

Energy Efficiency & Renewable Energy Guidance

For Listed Buildings and Undesignated Historic Buildings



ADOPTION DRAFT
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This guidance is intended to provide general advice to owners of historic buildings, developers, architects, surveyors and anyone proposing measures to improve energy efficiency or domestic scale renewable energy of designated and undesignated heritage assets.

For more information please contact the Historic Environment team at:
historic_environment@bathnes.gov.uk
This document can also be viewed on our website:
www.bathnes.gov.uk/greenbuild

Energy Efficiency & Renewable Energy Guidance:
For Listed Buildings and Undesignated Historic Buildings in Bath & North East Somerset can be made available in a range of languages, large print, Braille, on tape, electronic and accessible formats by contacting the Planning Department on:
Telephone: 01225 394041

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Listed Building Consent

Where this symbol appears, if your house is a listed building, you may require listed building consent for a retrofitting measure.

This document is an Annex to the **Sustainable Construction & Retrofitting Supplementary Planning Document**

Available online at
www.bathnes.gov.uk/greenbuild

if you would like more information on other planning and building regulation consents for retrofitting please refer to this document.

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1 Introduction

Climate change and the emerging energy deficit have necessitated a response and a focus on energy efficiency that is inevitably leading to changes to the historic environment. It is widely recognised and accepted that the historic environment should play its part in meeting these current and future challenges.

However, it is vital that changes are consistent with the aims of heritage protection and the statutory duty of care placed on the Local Planning Authority (LPA) by primary legislation and Government policy.

In accepting that some change will be necessary it is critical that this is carefully managed so that the historic environment and the heritage assets that it is made up of is sustained as cultural heritage for present and future generations. This is consistent with the key concept of guardianship.

The balancing of the varying and competing priorities and interests is a complex process and can be difficult to reconcile, but change is broadly acknowledged in principle by the legislation protecting the historic environment. National policy guidance has an emphasis on careful, sensitive informed management of change. The National Planning Policy Framework indicates that sustainable development should contribute to protecting and enhancing our historic environment. The LPA, therefore, aims to provide expert and specialist advice to enable this process of change in a sensitive, sustainable and informed way in order to achieve successful outcomes for the historic environment, heritage assets and the community.

Historic buildings are a finite resource and are inherently sustainable having been, in most cases, well-constructed from high quality, locally sourced materials by local craftsmen.

Their inherent embodied energy (the energy expended and encapsulated within the fabric of a building in its construction) means that their retention and care is both logical and consistent with modern concepts of sustainability and with the ambitions of reducing carbon emissions.

Historic buildings have served society and multiple generations often spanning many hundreds of years and with sensitive and careful management will continue to do so.

Legislative Framework: preservation, responsible retrofitting & detrimental impact

Designated heritage assets are protected by law under Planning (Listed Building & Conservation Areas) Act 1990 underpinned by Government policy: National Planning Policy Framework, Section 12: 'Conserving and enhancing the historic environment'. They are designated in recognition of their architectural or historic interest and the heritage and cultural significance and value that they possess.

The setting of heritage assets is an important material consideration when determining planning applications for development proposals which impact on their setting. Heritage assets are wide ranging and include designated and undesignated buildings, conservation areas, historic landscapes, parks and gardens and archaeological features and sites. Archaeological sites and features that have been designated as Scheduled Ancient Monuments are protected by law under the Ancient Monuments and Archaeological Areas Act 1979.

Central to primary legislation and Government policy is the emphasis on the presumption in favour of the preservation and enhancement of heritage assets and the avoidance of any detrimental and negative impact or harm that would be counter to these aims. Proposals that have a detrimental impact on the setting of heritage assets will not be viewed favourably by the LPA.

This guidance is informed and consistent with this and with conservation best practice and responsible retrofitting as advocated by English Heritage and the national amenity societies.

Consistent with Government policy relating to the historic environment this guidance recognises that because heritage assets can be both designated and undesignated an equally sensitive and thoughtful and sensitive approach to change should be employed to both. This is particularly the case in Bath & North East Somerset which has large numbers of designated and undesignated assets. Designated assets include the City of Bath World Heritage Site, as well as numerous Conservation Areas and Listed Buildings.

Architectural conservation rarely precludes change but rather should be seen as an essential mechanism for effective and appropriately managed change in a sensitive and informed way so as to avoid any detrimental impact or harm.

Bath & North East Somerset Council as Local Planning Authority and custodian plays a key role in this process. The issues of climate change and energy efficiency are likely to require varying levels of alteration and change to many heritage assets and the historic environment and the LPA provides support and specialist advice and promotes informed change and the responsible retrofitting of heritage assets.

Traditional buildings and their need to 'breathe'

It has been long recognised that traditionally constructed buildings utilising a solid wall construction (generally considered as buildings constructed before 1919) need to be able to 'breathe'.

The word 'breathe' in this sense means permeability and the ability of moisture to move freely, unhindered, throughout the width of the wall. This mechanism relies on moisture being able to evaporate into the external and internal atmospheres.

Internally moisture evaporates and enters the internal environment and relies on good ventilation to be evacuated into the external atmosphere. This process is critical for the health of the building and its occupants and relies on a number of factors in order to function properly including: permeable materials such as lime mortar, lime plaster, traditional permeable paint finishes and traditional, passive ventilation routes such as chimney flues and natural ventilation in doors and windows.

If non-permeable materials are used such as cementitious mortar, gypsum plaster, modern impermeable paint finishes and traditional ventilation routes are blocked this will result in high levels

of moisture and condensation to the detriment of the health of the building and its occupants. High levels of moisture trapped in masonry walls will lead to increased heat loss, discomfort for the occupants and may harm interior fixtures, fittings, finishes and structural timbers.

Whilst it is recognised that excessive drafts can cause discomfort for the occupants of a building it also needs to be recognised and understood that hermetically sealing a traditional building, in the manner of modern building construction, could cause significant problems for occupants and buildings alike. In proposing thermal upgrading measures an understanding of the needs of a traditionally constructed building need to be understood. For instance, care must be taken when improving thermal efficiency through draft proofing not to create a barrier to a sufficient level of ventilation.

The LPA advocates that owners of traditionally constructed buildings undertake an assessment of the needs of the building based on a thorough understanding of how it is constructed and how it is ventilated.

Renewable energy

Renewable energy creation technology, also known as micro generation, is now readily available for the domestic market and includes solar and photovoltaic panels and slates, wind and hydro turbines, ground and air source heat pumps and geothermal energy.

These can have varying impacts on the historic environment and the setting of heritage assets and their siting and implementation requires careful consideration. For example in the case of ground source heat pumps this can have a detrimental impact on archaeology and early contact with the LPA's archaeologist is strongly advised when considering installation. Geothermal energy may be problematic within the limits of Bath and the hot springs that are protected by the County of Avon Act 1982. Hydro turbines may offer an excellent opportunity and an example of a successful listed building application for the installation of a hydro turbine within a historic mill is provided in **section 5** of this guidance. It should be noted that planning permission will often be required for the installation of renewable energy systems, see the **Sustainable Construction and Retrofitting Supplementary Planning Document** for more information.

