Planning Policy Team

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OXFORD CITY COUNCIL

Heritage & Sustainability Guidance for Householders

Technical Advice Note (TAN) 15

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Contents

1. Introduction

1.1 Purpose of this guidance

We take as a starting point that historic buildings are inherently sustainable. The inherent embodied energy (i.e. the energy expended and encapsulated within the fabric of a building in its construction) of historic buildings means that their retention and care is consistent with modern concepts of sustainability and with the ambitions of reducing carbon emissions. This guidance has been produced to enhance an understanding of how historic and traditionally constructed buildings work and to explain how to find opportunities to improve energy efficiency while remaining sensitive to their historic characteristics and conservation requirements. The 'whole building approach' is promoted which seeks to save energy, sustain heritage significance, and maintain a healthy indoor environment through understanding the building in its context.

1.1.1 Scope of guidance

The emphasis of this guidance is on residential dwellings and small to medium sized domestic buildings, which comprise a significant proportion of the historic building stock in Oxford and indeed the UK as a whole. The guidance provides an overview of the most common energy efficiency options – ranging from 'hard' high impact measures to 'soft' lower impact measures - as applicable to each building element and evaluate their suitability for historic buildings in terms of their effectiveness as well as the impacts on their heritage characteristics. In addition it includes a review of local best practice examples of how energy improvement works can be carried out sensitively where there is a heritage interest.

1.2 Who is this guidance for?

The guidance has been prepared with the following groups of people in mind:

- Building owners and occupiers considering what action they need to take to improve energy performance, and to meet or potentially surpass a range of statutory requirements.
- Architects, surveyors and energy advisers preparing proposals for work on traditional or historic buildings, and who need to make an appropriate professional response to requirements which can often be in conflict.
- Building contractors, materials and component suppliers needing to understand the implications of decisions they make in carrying out their work, or of the technical advice they give to their customers.
- Officials, such as conservation and planning officers, building control surveyors, approved inspectors, environmental health officers and housing officers, who will be experts in one area (for example building conservation, general legislation or energy performance), but may be less familiar with the balances that need to be struck in reaching reasonable solutions that suit all parties.
- Local amenity groups with an interest in heritage and conservation matters.

1.3 Defining historic buildings

The guidance is intended to apply to historic buildings, which are generally understood as buildings that are of historic value, and to buildings with the potential to impact the appearance and character of conservation areas. These include:

- Listed buildings.
- Buildings located in conservation areas

- Buildings which are of particular architectural and historical interest
- Buildings of architectural and historical interest within national parks, areas of outstanding natural beauty, and world heritage sites.

The guidance is also applicable to buildings that have been built using traditional or vernacular techniques, whether or not they are in conservation areas and regardless of their age or specific historic interest. Generally speaking the scope of this guidance would encompass most buildings erected prior to the 1930s. Up until the 1930s, house construction was most commonly in brick solid wall construction. Stone built walls were also common, sometimes with brick backing. Although cavity walls were introduced as early as 1900, it was only in the mid-1930s that it began to predominate house construction and mark the time for what can be understood as modern housing in the UK.

Whilst most of the buildings of this era would not be of any specific historical or heritage significance, buildings from this time period constitute a significant proportion of the existing housing/building stock. Given how prevalent these buildings are, it is important to gain an understanding of how these buildings work and the best ways of improving their energy efficiency without being counterproductive to the way they already function.

1.4 Historic Building and Sustainability Myth Busters

It is not uncommon for historic buildings to be considered as obsolete and inherently unsustainable and there is often the mistaken belief that planning departments use a building's heritage status or situation in a conservation area as an excuse to not allow any changes of any kind to be made, including those that would enhance energy efficiency or promote sustainability. We have collated a non-exhaustive list of common myths and address them below.

a) **It will cost too much to increase the energy efficiency of an older building.**
There are many different measures which can increase the energy efficiency of a historic building, some of which are either free or very cheap to do.

It is possible to make small changes on a day-to-day level that can make a noticeable improvement in a historic buildings energy efficiency, even before having to consider using more substantial retrofitting options. 'Soft' measures such as draught proofing can make a significant difference to the energy efficiency of a building and the costs associated with this are relatively low.

b) Historic buildings are energy inefficient and cannot be sustainable.
Research demonstrates that up to a third of the total carbon emitted from a new home is released through construction and demolition. This 'embodied', carbon is often overlooked when it comes to assessments of the efficiency of historic buildings in comparison to new builds.

Without accounting for this aspect of the carbon associated with buildings, historic buildings are often perceived to be much less energy efficient than they actually are. Historically, materials used to construct buildings were more often locally sourced, therefore less carbon emissions were associated with transporting the materials, and the buildings were constructed to last longer.

The carbon costs which are associated with the construction of new buildings are often much higher than those associated with alterations to existing buildings. Having old buildings is an asset when it comes to saving carbon as there is a reduced need to build from scratch.

c) If my building lies within a conservation area, I cannot make any changes to it.
There is a common misconception that you cannot make any changes to historic buildings due to their historic significance. This TAN explains that there are a number of methods which can be carried out to retrofit a historic building to make it more energy efficient. It just requires extra consideration and assessment in order to find a solution which protects the historic significance of the building at the same time.

d) Changing your thermostat doesn't make much difference to savings.
Your heating bill can be reduced by 10% by turning your thermostat down by just 1°C. This small change can make a significant difference to energy savings as well as financial savings.

e) Installing solar panels on my roof is the best way to be more 'green'.
There is often a perception that in order to be more sustainable or 'green', a building has to appear from the outside to be energy efficient. This leads people to choose measures such as solar panels as this is a clear demonstration, to neighbours and those passing by, that the owners have taken action in being more energy efficient. A societal pressure to either appear to be acting in a certain way or to attempt to take significant action can motivate such measures.

However, it is important to assess whether or not a certain method or approach would actually be the most efficient and effective measure to take in that specific case. There are a number of low to moderate impact measures which can be taken before considering measures such as solar panels as an action to become more energy efficient. Often changes in behavioural practices and the way we use a building are enough to make a noticeable difference. Reducing the demand for energy is the best first step, rather than making the supply of energy greener.

f) Increasing the energy efficiency of a building reduces its carbon footprint
This is not always the case. Take the insertion of triple-glazed windows as an example – the carbon costs of manufacturing, transporting and installing these windows are also tied up in the life cycle of the windows. As such, when they are installed, they bring additional carbon costs to the building before they begin to improve the energy efficiency. This can take a significant amount of time to 'repay'.

g) The conservation of historic buildings is about keeping them the same
This is not entirely true. The primary focus of conservation is about what is best for the building and also for the people using it. It is also about managing change to best maintain the function and significance of the building.

h) Heritage designations prevent progress towards a greener future
The benefit of heritage designations is that they support sustainable decision-making which considers the long-term future of the buildings. This long-term vision allows for greater consideration of the future scenarios and the whole lifecycle of the building. As well as this, heritage designations provide an opportunity to educate people on the sustainability of materials used in historic buildings. Buildings that have been around for a long time have proven to be

repairable and sustainable, therefore there is a lesson to be learnt from historic buildings for the future of sustainable design.

2. Policy Context & Background

The following section sets out the policy context which influences the guidance set out in this Technical Advice Note. It begins with the national level framework, the National Planning Policy Framework (NPPF) and National Design Guide and then focusses down on local scale policies with the Oxford Local Plan 2016-2036.

2.1 The National Planning Policy Framework (NPPF)

The NPPF broadly sets out a framework through which local planning policies should be prepared. The overall purpose of the NPPF is to ensure that plans and decisions apply a presumption in favour of sustainable development.

For the purposes of this guidance, the most relevant sections of the NPPF are Chapter 12, 'Achieving well-designed Places', Chapter 14, 'Meeting the challenge of climate change, flooding and coastal change' and Chapter 16, 'Conserving and enhancing the historic environment'.

