and cement-based mixes also used from the Victorian period. It is sometimes found to be necessary to remove hard cement pointing from the joints between soft, hand-made tiles to reduce the rate of decay of the tile's surface. However, cutting out hard mortars is slow, potentially very damaging and great care should be taken: a considered judgement as to the benefit of the works against the potential for damage must be taken.

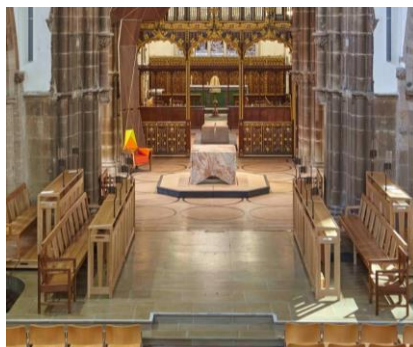
If new flags, tiles or bricks are required to fill in gaps and are thought to be entirely necessary, the replacements should be plain, of the same material and of similar density and porosity to the existing.

Brick floors

Most early brick floors were bedded directly on earth, or over a layer of sand or clay, or on a bed of well compacted rubble. Most have acquired a protective and attractive patina over the years. Their surfaces

are seldom level but this 'defect' is an intrinsic quality of such floors and will contribute to the aesthetic value of the building.

If the interstices between bricks have not been filled with mortar, this is an advantage and they should be left as such, as any moisture in the floor will be able to move unimpeded into the air above. However, where the arrises (edges) of the bricks appear to be vulnerable and are sustaining damage due to traffic across the surface there may be a case for pointing the joints. In such a case, or where pointing needs to be repaired, this should be done with a weak lime mortar.



Heavy staining or silting on the surface of a brick floor can be difficult to remove without saturating the bricks and overwhelming the joints with moisture. Saturation can lead to efflorescence which is also difficult to remedy. Surface dirt will usually respond to a gentle scrubbing with a non-ferrous bristle brush, using minimal quantities of water. As with tiles, mechanical abrasive

cleaning methods can scar the surface and destroy the fireskin of the bricks, rendering them more vulnerable to the absorption of dirt and erosion.

Re-laying an historic floor

In some cases there may be no alternative but to lift and re-lay an historic floor, though this should be seen as the last option as the potential for damage to the floor surface and potential archaeological deposits is high.

Where an undulating floor surface is not acceptable the first step is to understand what is causing the movement. Should it be the solution to the problem, floor paving can be lifted and replaced on a new bed of sand over a good thickness of hardcore, though this is not usually necessary because often the existing substrate of the floor will have been well compacted over centuries of use and does not have to be disturbed. Extreme care is necessary as lifting slabs can cause them to crack and the pressure on adjacent slabs may cause them too to fracture.

If it is proven necessary to lift and re-lay an old brick floor it should be remembered that historic bricks are not uniform in shape or appearance and are of irregular thicknesses. It can be difficult to lift and reverse them and set them to the level of a renewed base. When there is no alternative and the floor must be re-laid, the bricks





should be set close together on a bed of sand above a well compacted bed of hardcore.

Replacing an historic floor

Replacing the entire floor of an historic place of worship is a major undertaking and will have a considerable impact on the fabric of the building as well as its special architectural or historic interest. Even modest schemes to replace the areas of timber flooring beneath fixed pews will have a noticeable impact and should be carefully considered. The new floor will be in place for a long time to come and decisions therefore need to be made with a view to the long term sustainability of the building and the wishes of future generations. Careful thought and attention should be given to the design and appearance of the new floor finishes as they can dominate aesthetically, and in a crude manner.

The significance of the floor should be assessed in the statement of significance, heritage statement or conservation management plan as lifting an old floor undoubtedly affects a building's character and often results in the erosion/loss of some of its special interest. The replacement of an historic floor should only be considered where there is demonstrable need and strong justification.

During initial discussions on the subject of replacing an historic floor it can be useful to follow a hierarchical approach to the extent of intervention needed. Appendix 1 discusses this in more detail and proposes an approach based on established conservation principles.