Aims and limitations of the guidance

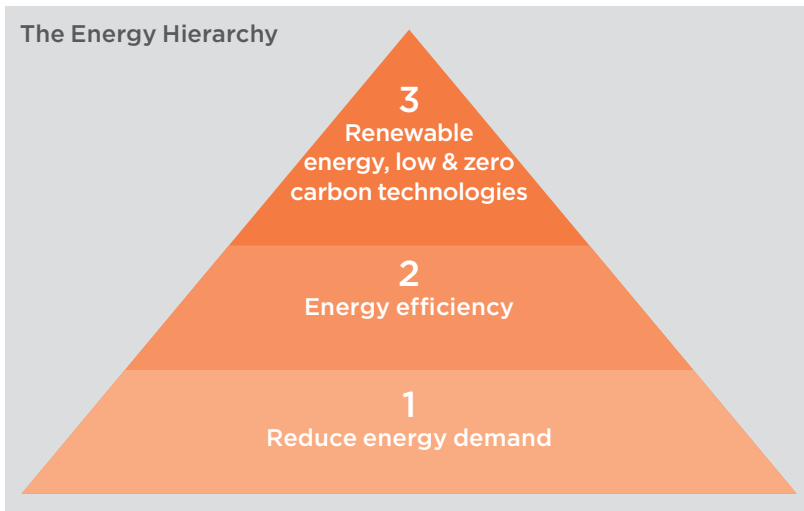
Whilst this guidance aims to provide advice and assistance regarding alterations to heritage assets it should not be regarded as providing a 'one-stop-shop' or 'one-size-fits-all' solution. Historic buildings are highly diverse in terms of type of construction, construction materials, plan form, degree of alteration over time and location and so what may be acceptable in one case may not be so in another.

It is recommended that specific and detailed guidance provided by English Heritage and other heritage organisations is also consulted (see section 6). The LPA can provide further assistance. The energy hierarchy and minimal intervention approach as advocated by English Heritage is advocated in this guidance. There will be an expectation that, in the first instance, low impact, low cost and simple thermal upgrading measures are considered before higher impact measures consistent with the energy hierarchy, which include occupant behaviour and sensible and responsible building maintenance.

2 The Energy Hierarchy

The National Planning Policy Framework emphasises that the different aspects of sustainable development should not be undertaken in isolation.

When considering energy efficiency proposals it is good practice to follow the energy hierarchy and address the least intrusive, low-impact measures first (e.g. loft insulation, draught proofing, energy efficient lighting, occupant behaviours).



Ranking improvement measures

As stated, the LPA supports this approach to sustainable retrofit. However, the ranking of different improvement measures in any retrofit project is dependent on its focus, and may differ between projects. Main focuses may include CO₂ savings, fuel bill savings, comfort, affordability or appearance.

Some measures may be ranked highly in one area but considerably lower in others, as illustrated in the following examples:

1. A biomass boiler would rank highly in terms of CO₂ savings, but lower in terms of affordability or fuel bill savings
2. Lined curtains may rank highly in terms of appearance, but much lower in terms of fuel bill or CO₂ savings

3. Photovoltaic panels could rank highly in terms of CO₂ savings and affordability, but lower in terms of appearance or comfort (as this is not an insulation measure)

4. Double glazing would rank highly in terms of comfort, but may rank lower in terms of affordability and appearance

In reality, for most householders their priorities will be a combination of the above factors (and others, such as householder disruption, for example). As such, it is not possible to list an absolute ranking system for different measures. Instead, the table on p17 lists all the measures contained in this section of the guidance and provides an indication of the impact in each of these key areas. This should allow prospective applicants to determine what is best for their own situation. The following should be noted, however:

a) The suggested impacts are broad indications only, and include many assumptions; individual properties and improvement specifications will vary considerably in terms of impact in the different areas

b) 'High' impact does not automatically mean 'good' (and vice versa) – a 'High' impact is good with respect to CO₂ savings, fuel bill savings and comfort is good, but a 'Low' impact is better with respect to cost and appearance

c) When considering more major improvements it is good practice to have addressed the easier, lower-impact measures in the first instance

MEASURE	IMPACT				
	CO ₂ savings	Fuel bill savings	Comfort	Cost	Appearance
Reinstate existing / missing shutters	●●	●●	●	●●	●
Draught proofing windows and doors	●	●	●	●●	●
Secondary glazing	●	●	●●	●●	●
Double glazing	●	●	●●	●●	●●
Draught proofing floors, skirting boards and ceilings	●	●	●●	●	●
Insulating timber floors	●	●	●●	●●	●
Insulating solid floors	●	●	●●	●●	●
Loft insulation	●●	●●	●	●●	●
Ventilation	●	●	●	●●	●●
External wall insulation	●	●	●	●	●
Internal wall insulation	●	●	●	●	●●
Boiler (and flue)	●●	●●	●●	●	●
Wood stove	●●	●	●	●●	●
Wood boiler	●	●	●●	●	●●
Air source heat pump	●●●● ¹	●●●● ¹	●●	●	●●
Ground source heat pump	●●●● ¹	●●●● ¹	●●	●	●
Photovoltaic panels	●	● ²	●	●●●● ²	●●
Solar water heating panels	●	●●	●	●	●●●● ³
Photovoltaic roof slates	●●	● ²	●	●●●● ²	●
Domestic-scale wind turbines	●●●● ⁴	●●●● ⁴	●	●●	●
Hydro power	●	●	●	●	●●●

- Low
- Moderate
- High

1 Dependent on fuel source: savings from displacing gas would be minimal to zero; savings from displacing more CO₂-intensive fuels (e.g. electricity, oil, LPG) would be considerably higher.

2 Actual fuel bill savings are likely to be Low-Moderate (depending on how PV is used), and capital costs are high, but income from the Feed-In Tariff means that the overall financial gains are High.

3 There are many different designs and styles, ranging from discreet recessed panels to more visible evacuate tube systems.

4 Domestic-scale wind turbines vary considerably in size and subsequent impact on CO₂ and fuel bills, from small building-mounted turbines (rarely recommended for significant impact) to relatively large (c.15m high) mast-mounted turbines. The larger the turbine the greater the impact (assuming appropriate siting).

3 Detailed Guidance on Retrofitting Measures

Listed Building Consent is required for alterations which affect the architectural or historic interest and character of a listed building. The following chapter sets out general guidelines.

Pre-application advice is advisable for most proposals prior to considering with any of the below alterations.

In the case where it is stated that a measure does **not** require Listed Building Consent or it is still likely to be of benefit to contact the LPA and seek advice.

Conservation best practice should always be followed when undertaking energy efficiency upgrading in listed buildings and it is essential that the relevant specialist guidance produced by English Heritage and other heritage organisations is consulted.

See **section 6** for more information.

Reinstate existing and missing shutters



Is listed building consent required?

- Listed Building Consent is **required** and replacements should be of the correct style, material and detailing to the originals
- Where shutters survive but have been painted, nailed or screwed shut, releasing them does **not require** Listed Building Consent

Guidance position

The LPA supports careful reinstatement of shutters where there is clear evidence of them having previously existed. Research shows that the use of shutters offers a significant improvement in thermal performance

Guidelines and factors that will be considered during the determination and assessment process

- Professional installation of replacement shutters is strongly advised

- Replacement shutters should be sympathetic to the design and materials of the window and replicate the original
- Releasing existing shutters may require the services of a suitably experienced and qualified professional depending on their condition and the ease of releasing them

Draught proofing windows and doors

Is listed building consent required?

- Listed Building Consent is **not normally required** for draught proofing windows or doors

Guidance position

The LPA supports careful draught proofing of windows and doors in listed buildings where there is not a detrimental impact

Guidelines and factors that will be considered during the determination and assessment process

- Unobtrusive products should always be used
- Loss of historic fabric should be avoided
- Professional installation will be needed for products such as rebated edge seals
- Care should be taken to ensure the strength of the frame is not compromised. This is particularly the case with slender late 18th century sash windows where the timber sections are often very narrow

Secondary glazing



Is listed building consent required?

Listed Building Consent is **normally required** for secondary glazing.