Chapter 12 - Achieving well-designed places - The NPPF makes clear that planning permission should be refused where the proposal is of poor design and fails to make use of opportunities to improve the character and quality of the area.

Paragraph 127 sets out what the government means by 'well-designed places', listing six key criteria which planning policies and decisions should ensure development proposals address. Paragraph 127 c) makes specific reference to local character and history.

Paragraph 131 highlights a focus on sustainability of design, stipulating that "*great weight should be given to outstanding or innovative designs which promote high levels of sustainability or help raise the standard of design more generally in an area, so long as they fit in with the overall form and layout of their surroundings."*

Chapter 14 - Meeting the challenge of climate change, flooding and coastal change - The NPPF encourages plans to take a proactive approach towards mitigating and adapting to climate change, stating that new development should be planned for in such a way that it avoids increasing the vulnerability to climate change associated impacts and can help to radically reduce greenhouse gas emissions. It encourages the reuse of existing resources and the conversion of existing buildings.

Paragraph 150, b) highlights that the location, orientation and design of a new development can help to reduce the associated greenhouse gas emissions. **Paragraph 153, b)** furthers this, explaining that local planning authorities should expect new developments to *"take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption".* Therefore highlighting that design is a key consideration for the minimisation of energy consumption in the built environment.

Chapter 16 – Conserving and enhancing the historic environment – This chapter stresses the importance of conserving heritage assets in a manner appropriate to their significance, acknowledging that they are an irreplaceable resource that should be conserved for the enjoyment of existing and future generations.

Paragraph 189 states the requirements which an applicant must meet when submitting proposals affecting heritage assets, including a description of the significance of any heritage assets affected by the proposals and any contribution made by their setting.

The remainder of this chapter outlines the considerations and tests which the local planning authority should carry out with regards to proposals affecting heritage assets.

2.2 The Oxford Local Plan 2036

Policy RE1 (Sustainable design and construction) – planning permission will only be granted where it has been demonstrated that the following sustainable design and construction principles (where relevant) have been incorporated: a) maximising energy efficiency and the use of low carbon energy; b) Conserving water and maximising water efficiency; c) Using recycled and recyclable materials and sourcing them responsibly; d) Minimising waste and maximising recycling during construction and operation; e) Minimising flood risk including flood resilient construction; f) Being flexible and adaptable to future occupier needs; and g) Incorporating measures to enhance biodiversity value. This policy also sets out carbon reduction requirements which are incrementally increased over the lifetime of the plan.

Policy DH1 (High quality design and placemaking) - Planning permission will only be granted for development of high quality design that creates or enhances local distinctiveness. This policy is supported by Appendix 6.1 of the plan which provides a design checklist for proposals.

Policy DH3 (Designated heritage assets) - Planning permission or listed building consent will be granted for development that respects and draws inspiration from Oxford's unique historic environment (above and below ground), responding positively to the significance character and distinctiveness of the heritage asset and locality. This policy also outlines the information which should be submitted through a heritage assessment as part of a proposal for development which would or may affect the significance of any designated heritage asset, either directly or by being within its setting.

Policy DH5 (Local heritage assets) - Planning permission will only be granted for development affecting a local heritage asset or its setting if it is demonstrated that due regard has been given to the impact on the asset's significance and its setting and that it is demonstrated that the significance of the asset and its conservation has informed the design of the proposed development.

Other Local Plan policies – There are a number of other policies (such as RE7, DH2, DH4, G8) which may or may not be relevant depending upon the specifics of the development proposal in each case. These are assessed on a case-by-case basis.

For more information about the Oxford Local Plan 2016-2036, please visit the Local Plan webpages.

2.3 Planning Consent Requirements

2.3.1 Making changes to a listed building

Statutory listing protects both the inside and outside of a building, as well as fixtures and fittings (like windows, doors or staircases) and subsidiary buildings that form the 'curtilage' of the building. You can only make alterations to a listed building if the Local Planning Authority (LPA) grants Listed Building Consent for any changes that might affect the special architectural or historic interest of the building. Carrying out work without Listed Building Consent could result in the LPA requesting that features s and fabric that have been removed are reinstated and/or later additions removed. Unlawful alterations to a listed building is also a criminal offence. Some minor, like for like repairs may not require listed building consent but this depends on how the repairs are undertaken and advice must be sought from the Local Planning Authority to establish what can and cannot be undertaken without consent. Depending on what you propose and how you use the building, you may well need planning permission in addition to listed building consent and approval under building and fire regulations.

2.3.2 Making changes to a building within a conservation area

They City Council will support changes that help to reveal the special features of the conservation area and enhance its character and appearance. This may mean that some changes are acceptable. Permitted development (PD) rights that normally apply to relatively minor alterations will be reduced in conservation areas, so planning permission will be needed for changes such as the installation of solar panels or air/ground source heat pumps. In some cases being in a conservation area will restrict what PD rights you have. In two of our conservation areas – Jericho and Osney Town – we have gone further and removed additional PD rights through Article 4 directions, including PD rights for changes to roof materials (including solar panels), alteration and replacement of windows, and the rendering or plastering of external brick and stone walls (potentially impacting the installation of external insulation).

2.3.3 Making changes where there is potential archaeological interest

The fabric of your building or the ground upon which it stands may have archaeological interest. Internal alterations to improve energy efficiency or below ground works (including geo-thermal heat pumps for example) may impact on archaeological remains. If you are planning substantial works to a historic buildings or ground works in an area that you suspect may be of archaeological interest then you may wish to establish whether there may be archaeological implications. Information on the archaeological potential of your building may be available via Heritage Gateway, Oxfordshire Heritage Search and the Oxford Archaeological Plan websites.

2.4 Green Retrofit and Building Regulations

Most types of building works have to conform to the Government's Building Regulations. Part L of the Regulations relates to conserving energy and sets out a requirement to improve the thermal performance of the building. The accompanying Technical Guidance states that the aim should be to improve energy efficiency as far as is 'reasonably practicable'. Where this affects existing buildings, the regulations also set standards of energy-efficiency requirements for extensions and other significant changes to a building.

From the perspective of Building Regulations, energy efficiency measures may be required where a building is:

- subject to a change of use,
- where certain work is undertaken to a thermal element (wall, floor and roof) or
- work is done to a controlled fitting or service: 'controlled fittings' include windows, doors or rooflights and 'controlled services' include systems used to manage the condition of the environment inside the building, e.g. heating system.

For instance, where a pitch roof is stripped and re-covered the regulations require this thermal element's performance to be improved as far as is reasonably practicable; where windows and doors are replaced the opportunity should be taken to upgrade them to help reduce the amount of energy required to reach comfort levels.

'Approved documents' describe how the regulations should be applied to specific types of building. Approved document L1B (domestic dwellings) and L2B (non-domestic dwellings) provide technical guidance to assist compliance with the functional requirements of the Building Regulations.

Listed buildings, buildings of historic interest located in Conservation Areas or of traditional construction may be exempted from some of the Regulations' requirements to prevent negative impacts on their character or the risk of deterioration of the building fabric and fittings.

There are many opportunities to improve the energy efficiency of your older building but you will need to think whether they are going to have a negative impact on its appearance, fabric, historic features or on the view from other buildings. You should consult our Building Control office and Heritage team for advice if you are planning building works to such a building. If energy efficiency measures are considered inappropriate as part of your work it is important to agree this with Building Control. The Building Regulations will also apply where solar panels or PV arrays are installed on the roof of a building. Competent installer schemes exist for these type of works, a list of competent installer schemes can be found in Part 3, clause 20 and Schedule 3 of the Building Regulations 2010 as amended. More information is available online.