Understanding the current situation

As with all projects that will lead to change in historic buildings, the first step is to investigate, analyse and record the existing situation. When considering the floor of a place of worship this might include looking through building records to discover when the floor was laid and how it was constructed, as well as physical inspection and investigation. The potential archaeological implications of interventions involving a floor cannot be overstated; quite apart from burials there is the potential to locate earlier phases of the building's development.

Issues to explore include the following:

- How old is the existing floor? Is it original to the building or a later alteration? Could an earlier floor exist below?
- Who designed the floor? Is the name of the architect known?

- What materials it is constructed from? Types of stone, tile, timber etc.? Are the materials local to the area and therefore of particular interest? On the other hand is the material unusually rare e.g. marble or rare stones?



- How was the floor constructed? What is the substructure of the floor and are there any burial vaults, service routes, voids or other structural concerns?
- Is there potential for items of archaeological interest to be found under the surface e.g. vaults or burials? It is important to remember that just because a floor is now inside the church this does not mean that this was always the case: Victorian extensions can cover earlier burial grounds, for example.
- Are there special elements such as important ledger stones, memorials or brasses? Remember that some stones might have carvings or lettering on the hidden face.





- How does the floor relate to the architecture – e.g. what is the nature of the junction between the floor and column bases?
- How does the floor relate to the furnishings – pews, screens, doors etc?
- What is the condition of the floor? If there are technical problems such as efflorescence or unevenness can the cause of these issues be ascertained and their impact reduced?
- Is the church at risk of flooding or rising ground water?
- Think too about issues affecting people with disabilities: not just wheelchair users, but the ambulant disabled. The visually impaired may find patterns, as well as inadequately marked ramps and steps difficult; those that walk with crutches may be troubled by changes in floor surface.

Assessing the significance of the floor

Once the congregation has uncovered all the available factual information about the floor an assessment needs to be made of its significance within the wider context of the church building and relative to the other elements of the built fabric and furnishings. Assessing significance is not an

easy task but the following headings might help:

- **Aesthetic contribution:** How does the floor contribute to the appearance of the church building? Does it make a positive or a negative impact? Is there something special about the patterns or the design? Is the floor special in terms of its materials or the design?



- **Contribution to the character of the space:** Is the floor a dominating element or a background element? Does the floor convey a sense of history due to its patina? Does the floor have unusual characteristics or important features?
- **Integration with other elements of the same period:** Was the floor laid as part of a major reordering or re-pewing scheme?

Setting out the need

When considering a reordering proposal that includes the partial or complete replacement of a floor it is important that the justification

for the works is very carefully considered and reasons for the change set out in a clear and thorough manner. The justification should explain exactly why change is needed and should also consider the medium and long-term requirements of the church community. The replacement of an historic floor for purely aesthetic reasons is unlikely to be acceptable. These issues should be dealt with in full in the statement of need and supported by evidence where possible. In particular it will be important that the following issues are satisfactorily addressed:

- Condition of the floor (including excess damp and any safety issues)
- Liturgical requirements
- Accessibility
- Environmental comfort (heating and energy use etc.)
- Functional requirements: future use of the space
- Aesthetic matters

The issue of replacing a floor often overlaps with the decision to make changes to the building services and especially introduction of underfloor heating systems. The long-term impact of underfloor heating systems on our historic churches is not yet known, especially when installed in conjunction with other alterations that may affect a building's equilibrium. This is particularly relevant in





churches that contain important historic furnishings as they may be adversely affected by proximity to a heat source.



Due to the traditional construction methods employed in church buildings, the substrate of historic floors is usually comprised of materials which will accommodate movement and structural stresses as they are capable of a degree of flexibility. Underfloor heating requires that the tolerance of the floor be greatly reduced due to the pipework to be laid in the floor. In almost all cases, for reasons of guarantee from the installer and manufacturer, the substrate of existing floors will have to be replaced by an inflexible concrete raft housing the underfloor heating. Where concrete structural components are introduced into a building of traditional construction, it can have unexpected and unintended consequences on the structural performance of the building.