Guidance position

Where appropriate the Council supports, in principle, the use of sympathetic secondary glazing where it can be demonstrated that there is no detrimental impact on the special architectural or historic interest of the building.

Decisions will be made on a case-by-case basis. Where secondary glazing is regarded as acceptable it is likely that simple units that can be easily removed from a minimal sub frame during the warmer months will be most appropriate.

Guidelines and factors that will be considered during the determination and assessment process

- The design and detailing of windows can be a significant component of a building's architectural interest and character

- Ensure that the proposed secondary glazing will not compromise the use of existing shutters
- Ensure that the design is as discreet as possible and has minimum visual impact on the existing window, including careful alignment of any glazing bars and use of slim frames of appropriate colour
- Ensure that any distinctive architectural detailing is not obscured by the frame of the secondary glazing
- Minimise the impact of permanent fixings required to secure the new frame
- Consider fitting secondary glazing within a removable frame (many systems allow this)
- Where a property is part of or similar to surrounding properties (e.g. terraced houses), use of discreet, complementary systems is particularly important to minimise the visual impact and to retain the sense of unity that is likely to exist

Double glazing: replacement windows



Is listed building consent required?

Listed Building Consent is **required** for installation of new double-glazed windows.

Guidance position

The LPA supports careful replacement of windows with timber-framed slim-profile double-glazed units where there is no detrimental impact on the special architectural or historic interest of the building, and under the following conditions:

- the existing windows are agreed as being modern or of no historic significance or heritage value
- the existing windows are original or historic, but are beyond feasible repair
- replacement would enhance the special architectural or historic interest of the building - for example where existing windows are inappropriate modern replacements and new windows are correctly and authentically detailed and constructed resulting in a significant conservation gain

Guidelines and factors that will be considered during the determination and assessment process

- The design and detailing of windows is often a significant component of a building's overall appearance and character
- The section of the glazed units should be no greater than 12mm (two layers of glass + cavity)
- The thickness and profile of timber glazing bars should be exact replicas of the original glazing bars
- The colour of any spacer (the perimeter strip between the two panes of glass) should match the colour of the painted timber
- At no time will applied (i.e. false) glazing bars or applied lead comes be considered appropriate
- PVCu is not regarded as an appropriate material
- Where a property is part of or similar to surrounding properties (e.g. terraced houses), use of discreet, complementary systems is particularly important to minimise the visual impact and to retain the sense of unity that is likely to exist particularly within a terrace

- The replacement of a window which is part of a unified façade consisting of original windows with a double glazed unit is unlikely to protect or enhance the character of the property
- If the windows can be repaired they should be retained however the installation of double glazing within an historic window is unlikely to be appropriate or feasible. If there is surviving historic glass of significance and this should also be retained and preserved. Historic glass is particularly rare within the Bath World Heritage Site due to the impact of the Baedeker air raids of 1942

3 Detailed Guidance on Retrofitting Measures

Draught proofing floors, skirting boards, ceilings and flues

Is listed building consent required?

Listed Building Consent is **not normally required**, unless the appearance of the room would be significantly affected

Guidance position

The LPA supports careful draught proofing of floors, skirting boards and ceilings where there is no detrimental impact on the special architectural or historic interest of the building or historic fabric

Guidelines and factors that will be considered during the determination and assessment process

- Any mastic-type draught proofing should be as discreet as possible in colour (i.e. clear, or matching the surrounding colour as closely as possible)
- Care should be taken if temporary removal of skirting boards is required

- Sealing the gaps between floorboards, traditionally referred to as caulking, is the most likely of these measures to affect appearance, and can make them harder to lift in the future. If you are planning any associated works that may require lifting of floorboards these should be done before sealing these gaps. Proprietary flexible caulking strip is an inexpensive and simple measure for draught proofing the gaps between timber floor boards. It should be noted that comprehensive eradication of natural ventilation beneath timber floors can lead to damp and decay.

- Temporarily sealing of unused flues is also a simple process that does not require consent – chimney balloons are simple to fit and are removable. Typically they also permit some air flow through being ill-fitting, which is important for ventilation and helps prevent an adverse increase in moisture levels. The total and comprehensive sealing of flues is not recommended

Insulating below suspended timber floors

Is listed building consent required?

Listed Building Consent is **not normally required**, unless original building elements (e.g. floorboards, skirting boards, door architraves) would require temporary removal.

Guidance position

The LPA supports careful installation of quilt or rigid board insulation below suspended timber ground floors where there is no detrimental impact on the special architectural or historic interest of the building. (This is more likely where installation from above is required.)

Guidelines and factors that will be considered during the determination and assessment process

- Insulating suspended timber floors from below is usually preferable except where there is a historically significant surface to a ceiling below. Installation from above should only be considered where it is not possible to insulate from below (i.e. no access)

- If installation from above is required, great care should be taken to avoid damaging historic building elements (e.g. floorboards, skirting boards, door architraves) – this should usually be possible, and the work should be carried out by a suitably experienced professional

- Quilt or rigid board insulation is preferable – sprayed foams will not usually be acceptable as they are not easily reversible should future repairs be required

- Breathable materials should be used to maintain the passage of air and moisture

- If lifting floorboards reveals ‘deafening’ material this should be left in place, as it can be an efficient fire retardant. However, it may reduce the space available for insulation, requiring thinner insulation board

Insulating solid floors



Is listed building consent required?

Listed Building Consent **is required** for insulation of solid floors.

Guidance position

The LPA supports careful insulation of solid ground floors where there is no detrimental impact on the architectural or historic interest of the building, including any archaeological features.

Guidelines and factors that will be considered during the determination and assessment process

- Where there are significant, undisturbed, historic floor surfaces the character and interest could be harmed from being lifted and therefore installing insulation is unlikely to be acceptable. However where there this is not the case (such as where there is a poor quality modern, replacement surface material or there is convincing evidence that a historic floor has been previously lifted and re-laid) the installation of under floor heating may be possible. In which case limecrete should be used which can be used in conjunction with insulation and under floor heating systems whilst allowing the transfer of moisture
- Breathable materials should be used to maintain the passage of moisture and air

- Work should be undertaken by a suitably experienced and qualified professional

Loft & roof insulation

Is listed building consent required?

- Listed Building Consent is **not normally required** for insulation of pitched roof spaces at floor level, as long as the insulation is not adhesive, avoids disturbance to historic fabric, and is easily reversible.

- Listed Building Consent is **not normally required** for insulation of pitched roof spaces below the roof, as long as the insulation is not adhesive, avoids disturbance or harm to historic fabric and roof profiles, does not cover significant detailing and is easily reversible

- Listed Building Consent **not normally required** for installation of pitched roof ventilation and should be discreet



- Listed Building Consent **is required** for insulation of flat roofs

Guidance position

The LPA supports careful insulation of loft and roof spaces where there is no detrimental impact on the architecture or historic interest of the building and advocates the use of permeable and sustainable traditional materials

Guidelines and factors that will be considered during the determination and assessment process

- Insulation of pitched roof spaces at floor level is always preferable; other options should only be considered where this is not practical or possible (e.g. if the roof space is floored and forms part of the living space)

- Ventilation in the roof space must be maintained. This may require the addition of roof vents – in such cases discreet conservation-grade roof vents should be selected (i.e. eaves vents or tile vents)

- Quilt or rigid board insulation is preferable – sprayed foams will not usually be acceptable as they are not easily reversible should future repairs be required and are not permeable

- Below-roof insulation (pitched or flat roofs) can require temporary removal of surfaces – care should always be taken, and some insulation methods require less removal of fabric than others so research is required into the different options

- Care needs to be taken to preserve in situ historically significant internal surfaces such as plastered or decorated ceilings and skillings

- Roofs can be the least altered areas of historic buildings and care should be taken to maintain historic roof profiles, verge details, plaster surfaces and any other significant features or detailing

- Use of permeable materials, particularly sustainable natural materials such as sheep’s wool and wood fibre insulation, is encouraged to minimise the risk of condensation. There are many suppliers in the UK – the Local Planning Authority can provide further advice regarding this

- Insulating flat roofs is complex and can require partial rebuilding of the roof – as such this should always be carried out by a suitably experienced and qualified professional

- Changes to rooflines should be avoided where possible

3 Detailed Guidance on Retrofitting Measures

Mechanical Ventilation



Is listed building consent required?