2.5 Future Homes and Future Buildings Standards

All homes and businesses will have to meet rigorous new energy efficiency standards to lower energy consumption and help achieve the government's 2050 net zero greenhouse emissions target. The government put in motion a 2 stage process by which it would consult on and make changes to Part L (conservation of fuel and power) and F (ventilation) of the Building Regulations to improve the energy efficiency of new residential and non-residential buildings.

The first stage addressed a Future Homes Standard for newly built homes. In its response to the consultation published in January 2021, the government set out the changes, whereby it requires that by 2025 new homes built to this Standard will have carbon dioxide emissions 75-80% lower than those built to current regulations, and will be 'zero carbon ready', i.e. not require further retrofit to achieve zero carbon status.

The second stage of the consultation (that has recently closed) addressed a Future Buildings Standard, setting out energy and ventilation standards for non-domestic buildings, existing homes and includes proposals to mitigate against overheating in residential buildings. There are no specific references in the proposals to buildings that are listed or of other heritage interest and the government response when it is published should bring clarity as to whether there would be any specific requirements.

3. Heritage & Sustainability Guidance on Energy Efficiency Measures

3.1 The need for a different approach to retrofitting historic buildings

Modern buildings are typically built with synthetic or natural insulation, vapour barriers, double glazed windows and mechanical ventilation in certain areas. By contrast, older buildings are often built using naturally water vapour 'permeable' materials and techniques, which are also described as 'breathable'. They were typically built using materials like stone, timber and lime that soak up moisture from rain, rising damp, cooking, washing and breathing and then let it evaporate gradually. The draughts of windows, fireplaces and roofs provide ventilation that also prevents` a build-up of moisture. Older buildings therefore need to breathe and should not be made airtight as much as new ones.

Bearing in mind these differences, the main risks to traditional buildings are:

- Moisture trapped within the building material – which can cause growth of mould, bringing health hazards and increased likelihood of materials rotting.
- Condensation within unheated areas.
- Rendering/pointing/repairing with incompatible materials – such as cement that is not water permeable.
- Condensation at a 'cold bridge' (at a point where insulated and uninsulated areas meet).
- Insufficient ventilation and heating needed to remove moisture.
- Irreversible change through inappropriate 'improvement' works.

When considering modern energy efficiency measures you will need to think how they affect moisture movement to avoid creating problems with damp that might be self-defeating. Alternatives to foil laced insulation and uPVC double glazed windows may need to be considered to ensure that moisture is not trapped. This means you need to consider natural, breathable materials and managing ventilation as you reduce draughts to maintain the proper functioning of your building and a healthy living environment.

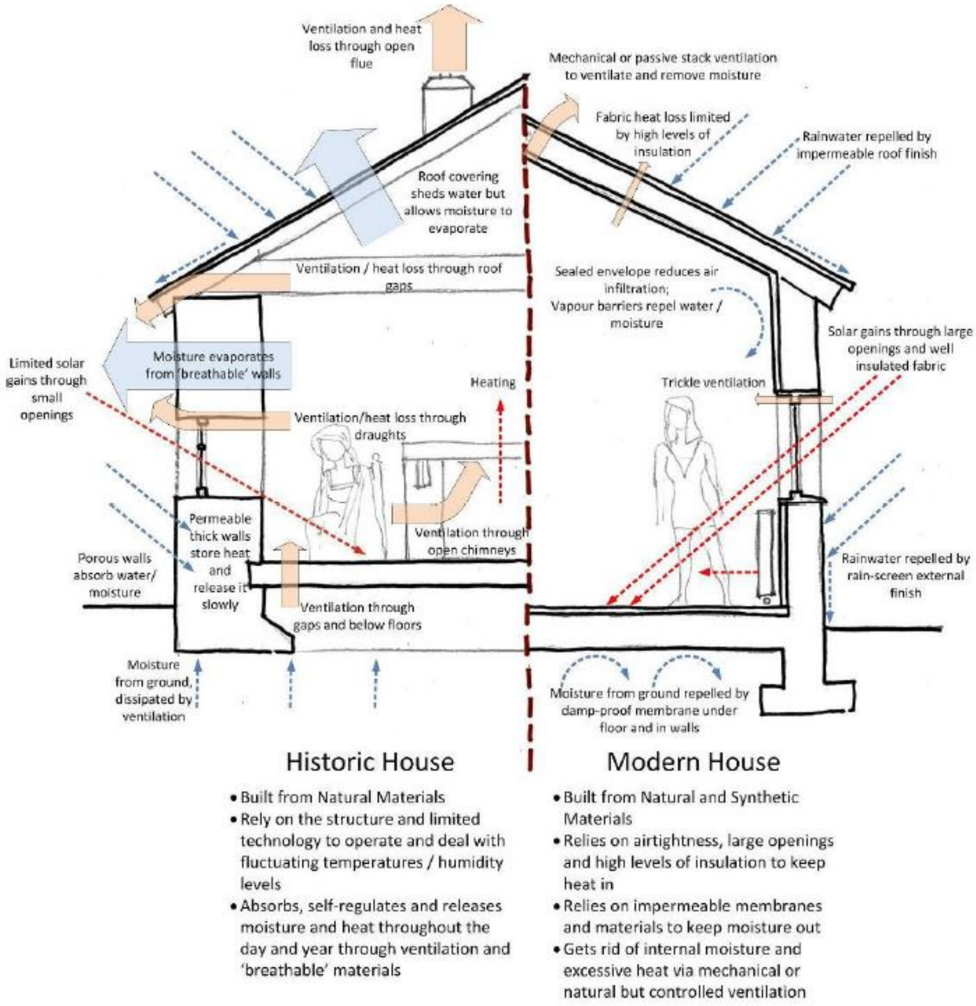

Figure 1: Differences in the movement of moisture for a historic and modern building

3.2 Importance of a Maintenance and repairs regime

All buildings need regular maintenance and repair, but with older buildings there is potential for problems to become serious over time if this hasn't been kept up. Resolving causes of leaks and unwanted draughts and promptly preventing new ones developing, along with other routine maintenance, will make your building work more efficiently and help protect its heritage value and the health of its users.

Keeping up a building maintenance regime can also help to ensure you cover all the tasks that will help to keep your historic building working efficiently. Appendix 1 is a suggested checklist of basic repair and maintenance tasks which can assist in a 'health check' to ensure that the fabric is in good condition and that the building functions as optimally possible. It is always advisable to follow a systematic approach such as beginning with the largest building elements such as walls, roofs and floors, then moving on to openings, chimneys and rainwater goods before moving on to fixtures and fittings, internal finishes and heating and lighting systems.

All repairs to the building (cracks, broken windows, leaky pipes, etc.) should be made using appropriate 'heritage friendly' materials and making sure, where replacements are needed, they are 'like-for-like' as much as possible to maintain the building's character. It is always best to seek a conservation specialist's advice if ever in doubt.

3.3 Common energy efficiency measures at-a-glance

Having explored all that can be done with the building through maintenance and simple changes in the way the building is operated, there is a range of further measures that can be implemented in a building to improve its energy efficiency. When applied to heritage or traditionally built buildings, the ideal scenario is that any efficiency measures do not disturb, or disturb very marginally, the existing building fabric and its features, and as much as possible have a capacity for reversibility. Any proposed changes should also allow the building to perform as optimally as possible, including allowing it to "breathe" and ventilate properly according to its design.

The following table gives an overview of measures and technologies that are commonly used in retrofitting existing buildings in order to improve their energy efficiency. Each measure is assessed according to its effectiveness, impact on heritage characteristics, what permissions are likely to be required and an indication of the return on investment. Combined with an understanding of the building's characteristics, the guide should assist in determining which measures are most suitable for your building. Later sections of this chapter will go into more detail on specific things to consider when deciding on a measure.

Categories

Heritage/appearance impact

This is the likely impact the chosen retrofit option will have on the building's character as a whole. Any change to a historic building should have the smallest possible impact and be reversible. Special attention needs to be paid to the materials used in the retrofit to ensure they do not compromise the breathability of the building.