Whilst there are occasions when an underfloor heating system may be appropriate for use in a place of worship it is

not a universally applicable approach as its success in use depends very much on the regular or daily use of the building (amongst other factors). The reasons for choosing an underfloor heating system, therefore, need to be thoroughly tested as a separate exercise, but with regard to the issue of the treatment of floors it is perhaps sufficient to say that a desire to install underfloor heating is not in itself sufficient justification for the replacement of an historic floor. Underfloor heating systems are not infallible and may need to be repaired in the future, necessitating the costly and disruptive uplifting of the floor.

Matters to consider with regard to the design of a new floor

If a convincing argument can be made for a new floor then the specification in terms of the layout, materials and detailing needs to be carefully considered. Natural stone is often the favoured option but there may be circumstances where other materials might be appropriate. Fitted carpet is not recommended as it has an overly domestic feel, quickly becomes tatty, and can cause damage to the floor on which it is laid (indeed the opportunity should be taken, as part of the work envisaged, to assess any damage that might have been caused to monuments, etc. by existing carpets and mats). It can also fundamentally alter

the acoustics of a building. Bear in mind that the specific choice of materials and finishes needs to be handled with some sensitivity; new natural stone or tiled floors are sometimes unsuccessful in that they are too uniform in colour, tone and pattern. In such cases the overall character can be unpleasantly bland and monotonous, as the patina and natural variation of the old floor is sacrificed in favour of uniformity and neatness. However, in contrast, more elaborate schemes that incorporate decorative devices need to be handled with care.

Examples of potential solutions (reused, new etc.)

There has been a recent trend for leaving the existing historic floor in place and adding a new floor structure above, incorporating underfloor heating. Whilst this does not necessarily result in the loss of historic fabric, it can require changes to be made to door thresholds, openings and other architectural details which will need careful thought: the junction of raised floors and the bases of pillars can be particularly challenging. The issues of needing to change thresholds, openings and architectural details also stand for proposals which include lifting the level of the floor itself. Adding a new 'floating' floor or lifting the existing floor level will have an impact on the character and appearance of





the church that may or may not be acceptable, and, in the case of the former, is not necessarily addressed by the argument that the new floor is a reversible intervention that could be removed at a later date.

If laying a new floor on top of the existing floor is acceptable, consideration still needs to be given to the issue of how to protect the historic floor especially if it features ledger stones, brasses or high quality medieval or Victorian tiles. Access through the new floor for maintenance to any underfloor heating system and historic floor may need to be provided.

In other cases, it has been possible to remove areas of timber pew platforms and to replace these with new natural stone or tiles set on a solid substrate, usually of lime concrete, and sometimes incorporating zoned underfloor heating (with the addition of traditional heating sources to augment the underfloor system). In many ways this would seem to be a reasonable compromise, but the choice of floor finish for the new areas is still an important consideration. Should the new floor materials attempt to replicate the pattern and materials of the existing floor, or should a contrasting material be chosen to allow the area formerly fitted with fixed pews or benches to be read?



Most heritage professionals now accept that lime concrete ('limecrete') is a more appropriate material than standard (cement-based) concrete for the substructure of a floor in an historic building, as it allows moisture to pass through the floor structure and is unlikely to exacerbate problems of excess dampness.

However, even when a 'breathable' lime concrete floor is used, the junction between the old and new fabric must still be handled with care (for instance by incorporating evaporation strips where appropriate).