Listed Building Consent **is required** to install and for an extractor fan or heat-recovery ventilation system

Guidance position

The LPA supports the installation of discreet ventilation outlets where they are deemed necessary and there is no detrimental impact on the architectural or historic interest of the building. The principal elevation should be avoided and a discreet location should be considered. Decisions will be made on a case-by-case basis

Guidelines and factors that will be considered during the determination and assessment process

Excessive moisture levels can lead to condensation and mould and bacterial growth, which can be harmful to historic building fabric and human health. Whilst traditional ventilation sources such as chimney stacks remain the best solution for traditionally constructed historic buildings, in some cases mechanical

ventilation may be required to augment this

- Principal elevations should be avoided. Where it can be successfully justified that there is no alternative, discreet outlet styles and colours will be of paramount importance, and decisions will be made on a case-by-case basis

- Specify an outlet of a discreet style and colour that matches the surrounding wall colour as closely as possible
- If possible, offer to remove redundant services from the wall where they are no longer required as a conservation gain
- Where practical, consider locating the exhaust through a vertical flue in a roof that cannot be seen

- Where a property is part of a unified terrace or similar to surrounding properties, use of discreet, complementary systems is particularly important to minimise the visual impact

Solid wall insulation: external



Is listed building consent required?

Listed Building Consent **is required** for external wall insulation.

Guidance position

The LPA supports external wall insulation, where appropriate and where it can be successfully demonstrated it would not cause physical or visual harm to the building.

In Bath the typical building construction is limestone ashlar to front, principal elevations and rubble limestone to side and rear elevations which would often have been finished in a lime wash or, more typically, a lime render. Therefore external wall insulation may be possible to side and rear elevations and finished with a lime render.

Local vernacular buildings are often entirely constructed from rubble stone and there may be opportunities for the use of external insulation on all elevations and finished with a lime render. A critical consideration is moisture permeability and the external

wall insulation would need to be a permeable material and thus allowing the transfer of moisture throughout the wall.

It is common for metal fixings and timbers to be found within masonry walls and trapped moisture can lead to decay and structural failure.

Assessment of such measures will be on a case-by-case basis and it will need to be successfully demonstrated that there will be no detrimental impact on the architectural or historic interest of the building. Decisions will be made on a case-by-case basis

Guidelines and factors that will be considered during the determination and assessment process

External wall insulation is a more thorough method of insulating walls than internal wall insulation and carries fewer technical risks. For many rendered buildings it will be a better solution than internal wall insulation.

- Use a finish which is appropriate for traditional building construction and sympathetic to the architectural context
- Vapour permeable insulation materials should always be used to allow moisture transfer through the walls

- A lime-based insulating render is likely to be the most acceptable insulation type for traditional buildings

- Cement-based insulating products are not suitable for use on traditional buildings

- Where painting is proposed, permeable paints should be used (e.g. limewash or mineral paint) to retain the permeability of the insulating material and to achieve an appropriate finish and presentation of the building

- Great care is necessary to ensure that detailing at roof eaves, and window and door reveals does not adversely affect the building's appearance or ability to shed rainwater

- If there is any evidence of damp within the walls, this must be resolved before applying insulation. If this is not resolved moisture may become trapped within the walls and cause structural damage, and the thermal performance of the insulation could be compromised. Any existing cement mortar should be removed and replaced with a suitable lime mortar
- Work must be undertaken by a suitably experienced and qualified professional

Solid wall insulation: internal



Is listed building consent required?

Listed Building Consent **is required** for internal wall insulation.

Guidance position

The LPA supports, where appropriate, careful installation of internal wall insulation where there is no detrimental impact on the architectural or historic interest of the building, including harm to significant architectural features such as window and door reveals, skirting, architraves, dado rails, cornicing and built-in furniture or extensive loss of historic fabric such as removal of lath and plaster linings or panelling.

It is common for metal fixings and timbers to be found within masonry walls and trapped moisture can lead to decay and structural failure.

Furthermore it would have to be successfully demonstrated that the wall insulation would not increase the risk of interstitial condensation, and allows the transfer of moisture. Decisions will be made on a case-by-case basis

Guidelines and factors that will be considered during the determination and assessment process

In many listed buildings and other historic buildings there is unlikely to be many opportunities for the installation of internal wall insulation and an alternative may be the use of an insulating lime plaster. However the following should be considered:

- Permeable insulation materials should always be used to allow moisture transfer through the walls. Features such as cornicing must be preserved – this may require the use of specialist insulation materials (e.g. slim-profile insulation, or blown beads behind lath and plaster) that avoid obscuring the cornicing. If the original wall lining is not present, the wall lining (e.g. plasterboard) may sometimes be removed and replaced with insulated plasterboard, natural wood fibre board or similar

- A low-impact approach and discreet materials should always be considered in relation to the way they are installed or the depth of the insulating material

- Installation should be thorough (i.e. not leave gaps) to avoid cold bridging as far as possible. Common areas where gaps are left include those behind kitchen or bathroom units

- Internal wall insulation is complex and requires careful design to be effective and to minimise technical risks. In most cases it will be necessary to obtain the advice of a suitably qualified architectural professional. If there is any evidence of damp within the walls, this must be resolved before applying insulation. If this is not resolved moisture may become trapped within the walls and cause physical harm and the thermal performance of the insulation could be compromised

- Permanent removal of historic architectural features such as skirting boards and architraves and other features is not regarded as acceptable however temporary removal may be required in some cases and care should be taken when removing and re-fitting them to avoid unacceptable harm. A suitably experienced and qualified professional should be used

Combination boilers and external wall mounted flues



Is listed building consent required?

Listed Building Consent **is required** for any boiler installation where an alternative location and an external flue is required or where alterations are required for associated plumbing

Guidance position

The LPA supports the installation of efficient combination boilers and the discreet location of new boiler flues where there is no detrimental impact on the architectural or historic interest of the building. Principal and visible elevations should be avoided and appropriately discreet locations should be identified and utilised. Decisions will be made on a case-by-case basis

Guidelines and factors that will be considered during the determination and assessment process

- Principal elevations should be avoided. Discreet and appropriate outlet styles, dimensions and colours will be

of paramount importance. Specify an outlet of a discreet style, size and colour that match the surrounding wall as closely as possible to minimise its impact. Decisions will be made on a case-by-case basis

- Where practical, consider putting the exhaust through a vertical flue in a roof that cannot be seen

- Plumbing routes should avoid notching floor joists and should be installed parallel to them to avoid harm to historic fabric and possible structural problems

- If possible, remove redundant services from the wall where they are no longer required

- Care should be taken when planning new pipe runs to avoid damaging historic surfaces and decorations (e.g. when lifting and re-laying floorboards). The work should be undertaken by a suitably experienced and qualified professional

- Flues will need to be appropriately located to ensure compliance with the Building Regulations

3 Detailed Guidance on Retrofitting Measures

Wood burning stoves and boilers

Is listed building consent required?

Listed Building Consent is **not normally required** for a wood burning stove, unless:

- installation requires removal of significant historic chimney pieces, hob grates and other associated historic ironmongery, hearths or any other associated historic architectural feature
- a new flue would be visible externally.