Energy efficiency

This is the capacity of the chosen retrofit option to reduce heat losses (which will lessen the need for using as much energy to heat the building and will improve comfort levels) and making the most out of the building's structure and existing elements to regulate the indoor temperature. A generic indication of high/medium/low energy efficiency is provided, and every product used will have a different performance. Specific energy efficiency data can be obtained from manufacturers or through a conservation specialist.

Initial costs

This is the level of investment needed at the start to purchase and install the chosen retrofit option. Actual prices can be obtained from manufacturers and distributors.

Time to pay back

This is the length of time needed to recover the initial investment, which is calculated by dividing the initial cost by the money saved every year after the installation of the retrofit option. Timings are indicative and details can be obtained from manufacturers or through conservation specialists.

Ranges:

Short – up to 5 years

Medium – 5 to 10 years

Long – over 10 years

Key

🟠 High impact /High cost / Low to modest effectiveness

🟡 Medium impact/Moderate cost/Modest effectiveness

🟢 Low impact/Low cost /High effectiveness

Building element	Retrofit option/measure	Heritage/appearance impact	Energy efficiency	Initial costs	Time to pay back	Type of Permission/Consent required
Roofs	***Pitched roof - warm***	🟡	🟢	🟢	Short	Listed building consent; Planning permission may be required in Article 4 areas
	Pitched roof - cold	🟢	🟢	🟢	Short	
	Thatched roofs – insulating in between and/or above rafters	🟢	🟢	🟢	Short	
	Thatched roofs – insulating below above rafters	🟡	🟢	🟢	Short	Listed building consent
	Flat roofs – insulation	🟡	🟢	🟢	Short	Listed building consent
	Dormer windows - insulation	🟡	🟡	🟢	Short	Listed building consent
	Chimneys – permanent or temporary blocking up	🟢	🟢	🟢	Short	

Key

Walls	***Solid Walls: Internal insulation***	🟡	🟡	🟠	Long	Listed building consent
	Solid Walls: External insulation	🟠	🟡	🟠	Long	Listed building consent; Planning permission may be required particularly in Article 4 areas
	Cavity insulation	🟢	🟢	🟢	Short	Listed building consent
Windows & Doors	***Draught proofing windows and doors***	🟢	🟢	🟢	Short	
	Secondary glazing	🟢	🟢	🟡	Short	Listed building consent
	Reinstating existing/missing shutters or using thick curtains	🟢	🟡	🟡	Long	
	Vacuum, thin profile double glazing	🟡	🟢	🟠	Medium	Listed building consent; Planning permission may be required particularly in Article 4 areas
Floors	***Solid ground floors – insulating layer below earth floor under bricks, floor tiles; underfloor heating***	🟢	🟢	🟡	Medium	
	Timber ground floors – new heritage compatible modern flooring	🟠	🟢	🟡	Medium	Listed building consent

Key

Floors	***Timber ground floors – vapour permeable insulation***	🟢	🟢	🟢	Short	
	Timber ground floors – draught proof gaps	🟢	🟢	🟢	Short	
Heating	***'A' or better rated mains Gas boiler***	🟢	🟢	🟡	Short	
	Electric storage heaters	🟡	🟢	🟢	Medium	
	Biomass Heating	🟢	🟢	🟢	Short	Planning permission; Listed building consent
	Air Source heat pump	🟠	🟡	🟠	Medium	Listed building consent
	Ground source heat pump	🟠	🟡	🟠	Medium	Listed building consent
Other	***Solar PV and solar water heating panels***	🟠	🟢	🟠	Medium	Listed building consent; Planning permission may be required particularly in Article 4 areas

3.4 Detailed guidance on energy efficiency measures

This section provides general guidelines and points to consider when energy efficiency upgrades are proposed for historic buildings. This is not an exhaustive list but considerations and line of thinking behind them should be applicable to almost any project. **Listed building consent must always be obtained before any alterations are carried to listed buildings.** Conservation best practice should always be followed when undertaking energy efficiency upgrading in all historic buildings and there is extensive specialist guidance available from various heritage organisations, a number which are listed in the **Advice and Guidance** and **Contacts** sections of this guidance. These should be consulted at a minimum prior to the start of any project. It is also advisable to seek pre-application advice from the council's planning department.

3.4.1 Roofs

a. Pitched Roofs: Warm Roof

Insulation is placed above the roof rafters, with a vapour barrier installed under the insulation. Ventilation is not usually required due to the placement of the insulation.

Sustainability/construction considerations

- Only vapour permeable insulating materials should be used.
- Be aware of cold bridges at junctions between roof and walls.

Heritage considerations

- It is likely that the height of the roof will need to be raised and the structure may also need reinforcing.
- If the building has a vaulted or ornate ceiling any related works would have to be carried out as part of already planned roof replacement works.

b. Pitched Roofs: Cold Roofs

Insulation is placed above or in between the ceiling joists with a ventilated roof space above it.

Sustainability/construction considerations

- The main risk of a cold roof is condensation caused by the warm air rising from the building below and meeting the cold air above the insulation layer. Condensation is prevented by using vapour-permeable insulating materials and by keeping ventilation patterns. Ventilation should be maintained at eaves level e.g. using soffit vents or tile vents. Note that depending on the type of roof construction, ventilation may also be needed at the ridge or at the abutment with a wall.
- For sloping ceiling insulation – they should be applied between and to the the underside of rafters retaining ventilation above.
- Water tanks in the loft space and pipework should be insulated.

Heritage considerations

- Does the ceiling finish present special features that would be damaged or hidden?

- If installed beneath the rafters, it could be done without stripping the roof covering or changing the roof height.
- It leaves the maximum room for natural air circulation under the roof covering.
- It may reduce the amount of usable floor space.

c. *Thatched Roofs:*

Many thatched buildings already provide adequate thermal performance; additional measures to improve the energy efficiency of thatched buildings should only be considered if strictly necessary and the measures do not compromise the traditional 'breathing' performance of the building.

Insulating sarking boards in between and/or above rafters.

- Only vapour permeable insulating materials should be used, and ventilation patterns used to prevent mould/condensation. Where insulation would restrict the drying of the underside of the thatch it would accelerate rotting including a process known as "heat pumping" that draws moisture into the heart of the thatch.
- This should only be considered if the thatch is being replaced.

Insulating sarking boards below rafters:

- This should be considered when the existing thatch is not being replaced and when the internal finish is not of historical value.
- Only vapour permeable insulating materials should be used, and ventilation patterns used to prevent mould/condensation. Where insulation would restrict the drying of the underside of the thatch it would accelerate rotting including a process known as "heat pumping" that draws moisture into the heart of the thatch.

d. *Flat Roofs*

Flat roofs typically have a relatively simple structure; historically they are constructed with a waterproof covering laid over timber decking on timber joists. Small gaps were left between the decking to allow for ventilation and movement. Modern upgrades to timber decking include plywood and other sheet materials. Metal roof coverings have always been recognised as being durable, with lead commonly used historically along with zinc and copper. Upgrades to these are metal coverings milled using modern techniques as well as synthetic membranes.

Insulation above existing structure:

- Attention should be given to the gaps between insulation and structure, through which moisture vapour can penetrate and condense. Ventilation patterns should be maintained to avoid condensation and mould.
- This would be an option if the roof covering is being replaced. Works for this option may involve an increase to the roof height which may be an issue from a planning or listed building consent point of view with potential negative impacts on the historic environment.

Insulation in between existing structure:

- This is an option if the ceiling is not of historical value and can be, or is going to be, replaced, and when the existing roof covering is not being replaced.
- Attention should be given to the gaps between insulation and structure, through which moisture vapour can penetrate and condense.