In all cases the following matters need to be addressed in the detailed design and specification:

- **Choice of material:** where stone is to be used it will be preferable to choose a suitable locally available or matching stone.
- **Sizing:** for a stone floor larger flags tend to look better than smaller flags, but this will depend on the nature of the stone and what can be obtained from the quarry. In either case it may be better to have a range of sizes rather than a single size and to vary the coursing of the stone accordingly. The setting out and coursing of all floors is important.
- **Pattern:** the layout of the flooring material needs to reflect the architecture of the building. Laying a single pattern throughout the space is rarely successful and therefore using a contrasting pattern or material to highlight certain areas or to demarcate spaces is often worthwhile.
- **Colour and tone:** the new material should complement the existing building and its features, but be aware that picking too 'safe' an option can result in a bland overall effect. Bear in mind that for people with visual impairments, contrast between building elements can help them orientate themselves within a space and so a uniform choice of colour or tone for all





elements within a building is often unhelpful. Steps need to be handled very carefully to avoid visual warning devices having to be applied afterwards.

- **Finish:** there is a need to ensure that the floor surface does not create a trip or slip hazard, but there are aesthetic issues to consider too. A floor that is too polished or highly reflective can appear dazzling, especially where it reflects individual light sources.
- **Maintenance:** some finishing treatments can make it difficult to maintain and clean floor surfaces in the future. In general, surface treatments reduce the breathability of the floor and are best avoided, though the congregation may have to accept that it will take time for the floor to acquire an attractive patina and that it may appear stained in the interim.



Further reading and advice

Advice on choosing a new heating system can be found at:

http://www.churchcare.co.uk/images/Guidance_Notes/Heating-System.pdf

SPAB position statement - *Heating in Churches: A Cautionary Note on Underfloor Heating:*

<https://www.spab.org.uk/advice/conservation-advice/spab-statement-5-heating-in-churches-a-cautionary-note-on-underfloor-heating/>

Guidance on writing statements of Significance and Need is available at:

http://www.churchcare.co.uk/images/Guidance_Notes/Significance_and_need.pdf





Appendix 1

Suggested hierarchy of approach to the repair or replacement of historic floors

Where a floor has a number of defects to be addressed, or areas of fabric or archaeology which are more significant than others, a 'one size fits all' approach may not be the best solution. The table below outlines a possible hierarchical approach based on conservation principles which takes account of both significance and need.

Approach	Conservation principles
Conservative repair	Conserve as found: Wherever possible, adopt an approach of maintaining as much of the existing fabric as possible as well as the patina of age. This is most likely to allow the historic significance of the floor to remain intact.
	Like for like repair: Repair using the original materials and methods. This can minimise the impact of essential works while providing the opportunity to improve on the existing situation.
Minimal intervention	Reversible repairs: Where more obvious repairs are unavoidable, they should be reversible wherever possible as this allows future developments of new repair methods to be employed when they become available, or like for like repairs to be made when this becomes economically viable.
	Sympathetic repair: Where a like for like repair or replacement is impractical, repairs using new materials that are in sympathy with the existing floor should be adopted.
Replacement	Where defects in the original construction of the existing floors are causing damage or are a danger, or where such defects are in conflict with the needs of the building or congregation, the existing floor could be replaced. This approach requires strong justification and evidence of need/arguments as to why the conservative repair and minimal intervention are not the appropriate solution.





THE SOCIETY FOR THE PROTECTION OF ANCIENT BUILDINGS

This document is intended as general guidance and the broad advice given herein will not prejudice the response of the separate bodies to individual cases which will be considered on a case by case basis. The content of this guidance is offered in good faith but neither the author nor the Society can accept responsibility arising from any incorrect or incomplete information.

The SPAB is a membership organisation founded by William Morris and Philip Webb in 1877 to defend buildings against unsympathetic works and restoration. Today our work is guided by Morris' original manifesto and we advocate for skilful repair and maintenance and resist conjectural restoration.

Technical advice and publications

The SPAB is happy to provide a variety of technical advice and resources to members and the general public. As a part of its campaigning and technical research work the Society produces a range of highly regarded advisory publications on subjects such as the control of damp in old buildings, repointing stone and brick walling, timber bell frames and the care and repair of old floors.

Please visit our website's advice pages for relevant guidance as well as for details of our activities and how to become a member at www.spab.org.uk or contact:

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