Listed Building Consent is required for a wood boiler where a new outbuilding would be attached to the listed building. Depending on the size of the new building if it is not attached to the listed building it may require planning permission

Guidance position

The LPA supports the installation of wood burning stoves where there is no detrimental impact on the architectural or historic interest of the building and where existing flues can be reused and does not cause harm to significant historic architectural features

The LPA supports the installation of wood boilers where there is no detrimental impact on the architectural or historic interest of the building and any required new outbuildings and flues are well designed, sensitively located and preserve the setting of the protected building

Guidelines and factors that will be considered during the determination and assessment process

- Care must be taken to address any fire risk where wood burning stoves are introduced in combination with the installation of flue liners
- Existing fireplaces can be appropriate for the installation of wood burning stoves, however if the room is of high status and formal with associated architectural detailing such as an ornate chimney piece the installation of a wood burning stove may not be appropriate. This may be particularly relevant in the case of classical buildings
- Where a flue would be visible externally (for a stove or boiler) these should be discreetly located
- Where a new outbuilding is required care should be taken regarding location and design

Air source heat pump



Is listed building consent required?

Listed Building Consent **is required** for an air source heat pump

Guidance position

The LPA supports the installation of air source heat pumps where there is no detrimental impact on the architectural or historic interest of the building and they can be discreetly located

Guidelines and factors that will be considered during the determination and assessment process

- Air source heat pumps are most effective in modern buildings that have been constructed to achieve a high level of air tightness. Traditionally constructed buildings require some level of natural, passive ventilation and therefore the level of airtightness required for air source heat pumps to operate efficiently is unlikely to be achievable

- Heat pumps are generally not recommended to replace gas boilers, as running costs and CO₂ emissions are similar – they are therefore best used in off-gas areas
- Care should be taken to locate the external unit of an air source heat pump in a discreet location away from the principal elevation – this could include behind greenery or fencing, or even within a loft space if the model is deemed suitable
- Older properties often contain microbore pipework, which may need to be replaced as it is not usually compatible with a heat pump. Care should be taken when planning pipe runs to avoid damaging historic interiors
- When used for space heating, heat pumps work most efficiently with under-floor heating. This is unlikely to be appropriate where there are significant, undisturbed, historic floor surfaces which could be harmed from being lifted. However where there is not the case such as where there is a poor quality modern, replacement flooring material or there is convincing evidence that a historic floor has been previously lifted and re-laid the installation of under floor heating may be possible. In which case it is highly recommended that limecrete is used which can be used in conjunction with insulation and under floor heating systems whilst allowing the transfer of moisture
- If under-floor heating is not possible, radiators may be considered. In some cases historic radiators may survive and are likely to be considered as significant elements of the interior and therefore their retention is important. Where this is not the case new radiators should be of a discreet design sensitively located

Ground source heat pump



Is listed building consent required?

Listed Building Consent **is required** for a ground source heat pump, where it involves alterations to the listed building

Guidance position

The LPA supports the installation of ground source heat pumps where there is no detrimental impact on the architectural or historic interest of the building and any below ground archaeology

Guidelines and factors that will be considered during the determination and assessment process

- Heat pumps are generally not recommended to replace gas boilers, as running costs and CO₂ emissions are similar – they are therefore best used in off-gas areas

- In Bath there is a significant concentration of known and potential archaeology which would be adversely affected by the required ground works and disturbance – prior to works commencing an archaeological assessment should be undertaken by a suitably qualified and experienced professional
- Any proposed boreholes need to have regard to the **County of Avon Act (1982)** which protects the source of the Bath hot springs (please contact the Council for more detailed information and advice)
- Care should be taken when drilling boreholes adjacent to any particularly fragile structure, to avoid damage from vibrations
- Older properties often contain microbore pipework, which may need to be replaced as it is not usually compatible with a heat pump. Care should be taken when planning pipe runs to avoid damaging historic interiors

- When used for space heating, heat pumps work most efficiently with under-floor heating. This is unlikely to be appropriate where there are significant, undisturbed, historic floor surfaces which could be harmed from being lifted. However where there is not the case such as where there is a poor quality modern, replacement flooring material or there is convincing evidence that a historic floor has been previously lifted and re-laid the installation of under floor heating may be possible. In which case it is highly recommended that limecrete is used which can be used in conjunction with insulation and under floor heating systems whilst allowing the transfer of moisture

Solar panels including photovoltaic (PV) and solar water heating panels



Is listed building consent required?

Listed Building Consent **is required** for solar panels on listed buildings and any curtilage listed buildings. Planning permission is also required if located within the curtilage of the listed building

Guidance position

The LPA supports the installation of roof- and ground-mounted solar panels where there is no detrimental impact on the architectural or historic interest of the building and they are discreetly located

Guidelines and factors that will be considered during the determination and assessment process

- Panels should be located as discreetly as possible, avoiding principal roof elevations unless they are not visible. 'M' style roofs, common in Bath, offer a 'hidden' roof valley that can be exploited, as can other hidden roof areas including outbuildings. If the roofs are not suitable, ground-mounted or

outbuilding mounted panels may be considered where they can be discreetly located without detriment to the setting of the listed building and other heritage assets.

It is more desirable to locate panels off the building where space permits within the grounds of the building. This is more likely to be possible within rural areas.

Consideration should also be given to the surrounding topography of a settlement or building which may afford a highly visible roofscape. This is particularly the case in Bath where the roofscape and views over the city are regarded as significant.

A comprehensive assessment should be carried out to establish the impact on significant views and the impact on the setting of heritage assets

- Consideration should be given to the additional weight of solar panels and an assessment of the roof structure should be undertaken by a structural engineer to ensure that damage does not occur as a result of the installation of the panels
- When selecting panels, care should be taken to select discreet styles that will have a low impact

3 Detailed Guidance on Retrofitting Measures

- If considering recessed panels, consideration should be given to the loss of historic fabric where the roofing material is historic and significant. These may be stored and replaced when the panels have reached the end of their useful life
- Evacuated tube solar thermal systems are considerably more visible than flat-plate panels. However, they require less space which can be an advantage, and can be well suited to flat roofs as they can often be laid flat (and therefore be less visible) without compromising their performance
- Fixings should cause no damage to significant historic fabric and the installation should be reversible without significant impact on historic fabric
- Cabling, pipework, fuse boxes or other related equipment should be accommodated without loss of, or damage to, significant historic fabric – in the case of PV, the electrical equipment may be mounted on a single wooden board secured to the wall to minimise the number of fixings required
- Where a flat roof has a lead covering, a specialist lead contractor should be consulted

- to ensure that pipework or cabling installation does not damage the roof
- Thatched roofs are not suitable for solar panels
 - Ensure there is a supply of replacement matching stone/handmade tiles before the work proceeds, in case of damage during installation
 - Many older buildings have high chimneys, which can cast shade on a high proportion of the roof area over the course of a day. Panels should be located appropriately to avoid compromising their performance

Solar PV roof slates



Is listed building consent required?

Listed Building Consent **is required** for PV roof slates on listed buildings and any buildings within their curtilage

Guidance position

The LPA supports the installation of solar PV slates where there is no detrimental impact to the architectural or historic interest of the building or the setting of heritage assets, they are discreetly located and where the installation does not involve the loss of significant historic fabric

Guidelines and factors that will be considered during the determination and assessment process

The same principles as above apply for PV tiles, however there are also some additional considerations, as follows:

- Solar tiles should be of a similar colour and appearance to the original tiles

- PV tiles have a different appearance to panels, and their visual impact can depend on how much of the roof is covered – 100% coverage is likely to have a detrimental impact and therefore unlikely to be acceptable in most cases
- The type of PV tile also affects its appearance. Some PV tiles mimic traditional roof slates and have been successfully used on listed buildings, although their performance should also be a consideration
- PV tiles are often more likely to be acceptable on more modern listed buildings and where the roof is not highly visible from any vantage point
- In most cases discreet location will be a determining factor for successful installation for instance behind parapets and within other hidden areas of a roof

Domestic-scale wind turbines



Is listed building consent required?