- Ventilation should be installed if not already provided, in order to avoid condensation and mould.

Insulation below existing structure

- This is an option if the ceiling is not of historical value and can be, or is going to be, replaced, and when the existing roof covering is not being replaced. If the ceiling finish does not present special features that would be damaged or hidden by the works then the heritage impact is considered neutral.
- Attention should be given to the gaps between insulation and structure, through which moisture vapour can penetrate and condense.
- Ventilation should be installed if not already provided, in order to avoid condensation and mould.

3.4.2 Walls

Up until the 1930s, house construction was most commonly in brick solid wall construction. Stone built walls were also the norm in some areas, sometimes with brick backing. Mortars and plasters were mostly lime based, although bulking with cheap materials was common.

a. Solid Walls: Internal Insulation

Internal solid wall insulation works by adding a thermal layer of material to the existing solid wall facing the indoor spaces. These take the form of rigid insulation boards, or more innovative materials such as aerogel. Where novel materials or products are used, it is important that they have an independent third party certification such as from the British Board of Agrément (BBA - www.bbacerts.co.uk) in order to ensure that they are fit for purpose.

Benefits

- Thick solid walls already have the capacity to absorb heat over time and release it relatively slowly as the surroundings cool down, which will have a stabilising effect to the indoor conditions.
- Internal solid wall insulation may be a useful option in a heritage context where the external appearance of the building has to be maintained.
- It may be convenient when other, more effective solutions are not feasible.

Challenges

- Internal insulation does not have the best insulating performance overall as it will only reduce short term heat loses to the outside, while isolating the indoor environment from the benefits of solid walls' thermal mass. Installing internal insulation will add to the thickness of the wall and may result in a loss of internal area, even if minimal.
- The condition of the wall underneath would be hidden so a means of continuous monitoring would be recommended to reveal problems as they occur.
- Installation is a major undertaking that would almost certainly create significant disruption to the normal running of a household. Rooms rendered unusable until after works are complete, removal and reinstallation of fittings

Sustainability/construction considerations

- Only vapour permeable insulating materials (e.g. wood fibre boards) should be used. Cold bridges must be minimised, especially around windows and doors and at the junctions between walls and floors. Walls should also be free from moisture/damp, otherwise existing condensation issues will be exacerbated.

Heritage considerations

- Does the internal wall present special features that would be damaged or hidden by the works? Does it alter the internal character of the building? If not then this is a neutral option.
- Planning permission would not normally be required, but listed building consent would be where applicable.

b. Solid Walls: External Insulation

External solid wall insulation involves adding a layer of insulating material to the outside walls of a building and coating this with a protective render or cladding.

Benefits

- It is likely to be more effective than internal insulation at keeping comfortable levels of warmth over the day/night heating and cooling cycles, however walls should also be free from moisture/damp, otherwise existing condensation issues will be exacerbated.

Challenges

- The increased depth of the external render will require adaptation of the roof and wall junctions, the repositioning of installations such as soil and vent pipes, boiler flues or rainwater downpipes, and potentially the repositioning of doors and windows. Scaffolding access will also be required.
- The condition of the wall underneath would be hidden so a means of continuous monitoring would be recommended to reveal problems as they occur.
- Solid wall insulation is very expensive and is unlikely to be suitable for listed buildings, either internally or externally. This is due to the visual alteration to the character and appearance, and to the structural and thermal qualities of the walls, which can be severely damaged if not permitted to breathe.

Sustainability/construction considerations

- Thick solid walls already have the capacity to absorb heat over time and release it relatively slowly as the surroundings cool down, which will have a stabilising effect to the indoor conditions.
- If used, only vapour permeable insulating materials (e.g. wood-fibre boards, mineral wool, hemp-lime composites) with a moisture permeable protective (e.g. lime render, tile rain screen cladding).

Heritage considerations

- Installation of external insulation is very likely to change the appearance of a building, and potentially alter its character even when already rendered. If used, careful design, correct choice of materials, good detailing and extremely high standards of workmanship would be required. Planning permission would normally be required, as would listed building consent where applicable.

- Care must be taken in relation to adjoining properties.

Opportunities

- Many historic buildings have undergone alterations over the years that may have diminished their significance or put it at risk. Harmful past alterations may, however, present opportunities for more sensitive refurbishment as part of wider energy saving improvements.

c. Cavity Wall Insulation

External cavity walls are made of two 'skins' with a small gap between them. This means that the gap between them can be filled with insulating material to stop the warmth escaping to the outside. Although cavity walls were introduced as early as 1900, it was only until the mid-1930s that it began to predominate house construction and mark the time for what can be understood as modern housing in the UK.

Benefits

- Low visual impact as insulation would be invisible both internally and externally
- Cavity wall insulation is highly efficient and there are noticeable gains in heat retention.
- There is potential to use alternatives to synthetic insulating material.

Challenges

- Extraction of cavity insulation, and therefore reversibility of works, is very difficult. Loose fill materials as opposed to foam based material can improve the situation.

Sustainability considerations

- Early cavity walls had a special bonding brick to connect the layers of bricks, which creates a potential moisture path and thermal bridge. If this is present, the wall needs to be treated as a solid wall, and therefore the cavity cannot be filled with insulation. This construction type is often not easily recognisable from the outside, measurement of the wall thickness and a careful survey needs to be carried out to ensure the wall has a continuous cavity.

Heritage considerations

- The external and internal appearance of the wall would not be affected by this measure.
- Planning permission would not normally be required, but listed building consent would be required where applicable.

3.4.3 Doors and Windows

a. Draught proofing

At its most basic level, it involves preventing cold air from the outside entering into a building through gaps, and keeping warm air in. Gaps can form through gaps in the building fabric or fittings, as well as openings such as doors and windows or even letterboxes and keyholes. This is perhaps the most basic measure possible and is the starting point of any energy efficiency upgrades, and is often done without cost.

Benefits

- One of the least intrusive measures to improve energy efficiency on a buildings appearance
- Effective in bringing about energy efficiency and relatively low cost outlay.

Challenges

- Poorly fitting timber sash frames could cause major heat losses. Repairs can be carried out by a specialist carpenter.
- Periodic checking of draught-proofing system should be part of maintenance regime
- Not as effective in leaded windows where heat losses can also come from around the lead.

Sustainability considerations

- Its effectiveness is dependent on the state of repair of the building fabric, so an ongoing maintenance regime is important. Prioritise repair of windows and doors before draught-proofing them.
- Before draught-proofing, a fan pressurisation test may be needed to identity the extent of air infiltration and to locate draughts. Note that older buildings need a certain degree of background ventilation to enable them to breathe, and cannot be expected to be completely air tight.
- With replacement windows there is only a building control requirement to provide trickle vents if the windows had them fitted previously.

b. Secondary glazing:

Secondary glazing involves installing supplementary glazing on the inside of an existing single-glazed window.

Benefits

- Lower cost outlay than double glazed windows or replacement of existing units
- Heat losses from a window could be reduced by over 60% by using secondary glazing with a low emissivity ((low E) glass hard coating facing outside. It can last longer as it is not exposed.
- Transmitted noise from the outside is also reduced.
- If carefully designed and installed it has a low heritage impact and is easily reversible

Sustainability/construction considerations

- When secondary glazing is the preferred option, draught proofing should not be applied to the original window to allow ventilation and prevent condensation.
- Primary and secondary windows must open and shut with ease where natural ventilation is required
- Poor heat conductors make better frame materials (for example, wood rather than metal)

c. Vacuum, thin profile double glazing

This is a very innovative product developed for some historic buildings. It has the energy efficiency performance of a double glazed unit with the slim profile of single glazing.

Benefits

- Performance of double glazed unit with the slim profile of single glazed gives the potential for reduced visual impact.

- Where historic windows or replacement windows of historic pattern survive without historic glass it may be possible to introduce slim-profile double-glazing without harming the significance of the building.

Challenges

- High cost outlay
- Double glazed units are energy-intensive to manufacture, and can have a short lifespan;
- The replacement of original window and glass fittings may result in the loss of attractive features.
- Metal frames are cold bridges and are especially likely to attract condensation

Heritage considerations

- This option should only be considered after all other lower impact alternatives have been explored. A balance needs to be struck between historic value and the best possible U-value. Replacement of historic fittings should only be considered on a case by case basis where originals have no historical value and are obviously beyond repair. Many windows have lasted a long time and are capable of being repaired by a specialist carpenter rather than being replaced.

3.4.4 Floors

a. Solid Floors

Solid ground floors have traditionally consisted of lime-based ground floor **s**labs or tiles laid straight onto highly compacted soil, they were the predominant form of floor construction until the early 18th century. The most obvious 'modernising' measure would be to install an insulating layer below the earth floor, which is often covered by tiles, brick or stone work. The removal of the solid floor would also be required if underfloor heating is being considered.

Heritage considerations

- Excavating or removing original solid floors should only be an option of last resort, particularly if floor or other building elements are of recognised heritage significance unless the floor is already in poor condition and needs to be taken up or re-laid.
- Where a floor is to be excavated the archaeology should be recorded.

Sustainability/construction considerations

- Heat loss through solid floors is significantly less than from other elements. Given the costs, potential disruption and potential heritage impacts it may be better to focus on measures that would give greater benefits in a shorter time frame.
- If earth or stone floors do not already have a damp-proof membrane, then any measure adopted must retain the breathable qualities of the original floor system.
- What is needed is a permeable but water resistant system. Vermiculite or clay beads are examples of what can provide an insulating layer below bricks, stones or flags.
- If underfloor heating is considered in this situation, consider using 'limecrete' insulation and a permeable floor finish – in keeping with original finish or a sympathetic alternative.

b. Timber Floors

Suspended timber floors appeared in the UK in the early 18th century. Air flow was maintained between the ground and the timbers above by vents in the external walls, to ensure that the air did not become too damp.

Replacement with heritage compatible flooring to modern standards:

- This should only be an option of last resort, particularly if floor or other building elements are of recognised heritage significance. This should only be considered if the floor is already in poor condition and needs to be taken up or re-laid. Such works should only be carried out by a specialist carpenter.

Installation of Vapour permeable insulation

- This would involve lifting the floor boards and inserting vapour permeable insulation suspended in netting between the floor joists.
- If the flooring is accessible from underneath it may be possible to place vapour permeable insulation fit tightly in between joists with additional vapour permeable insulation board below if required.
- The ideal time for this option is when plumbing or other works are already scheduled.

Draught-proof gaps between boards

- This is the lowest impact option and is a good consideration if the flooring elements are in good condition and where gaps in the flooring have been identified as a source of heat loss. However air bricks and ventilation should not be covered up.

3.4.5 Heating & Energy

a. 'A' or better rated gas boiler:

Benefits:

- Highly energy efficient and a particularly good option when replacing a more inefficient system – such as oil/LPG/solid fuel systems or electric convection/storage heaters or old style gas boilers (rated E or worse)
- Relatively short payback time
- They are often compact in design and situated internally and as such would have a minimal heritage impact

Challenges

- High initial cost outlay
- Effectiveness may be dependent on the size of the property and how well it is insulated.

Sustainability/construction considerations

- Consider installing heating controls to dynamically adjust settings to avoid wasted energy.
- Its effectiveness is dependent on the state of repair of the building fabric, so an ongoing maintenance regime is important. It is advisable to undertake repairs and upkeep of more passive measures prior to making an investment in a new heating system.

b. Biomass heating

This involves using organic material – usually wooden logs, chips or pellets –to provide heating either for a single room or an entire property.

Benefits:

- This can be considered to be 'low carbon' because the amount of CO_2 released when wood fuel is burnt is approximately the same as that absorbed by trees when they are growing. Note that this is <u>not</u> a 'carbon neutral' or 'zero carbon' option because there are still carbon emissions associated with the fuel's extraction, processing and transportation.
- There is a potential for financial savings when compared to conventional electric or gas heating.

Challenges:

- This option is workable where there is reliable wood supply, storage space and delivery access and may be challenging to implement for properties that do not have these facilities.
- Impacts on neighbouring amenity have to be considered.

Sustainability/construction considerations:

- A shorter or longer pay back will depend on the system that this new technology is replacing: more savings would be made if a wood burning system replaces an electric storage heating than if it replaces a gas heating system.
- Effectiveness would depend on the size of the property and how well it is insulated.

Heritage considerations

- Consents may be required especially if a new flue is required.
- Consider visual impacts even though it is expected to be minimal.

c. Ground source heat pump

A method of heating that makes use of the latent heat from just below the surface of the ground that comes from solar radiation. This low-grade heat is taken from the ground using buried pipe network, around which a mixture of water and anti-freeze is pumped. This heat is then taken from the liquid within the pipework by the heat pump and upgraded to a higher temperature and more 'useful' heat. Heat pumps work most efficiently with a low temperature distribution circuit, which means systems like underfloor heating, warm air heating or radiators will be good methods of distributing the heat.

Benefits

- System can be used for both heating and cooling
- Low maintenance once installed.
- Once the pipework is buried the surface of the ground can return to being a field, garden, drive etc.,
- Very energy efficient and compatible with low energy consumption rates
- Thermal output is not dependent on external weather conditions

Challenges

- Installation can be a significant undertaking, involving a significant amount of ground works and works to the internal and external fabric of the building. These can create a notable level

of disruption and also have significant impacts on the building fabric, the landscape, existing services and potentially important remains.
- Because of the level of works, consents may be required from several agencies.
- Space would have to be set aside for associated plant, usually internally.

Sustainability/construction considerations

- This system is electrically powered and as such cannot be considered as zero carbon unless the power comes from a renewable source. There are no significant running cost or CO2 emissions gains compared to a gas boiler, so it is best used in off gas areas.
- A pre-existing heating system can sometimes be integrated or repurposed to work with a heat pump. The capacity of an existing system should be determined after a careful survey.

Heritage considerations

Although much of the infrastructure is under the ground surface, there are several elements that can have a visual impact such as pipes, cables, conduit, trunking, grilles, louvres and radiators. The impact should be taken into consideration.

Older properties may have microbore pipework which would need replacing to work with this system. Great care must be taken when laying replacements to ensure that historic fabric is not damaged.

Where there are significant undisturbed historic elements, installing this system can put these at risk, particularly if they are floor surfaces. It is highly unlikely that this would be an appropriate option in majority of cases where an historic or traditionally built building is involved.

Opportunities
Where there is clear evidence that historic surfaces have been disturbed or lifted, or there has been poor quality modern replacement fittings and finishing to historic fabric, this system may potentially be integrated into a building with more sympathetic and appropriate finishing. However consider how the system can be removed without permanently damaging the building.

d. Air source heat pump

Air-source heat pumps extract heat from the outside air and release it into a building. Outside air is drawn in by a fan and some of the heat energy is removed. This heat is then upgraded to a higher temperature in the heat pump. This refrigerant can then either heat air to be distributed around the property (air-to-air) or heat water for a conventional low-temperature hot water system (air-to-water).

Benefits

- System can be used for both heating and cooling
- Low maintenance once installed.
- This system would be a useful option where there are no connections to the gas grid.

Sustainability considerations

Heat pumps are most effective in buildings that warm up quickly, keep the heat in and so require little energy to maintain a temperature once it has been reached. It is therefore advisable to have a well-insulated building with high standards of air tightness. Where this is not possible or practical, a supplementary system may be required which can be traditional systems or renewable technologies.