Listed Building Consent **is required** for building-mounted turbines

Listed Building Consent is **not required** for free-standing mast-mounted wind turbines (Planning Permission will however be required)

Guidance position

The LPA supports the installation of mast-mounted wind turbines within the curtilage of listed buildings where there is no significant impact on the architectural or special interest of the building, on any underground archaeology or on the setting of the building and any other heritage assets

Building-mounted wind turbines will not normally be acceptable on listed buildings

Guidelines and factors that will be considered during the determination and assessment process

- Building-mounted turbines are unlikely to be suitable on listed buildings
- Due to their significant visual impact, proposals for wind turbines in historic settings and landscapes will require significant justification, assessment on the impact of the setting of heritage assets and evidence of their likely effectiveness (e.g. turbine specifications, site assessment and wind speed monitoring) in order to demonstrate the benefit they would have
- It is recognised that appropriate location of wind turbines is critical to their performance. Within this requirement, turbines should be located as discreetly as possible to avoid harm to the setting of heritage assets
- The installation must be easily reversible, without significant long term impact
- Cabling, pipe-work, fuse boxes or other related equipment should be accommodated without loss of, or damage to, significant historic fabric
- In Bath there is a significant concentration of known and potential archaeology where ground disturbance could be harmful – turbine mast foundations should not disturb archaeological features, and applications should demonstrate that this has been considered and thoroughly assessed by a suitably experienced and qualified professional
- An appropriate condition will be imposed requiring removal of the equipment and installation, including cabling and any foundations once the turbine is no longer operational

Hydro turbines



Is listed building consent required?

Listed Building Consent **is required** for installation of hydro turbines where it involves alteration to the listed building. (Planning Permission and other consents are likely to be required for hydro turbines)

Guidance position

The LPA supports the installation of hydro turbines within listed buildings where there is no detrimental impact on the architectural or special interest of the building, on archaeological features or on the setting of the building and adjacent heritage assets

Guidelines and factors that will be considered during the determination and assessment process

- There may be cases where the reuse of a former water mill would result in an improvement and enhancement of the building or buildings. For instance where there is surviving but redundant mill machinery and associated buildings which required to be restored to facilitate the installation of a hydro turbine
- Turbines and any new outbuildings required should be appropriately located and should not have a detrimental impact on the building
- The visual style of the turbine should be appropriate for the historic and traditional context of the building
- Penstocks should be buried where possible to minimise visual impact
- In Bath there is a significant concentration of known and potential archaeology where ground disturbance could be harmful – any ground works should not disturb archaeological features, and applications should demonstrate that this has been considered and thoroughly assessed by a suitably experienced and qualified professional
- For proposals relating to historic water mills, opportunities should be taken to restore the building or buildings and reveal or reinstate features of significance in conjunction with installation of the hydro turbine

4 What makes a good Listed Building Consent Application? Hints and Tips

General guidance on listed buildings and Consent applications is available on our website, as follows:

- Listed Building Consent - Application Form
- Listed Building Consent - Checklist
- Listed Building Consent - Guidance Note
- Listed Building Consent - FAQs

As well as reading this guidance it is important to engage with the Historic Environment Team at an early stage, to establish whether or not the LPA can support the proposals and if so the most appropriate approach to take.

This will usually require engagement with the formal pre-application process for which there is a charge, however its benefits cannot be overstated and can, if in principle support can be provided, lead to a successful scheme and outcome.

When applying for Listed Building Consent for energy efficiency or renewable energy measures, there are a number of particular considerations. These predominantly relate to the level of impact, if any, on the architectural and historic interest of the protected building.

Designation is a formal and legal acknowledgement of a building's architectural and historic interest and national significance and importance. However, some change is inevitable, and the LPA will work with listed building owners to manage this change and identify ways to meet the needs of occupants wherever possible although the level of change is likely to differ significantly from one building to another and each building will be assessed on a case-by-case basis and each building on its own merits.

Whilst anyone can apply for listed building consent in reality it requires specialist skills, knowledge and experience and therefore listed building owners are strongly advised to instruct a conservation specialist architectural professional to assist them (i.e. a surveyor, architect or architectural technician). The LPA has a limited list of conservation specialists and this can be provided if required (contact a member of the Historic Environment Team for more information).

The increasing focus on energy efficiency and renewable energy in recent years has led to a huge increase in the number of applications for improvement measures in listed buildings. This brings complexities as well as benefits, and it is important that applications are as clear as possible. When submitting your application, there are a number of things that need to be considered.

1. Research

For many energy efficient measures, there can be a bewildering array of choices available. Spend time early on researching all the options available to you, and make sure the application reflects this and shows exactly why you have selected the system in question.

You should make it as easy as possible for the LPA to assess your application. Doing your research also extends to choosing the right person or organisation to give you the professional support you will need, e.g. architects, surveyors or contractors – make sure you use someone who really understands both the energy and conservation aspects of your application but most importantly they understand and are experienced in architectural conservation. It is important to be aware and have knowledge of the relevant specialist guidance, much of which has been produced by English Heritage and is available on the internet (see section 6 of this document).

2. Detail

Provide as much detail as possible about the particular technology you want to install.

The type of draught proofing, double glazing or solar panel will determine its impact on the building – again, demonstrate that you have done your research and selected the system most sensitive and sympathetic for the building and, if relevant, for the setting of the conservation area and, in the case of Bath, the World Heritage Site.

Remember that for many improvement measures there are solutions available that are both effective and discreet, although some may require additional scoping works (e.g. a structural survey of a roof where solar panels are proposed to take account of the additional weight).

Specifications, drawings and photographs are all helpful to the LPA, and photo-montages showing the likely appearance post-installations are also useful. If in doubt, provide more rather than less detail in the application.

3. A practical approach

The communication of a practical, common-sense and sensitive approach will be expected. Showing that you have considered or adopted passive and low impact measures is important and consistent with the hierarchical approach. For example, proposing a heat pump, external and internal insulation in the first instance, having not considered and implemented simple draft exclusion or replacing a gas central heating boiler with an efficient modern combination boiler would not be in line with energy hierarchy unless there were other factors in terms of impact on historic fabric you are considering.

4. Location

For more visual measures (solar panels, air source heat pumps, boiler flues, external wall insulation etc, demonstrate that you have thought about their impact on the building's and, where relevant, the conservation area's appearance and setting and what considerations have been taken to minimise the impact. Be sure to locate them in a discreet position. The 'Guidance on measures for listed buildings' section of this document provides numerous examples of this.

5. Loss of historic fabric

Loss of significant historic building fabric is seldom regarded as acceptable and is inconsistent with the aims of heritage protection as enshrined in the primary legislation, national policy and guidance relating to the historic environment. However there may be some circumstances where the temporary removal of historic fabric may be regarded as justifiable. The Historic Environment Team should be consulted in order to provide advice and clarification.

6. Precedence

Precedence is not a determining factor in assessing changes to listed buildings – i.e. a measure approved on one building may not be deemed appropriate for another. Each application is assessed on its own merits, and this can mean that seemingly similar proposals for similar buildings do not always receive the same outcomes. However, it can be helpful to show the LPA some examples of what you are proposing to help illustrate your application where this has been successfully applied on other buildings.