Heritage considerations

An internal heat pump will have a lesser visual impact on a buildings external appearance. However the external parts will require some space outside, so the location of these should be carefully considered. They can often be placed in locations where they are not visually intrusive, such as along hedge lines. Some manufacturers colour the external units so that they blend into their surroundings more easily.

e. Solar Photovoltaic (PV) panels

Solar PV systems turn sunlight into electricity through the 'solar cells' made up of semiconductor material between layers of glass. Electricity leaves the panel as direct current (DC) and passes through an inverter that converts it to 240V alternating current (AC), so that it can be used in your home. Options for installing a PV array include:

- Fixed over the roof covering – standard solar PV panels
- Integrated into the roof covering – solar tiles and slates
- Ballasted or fixed on a flat roof – usually fixed and tilted to get the best orientation towards the sun
- Free-standing ground-mounted, set away from the building

Benefits

- Solar power is truly a renewable energy source and contributes to reduction of carbon emissions.
- There is potential for savings in fuel costs.
- Low running costs.
- Relatively low maintenance with the potential for a long operating life.

Challenges

- The effectiveness depends on several factors, including the geographical location of the site, orientation of the installation, weather/cloud cover.
- As a result of which the level of energy derived can be variable, especially in high latitude locations.
- They can have high upfront costs and payback time could be lengthy. Solar energy storage technology can also be expensive. Note that most government subsidy schemes have expired.
- There is almost always a level of visual impact on the building and setting.
- For most domestic and modestly sized installations, the public benefits - in terms of selling energy back to the national grid, reducing air pollution and the effects of global warming - are limited due to the small scale of the development. Where designated heritage assets are involved, i.e. conservation areas and/or listed buildings, the public benefits are unlikely to outweigh by themselves the great weight that is required to be given to harm (not only visual harm) caused to their significance of these assets.

Sustainability considerations

- With roof-mounted installations it is necessary to check that the roof is able to support the wind, snow and static load.
- The means of fixing and operating the panels and other equipment should not impede the buildings functioning such as rainwater disposal and ventilation, and should also not hinder maintenance work.

- Solar panels need maximum exposure to the sun, achieved by facing panels in a direction between south east & south west.
- Shadows cast on panels by trees, buildings and other features can greatly reduce the amount of electricity generated, even if it is only part of the panel is in shade.

Heritage considerations

- It is vital that all required consents are obtained before carrying out any works especially if they affect any designated heritage assets. Installation is carefully planned, with consideration to how damage to the building fabric can be minimised, how it is installed and maintained, and how the equipment can be removed at the end of its useful life.

- Attaching components to the main elevation of the building i.e. the face(s) of the building as seen from the direction it is most commonly viewed, should be avoided.

- Besides the visual impact on a building, the impact on the setting should also be considered. It would usually be measured against the views to and from the installation where they would be visually prominent. Any impacts should be mitigated as much as possible, through careful placement, choosing less reflective panels and frames whenever possible, or through the use of screening or the characteristics of the building e.g. shallow roof pitches to make panels less prominent.

4. Case Studies

The following case studies are examples where consent has been sought for energy efficiency upgrade works that affect buildings of historic interest. All planning and listed building consent applications can be viewed online on the council's planning pages.

4.1 21 Paradise Street (planning reference: 19/03118/LBC)

4.1.1 Description of the building

The site is within the Central Conservation Area and contains two grade II* listed buildings, The Master's Lodgings and The Cloisters which face onto a central courtyard surrounded by walls to the north and south. The buildings underwent substantial refurbishment works in the late 1970s and further works in the 1980s. Most recently the buildings were occupied by Cherwell College and used as office and teaching accommodation. The Master's Lodgings is a 17th century building which was upgraded and extended circa 1700, and is of particularly high significance due to the survival of the historic floorplan and fine early 18th century decorative features. These include the semi-domed decorative entrance canopy, panelling, chimney pieces, cornicing, and staircase. Although the external elevations are now rendered, it is likely that these are constructed from timber frame with historic brickwork and stonework.

4.1.2 Key elements of application

A scheme of several refurbishment and upgrade works were proposed including roof repair works involving the installation of roof insulation, and the addition of underfloor heating in the Victorian wing of the Maters Lodgings and the ground floor of the Cloisters.

4.1.3 Planning comments and feedback

The installation of underfloor heating systems in the Victorian wing of the Master's Lodgings and Cloisters ground floor kitchen area would not impact fabric of historic importance, nor affect the heritage significance of the buildings. The applicant submitted additional information regarding the much needed repair and refurbishment works are these were considered acceptable and in sufficient detail. Further details are likely to be requested on specific methods as part of the permission conditions, in order to ensure appropriate and sympathetic works.

Great weight and importance has been given to the desirability of preserving these grade II* listed building as designated heritage assets. The proposed scheme would not cause harm to the architectural or historic significance of the buildings.

4.1.4 Outcome

Application approved subject to submission of further details of construction methods, in order to ensure works are appropriate and sympathetic.

4.2 6 St Andrew's Lane (planning reference: 19/03179/LBC)

4.2.1 Description of building

The subject building, also known as Pumpkin Cottage is a grade II listed building located in the Old Headington Conservation area and is suspected to date from the early 17th century. The part of the building of the highest heritage significance is the principal front range, of which the west bay is expected to be date to the early-17th century and the east bay slightly later. The building has undergone a number of internal alterations in the past which have altered its original floorplan, however the historic floorplan can still be read and understood and there is a substantial amount of original fabric remaining.

The property has high heritage significance and makes a significant and positive contribution to the character and appearance of the conservation area, being evidence of the historic origins of the former rural village and having strong aesthetic value. The stone boundary walls surrounding the site are also listed and are considered to make a positive contribution to the character and appearance of the conservation area.

4.2.2 Key elements of application

Listed building consent was sought for the upgrading of the existing mechanical and electrical services throughout the building, and the replacement of the existing terracotta tiled floor finish across the ground floor and installation of an underfloor heating system and floor mounted power sockets.

At first floor level it was proposed to remove the existing carpet floor finish, chipboard lining and painted fibre board, in order to reveal the existing floorboards and within the void, installing mineral wool insulation and running through power and light cables. The existing areas of plasterboard on the ceilings were to be removed and new breathable insulated plasterboard (Aerogel) fitted in between the ceilings joists with a lime mix plaster skim coat.

4.2.3 Planning comments and feedback

The proposed replacement of existing areas of modern plasterboard on the ceilings with a layer breathable insulation, plasterboard and lime plaster skim is considered a suitably sensitive way of improving the thermal efficiency of the building whilst ensuring existing historic fabric remains in situ and unharmed. Given the low floor to ceiling height of these spaces and the fact that the proposals would not result in the loss of any fabric of significance, it is considered a justified alteration that would enable more liveable spaces suited to modern living standards whilst retaining historic fabric *in situ.*

The proposal to install the new areas of insulation and plasterboard in between the ceiling joists in the front first floor rooms would impact the original character of these spaces which would have historically featured horizontal ceilings below the ceiling joists.

The low level of less than substantial that would be caused by the first floor ceiling alterations are considered justified and outweighed by the public benefit of ensuring the continued use and maintenance of the building.

4.2.4 Outcome

Application approved subject to conditions, including the preservation of key historical features.

4.3 70 Banbury Road (planning reference: 10/01221/LBC)

4.3.1 Description of building

No. 70 Banbury Road is part of the Park Town development designed by Samuel Seckham and completed in 1853. The building has undergone alterations over the years. In the 1960s all floor layouts were remodelled and basement light wells extended to the rear and front of the building. In the 1980s further changes were made to the room layouts as part of a general refurbishment of the whole building. In 1999 more substantial alterations were made to the layout of the basement rooms including the formation of new bathroom and kitchen facilities. The building is owned by Corpus Christi and is currently used for student accommodation.

4.3.2 Key elements of application

The proposal is for improvement and upgrade works to increase the thermal efficiency of the building, including the renewal of roof finishes, the installation of thermal insulation, e re-rendering of the external walls with lime render, window repairs to reduce drafts and the installation of photo-voltaic solar panels to both the SW and NW corners of the building.

4.3.3 Planning comments and feedback:

The works will not require any structural alterations to the building but will improve the thermal efficiency of the building. The existing render is in a poor state of repair in places and water has been allowed to saturate the backing brickwork. The proposal is to remove the defective areas of render and place using a lime render decorated with a breathable Silicate Masonry Paint to match existing. This method of repair and redecoration will ensure that as much historic render is retained on site but any further damage to the building by water penetration is stopped.

Plans to overhaul and retain the existing windows will respect the special interest of the listed building. Works will entail piecing in place the rotten timberwork, replacing broken and missing parting and sash beads, weather stripping etc to allow the windows to fit the frames and reduce draughts.

The new solar panels will be concealed from view by the existing parapet wall and coping to the lead roof. It is also proposed to attach them to the building using clamps to avoid damage to the existing lead work.

4.3.4 Outcome

Application approved subject to conditions, including the preservation of key historical features.

Appendix 1: Suggested Checklist for Building Health and Energy Efficiency

The external fabric

Walls	• Note the position of any existing cracks, bulges or other such defects. Take photographs so you have a record to check for changes. • Take advice from a conservation specialist about whether repair or monitoring is required. Report significant changes in any cracks to your conservation specialist. • Take professional advice if there is evidence of 'spalling' of masonry or brickwork and make repairs using matching materials to the original as well as addressing the causes, where they can be identified. • Take professional advice if the mortar of masonry or brickwork appears defective and repair on a like for like basis if necessary. • Ensure the integrity of paint finishes is maintained by renewing external paintwork every few years. Be careful to use a paint that allows moisture to pass through. • Ensure that any paving or rendering does not breach any DPC or other waterproofing arrangements. • Consider removing ivy and other climbing plants if there is an indication they are causing damage.
Roof	• Replace slipped slates and tiles with matching materials if there is cracking, you may need to use a temporary repair until this is done. • Clear away snow from parapets and valley gutters in the winter. Consider fitting heating tapes with a frost thermostat in inaccessible gutters, hoppers and downpipes to prevent snowfall or ice causing blockages and floods. • Ensure electrical wiring in roof spaces is checked regularly by a qualified electrician. • Clear debris from roof valleys and parapet gutters at least twice a year and clear materials in roof spaces that will encourage insect infestation, fungi or restrict ventilation. • Does the roof insulation restrict ventilation? Clear a path to allow airflow using tiles or pipe to keep this open.
Windows	• Repaint windows every few years to protect the woodwork from moisture penetration.

The external fabric

	• Ensure windows open easily to encourage their use for ventilation. This might include lubricating window ironmongery, checking hinges and catches are in good condition and well fixed or overhauling sash-cords, weights and pulleys. • Clear dirt from condensation drainage channels. • Replace cracked or broken panes of glass and repair cracked, crumbling or 'gappy' putty. • Replace old brush seals where these have become deformed or otherwise ineffective. • Ensure windows are regularly cleaned to ensure efficiency for lighting.
Doors	• Lubricate door ironmongery and check they open easily to encourage their use in summer to ventilate the building. • Seal redundant key holes to prevent draughts. Ensure paint finishes are maintained by repainting every few years. • Check that gaps and minor openings such as letter boxes and brush or fin seals are maintained in order to reduce the occurrence of draughts.
Rainwater goods and drains	• Clear away leaves, silt and debris from gutters, hoppers, downpipes and gullies regularly (at least twice a year). • Check the mortar of ground gutters and repoint if necessary or replace any broken or frost damaged bricks.
Chimneys	• Have functioning chimneys swept once a year. • Use chimney dampers to reduce draughts where they exist – whilst maintaining some flow of air to ventilate rooms. • Use a removable chimney balloon if chimneys are causing a considerable draught.
Ventilation	• Clear away plant growth from around the building to allow air to circulate if there is evidence of areas of damp or condensation. • Remove ivy and other climbing plants blocking air bricks or ventilators. • Clean air bricks or ventilators and consider fitting fine mesh behind the ventilator to keep out rodents and insects.

The inside

Walls	• Identify and address the cause of any dampness indicated by patches of staining or peeling paint. • Check hidden voids regularly for evidence of pests to prevent infestations.
Floors and ceilings	• Note any staining on the underside of ceilings and inspect roof or under floors to find causes.
Windows	• Open the windows and doors on dry days during summer months to allow water vapour to escape. • Overhaul shutters to make use of them and upgrade curtains or blinds for improved thermal performance. Thick linings can also be used.
Doors between rooms	• Replace brush seals that have become worn or deformed to reduce draughts between rooms. • Ensure that door closers – such as spring closers on fire doors p work to reduce draughts.
Heating	• Commission an annual 'routine' check and service of your boiler. • Bleed radiators once a month. • Ensure your thermostat is operational and that timer settings are appropriate to your needs. • Consider installing thermostatic radiator valves – which work by sensing the air temperature in the room and adjusting the flow of hot water entering into the radiator when the desired temperature is reached.
Lighting	• Commission an electrical inspection by a qualified person at least once every five years. • Upgrade bulbs for energy saving ones.
Ventilation	• Clean fan vents of dust and cobwebs. Repair and replace with low carbon models if they have become inefficient.

Appendix 2: Resources & Further Reading

The following web based resources provide further information and detailed assistance regarding retrofitting, renewable energy technologies and energy efficiency in the context of the historic environment. Much of the content of this TAN has been derived from these and similar resources. It is not an exhaustive list but includes some of the most up to date and relevant guidance available.

Centre for Sustainable Energy

The Centre publishes a good range of information leaflets on various subjects including introductions to renewable technologies, energy saving tips and general advice to householders

Historic England

There are a range of publications with guidance and advice on sustainability, energy efficiency and renewable technologies with a specific focus on their impacts on historic buildings and heritage assets.

Sustainable Traditional Building Alliance (STBA): 'Planning responsible retrofit of traditional buildings'.

This is a comprehensive guide on retrofitting traditional buildings for energy efficiency purposes. A download is available from STBA and Historic England.

Institute of Historic Building Conservation (IHBC): 'A Stitch in Time'

Advice for building owners relating to repairs and maintenance of historic properties, including checklists and links to further resources. A download is available from IHBC and Historic England.

British Board of Agrément (BBA):

Construction Certification Body that offers approval, certification and expert test services to manufacturers of products and systems.

Archaeology Resources

Heritage Gateway

This webpage allows you to cross-search over 60 resources, offering local and national information relating to England's heritage.

Oxfordshire Heritage Search

The Heritage Search is a catalogue of Oxfordshire's cultural and heritage resources. Use it to find a wide range of materials relating to Oxfordshire's past.

Oxford Archaeological Plan

The city council has produced a series of documents aimed at improving access to information on Oxford's rich archaeological and built heritage.

Contacts

Heritage Organisations and Local Amenity Societies

Oxford Preservation Trust

10 Turn Again Ln, Oxford OX1 1QL

info@oxfordpreservation.org.uk

Oxford Civic Society

67 Cunliffe Close, Oxford, OX2 7BJ

info@oxcivicsoc.org.uk

Society for the Protection of Ancient Buildings (SPAB)

The SPAB, 37 Spital Square, London E1 6DY

Institute of Historic Building Conservation (IHBC)

Jubilee House, High Street, Tisbury, Wiltshire SP3 6HA

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Historic England (London & Southeast Office)

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For queries on the Local Plan and other aspects of planning policy please contact the **Planning Policy team** at planningpolicy@oxford.gov.uk

For advice on historic buildings, conservation areas and other heritage matters please contact the **Urban Design and Heritage Team** at heritage@oxford.gov.uk