7. Appropriateness

For higher-impact measures in particular it is important to explain and justify clearly why you feel they are needed for your property. Remember, while you may have a focus on saving energy, reducing your carbon footprint and CO₂ emissions or making your house warmer, the LPA will assess the application based on its physical and visual impact on the architectural and historic interest of the listed building and on the setting of the conservation area and other heritage assets where this is relevant.

Therefore it will be expected that stronger justification will be required in the case of higher-impact measures: the greater the impact, the greater the justification that will be required. It will also be expected that relevant guidance has been consulted and that the proposals are consistent with the approach advocated by the guidance and with conservation best practice.

Some example applications and cases are provided in **section 5, Case Studies**, of this document.

Furthermore there is public access to all of the applications received by the LPA and decisions can be scrutinised which may of some assistance when considering proposals.

5 Local Case Studies

The following case studies provide examples of detailed applications for Listed Building Consent, demonstrating good practice both in the level of detail provided and in the initial consideration of measures. You will see that not all of the proposed measures were well received; however these also provide useful case studies for potential applicants. Please note that all planning and listed building applications are available for public viewing **online**.



A) New slim-profile double-glazed windows in Grade I listed building (St John's Hospital, Bath City Centre; view application)

Key elements of this application:

An appropriate intervention

– The original windows were no longer in place, and the current windows did not match the originals – so this represented a good opportunity to bring back the original window designs while upgrading the thermal performance to modern standards which is particularly important given this building's function. Double glazing was demonstrated to be preferable to secondary glazing and blinds/curtains in this instance, due to the importance of daytime thermal comfort and ease of use for occupants

Drawings – Detailed, professional scale drawings showing current and proposed building details. These are available online

Supporting materials – Detailed, clearly laid out and explained, demonstrating a thorough knowledge and relevant research. The covering letter and Design Statement show an understanding of both key aspects of the application, a) built heritage (of the building and its setting) and b) energy conservation. Referencing to previous installations and research are clear and thorough.

Additional detailed written response to English Heritage advice

LPA feedback – Noted that the building was very prominent both in style and location, and that there may be some visual impact from replacing single glazing with double glazing; but also that other energy efficiency measures had already been carried out; that the current windows were not original and that the new windows would help bring back original window designs

Other feedback – External feedback was mixed. Bath Preservation Trust noted that a whole-building approach was less intrusive than a partial approach, and that *'public benefits of mitigating climate change outweigh concerns about visual appearance of the glass'*. Bath Heritage Watchdog objected to the proposal, however, feeling that *'single glazing forms part of the interest of a listed building and should be retained to preserve the integrity of the building'*

Outcome – Approved



B) New slim-profile double-glazed units in Grade II listed building (Tunley Farmhouse, Tunley Hill, Camerton; view application)

Key elements of this application:

An appropriate intervention

– The existing windows were not original, were in a poor state of repair and needed replacing; the proposed new windows matched the design of the originals. The proposed works would also go some way to remedying a lack of planning enforcement on adjacent properties that had adversely affected the property in question. However, it should be noted that the original proposal for double glazing of standard (20mm) cavity width was re-negotiated to slim-profile double glazing, which lengthened the timescale for granting consent to seven months

Drawings – Detailed drawings showing current and proposed building details

Supporting materials – Clear, simple explanations of why the proposed works are needed

LPA feedback – The LPA felt that the original proposal for 20mm cavity double glazing would have been harmful to the property's character and appearance, and re-negotiated to slim-profile double glazing

Other feedback – The local parish council supported the application, highlighting the lack of planning enforcement in neighbouring properties

Outcome – Approved but with a change from standard-depth to slim-profile double glazing

5 Local Case Studies

Bath Homes fit for the future.

Georgian / Regency Terrace, Bear Flat




Overview
 Address: 1762/1811 - Georgian / Regency, Grade II listed
 Type: 3 storey terrace
 Years in residence: 43
 No. Bedrooms: 5
 Wall type: Solid wall, Bath stone Ashlar

Key Features

- Solar PV (on Grade II listed)
- Loft insulation
- Secondary Glazing
- Draught Proofing
- Zoned Heating Controls
- Radiator Reflectors
- Low Energy Appliances

Introduction
 John and Pat Taplin have lived in their attractive Grade II listed terrace home for 43 years and have always taken a DIY approach to making their home warmer and greener. They have fitted home-built seasonal secondary glazing units in most of the windows and fitted their own draught proofing, radiator reflectors and loft insulation. More recently solar PV panels were installed in the roof valley to help compensate for the rising cost of electricity and to reduce their carbon footprint. They have changed their domestic habits to take advantage of the free electricity that is generated during the day and saved £600 from the government's Feed-in Tariff in the first 18 months.

Features
Secondary Glazing
 Over 30 years, John has built his own secondary glazing units and fitted them to most of their windows, including a stained glass semi-circular feature window. He has experimented with different materials and fittings and examples can be seen that are made of glass, Perspex, and glazing film. The secondary glazing, not only reduces heat loss and draughts through the old sash windows, but improves acoustic insulation that reduces traffic noise in the house.

Solar PV
 John and Pat had originally looked into installing a solar hot water system, though it was ruled out due to the disruption that would be caused by the need for a new dual-coil hot water tank and new piping to be run through their 3 storeys. This was the first Grade II listed home in Bath to be granted planning permission for solar PV panels on the roof. John said 'to obtain Listed Building consent, we had to prove that the installed PV panels could not be seen from anywhere external to the building. In addition, we had to confirm that we had considered all of English Heritage's criteria set out in their publication 'Microgeneration in the Historic

"We try to use electrical appliances when the sun is shining to use our 'home-made electricity'. With the cost of electricity rising, we think that this will be a good investment."

View the **case study** online for more information

C) Photovoltaic panels on Grade II listed building (19 Devonshire Buildings, Bear Flat; view application)

Key elements of this application:

An appropriate intervention – From a heritage perspective the siting is appropriate as it is discreet, with panels 'hidden' inside the double-pitched roof valley, external wiring run behind a downpipe to minimise visual impact, a board-mounted inverter to minimise fixings to original fabric, and a high position ensuring the roof is not overlooked. From an energy efficiency perspective, the siting is unfortunately less appropriate, as the requirement to hide the panels to minimise visual impact results in regular overshadowing by the roofline and chimney, causing sub-optimal performance – this is a good example of where heritage and energy conservation priorities can conflict. The installation was however combined with other energy-saving measures, demonstrating a holistic approach

Drawings – Detailed drawings, clearly showing the location of the installations and the fixing details

Supporting materials – Clear, detailed explanations in support of the proposed works, demonstrating a good understanding of both heritage and energy conservation principles, an awareness of relevant legislation and guidance, a thorough approach that has included both heritage and energy-saving improvements, and clear reasons for proposing PV over other renewable energy technologies. Also an illustration of conservation as 'management of change', detailing the changes that have taken place in the property over time

LPA feedback – Noted that there is 'no substantive reason for refusing consent in this particular case', but requires applicant to demonstrate that roof structure is sufficiently robust to carry weight of PV panels

Other feedback – One letter highlighted heritage issues and the need to assess roof structure

Outcome – Approved subject to demonstrating that the roof structure would support weight of PV panels



D) Photovoltaic panels on Grade II listed building (The Old Rectory, Newton St. Loe; view application)

Key elements of this application:

An appropriate intervention – As in case study C, the elevated position of the building and the panel location in a hidden roof valley ensures discretion. Furthermore, the applicant specified non-standard panel finishes to render them still more discreet

Drawings – Detailed drawings and photographs, clearly showing siting and installation method

Supporting materials – A short but clear Design and Access Statement to accompany the drawings and photographs, highlighting the discreet panel finishes specified (black frames and backing sheets) and the intention to conduct a structural survey to ensure the roof's structural integrity is maintained

LPA feedback – Noted that 'appropriate conditions exist in order to facilitate solar panels', namely the hidden, internal roof valley, the parapet, the elevated position of the building and surrounding topography, and the minimal fixings and wiring required. Also stated a requirement to conduct the aforementioned structural survey

Other feedback – The local parish council supported the application. Bath Preservation Trust also supported the application, noting that there would be no adverse visual impact, and recommending that consent should be subject to proving the integrity of the roof structure and that other energy conservation works should also be carried out

Outcome – Approved subject to satisfactory structural survey

5 Local Case Studies



E) Refurbishment and extension of a Grade II listed building incorporating energy conservation measures (7 Charlotte Street; view application)

Key elements of this application:

An appropriate intervention

Energy efficiency measures were proposed as part of a wider refurbishment and extension; this is a good time to consider such measures as other building works are taking place in any case. Proposed measures included draught proofing, shutter repairs, internal wall insulation, secondary glazing, slim-profile double glazing, roof insulation, solid and suspended floor insulation, gas central heating and a solar thermal array (sited on the principal elevation, but not visible due to the building's elevation and parapet). Pre-Application Advice was sought from the LPA before submitting the formal application. It should be noted that the secondary glazing and internal wall insulation were withdrawn from the application (for later re-submission) at the LPA's request

Drawings – Numerous very detailed drawings and photographs showing proposed works

Supporting materials – A Design and Access Statement and Sustainable Construction Checklist were both submitted to provide details of all the proposed measures and reference local and national planning and climate change policy, together with other correspondence and reports throughout the assessment process. The formal reports also made use of modern energy analysis tools such as Energy Performance Certificate ratings, air pressure testing and thermal imaging to illustrate their proposals. Much of the mid-assessment dialogue related to certain improvements that were felt to be contentious, primarily the secondary glazing and internal wall insulation

LPA feedback – The LPA noted the need to upgrade the building to make it fit for habitation, and supported the replacement of a poor existing extension with an improved version and the window replacements which they felt would enhance the property. They also felt the solar thermal evacuated tubes were acceptable. However, the LPA requested that the internal wall insulation and secondary glazing should be withdrawn from the application as they felt these

measures would have a 'detrimental impact' on the building. (The applicant agreed in order to achieve a timely decision; these measures have since been re-submitted under a separate application.)

Other feedback – An archaeologist provided groundwork recommendations. Bath Preservation Trust supported the proposed works including internal wall insulation where there was not significant plasterwork, and supported monitoring this measure for research

Outcome – Approved following withdrawal of the internal wall insulation and secondary glazing measures from the application. A separate listed building application was submitted for these measures however was subsequently refused because they were deemed harmful and would not preserve the historic architectural interest and character of the protected building



F) Hydro turbine in a Grade II listed building (The Mill House, Midford; view application)

Key elements of this application:

An appropriate intervention

This building was constructed as a mill and had already been converted to generate electricity, however the current system was no longer functional; proposing a replacement hydro turbine is therefore entirely appropriate for this building and is in keeping with its original intended use.

The introduction of a new hydro-electric turbine was proposed as part of a larger refurbishment project that included demolishing a modern structure and improving the other existing structures, and the project was discussed with the LPA through the Pre-Application Advice function prior to submitting the full application

Drawings – Detailed drawings were provided including several detailing the proposed hydro turbine.

Supporting materials

Comprehensive documentation was provided alongside the main application form, including a Design and Access Statement, a Heritage Statement, a hydro feasibility study report and broader environmental reports often required for hydro schemes (e.g. assessing wildlife and flooding impacts). The Design and Access Statement and the Heritage Statement both demonstrate a thorough understanding of the building's heritage; indeed, the hydro turbine is not portrayed as the prominent feature of this application. However, the hydro feasibility study clearly demonstrates the energy, CO₂ and financial benefits of the turbine as well as the history of the earlier turbines

LPA feedback – The LPA was very supportive of the applicant's desire to retain the historic integrity of this 'significant' building, and noted that the building already includes 'many layers of change and intervention over 700 years', that the proposals would preserve and enhance the building's significance. They were also supportive of the fact part of the proposals would see a modern structure removed and more traditional features reinstated and of the installation of the hydro turbine

Other feedback – An Ecology Officer provided comments on any environmental/wildlife impact, not relating to the hydro turbine

Outcome – Approved

5 Local Case Studies

Learning from unsuccessful applications

Not all applications for Listed Building Consent are successful. There are many reasons for refusal of Consent, and it is useful to be aware of these when considering your own application. Some cases and reasons for refusal are given below including the key concerns of the LPA:

Proposal & Reasons for refusal	Example response
1. The visual impact of proposed 210 photovoltaic panels deemed harmful	<ul style="list-style-type: none"> • ‘...will have a detrimental impact on the setting of heritage assets including listed buildings, the Bath Conservation Area and the Bath World Heritage Site and also important and significant historic views of the city’ • ‘...will cause visual harm to the protected building and the setting of adjacent heritage assets’
Not enough detail has been provided on the possible impact of the building	<ul style="list-style-type: none"> • ‘...lack of information relating to the structural analysis of the...building and the impact on the roof and the integrity of the structure resulting from the installation [of photovoltaic panels]’ • ‘...lack of information relating to an analysis of the physical and structural impact on the roof structures...and therefore the proposals may lead to structural harm and damage to historic fabric’
Not enough detail has been provided on the history and listing of the building	<ul style="list-style-type: none"> • ‘...lack of information regarding...the heritage significance of the building and its context’
Lack of awareness of relevant planning policies	<ul style="list-style-type: none"> • ‘...the proposals are regarded as contrary to Planning (Listed Buildings & Conservation Areas) Act 1990, Planning Policy 5: Planning for the Historic Environment and local and national policy guidance’
2. The visual impact of internal wall insulation regarded as unacceptable	<ul style="list-style-type: none"> • ‘...the wall insulation will result in the loss from view of important historic fabric including original lime plaster wall finishes and internal joinery.’ • ‘...the insulation will unacceptably alter the character of the interior of the building...’
Detrimental physical & technical impact of internal wall insulation	<ul style="list-style-type: none"> • ‘...Traditionally constructed historic buildings with a solid wall construction rely on the transference of moisture from within the wall so that it can be dissipated as vapour. Internally this process relies on adequate ventilation however it is clear that the aims of thermally upgrading the building are to minimise draughts and cold air entering the building.’ • ‘...likely to cause harm to internal fabric resulting from the inevitable increase in levels of damp and condensation...’ • ‘...likely that interstitial condensation between the existing internal wall surface and the internal surface of the wall insulation will occur.’ • ‘...although the aims of improving the thermal performance of historic buildings is supported in principle, this cannot be at the expense of heritage value and historic architectural interest and preservation.’ • ‘...there is a potential for physical harm to occur following the installation of the wall insulation...’

Proposal & Reasons for refusal	Example response
3. Installation of replacement windows with double glazing will cause visual harm to the terrace and Conservation Area	<p>This proposal to replace the existing windows is welcomed as it provides the opportunity for improvement and to reverse the trend for inappropriate replacements. As proposed the window type and design is not an issue, but use of standard, sealed double glazed units does cause concern.’</p> <ul style="list-style-type: none"> • ‘As proposed the window type and design is not an issue, but use of standard, sealed double glazed units does cause concern.’ • ‘The two panes introduce a double imaging which is visually intrusive and inappropriate for use on listed buildings.’ • ‘The desire to improve thermal efficiency is fully appreciated, but historic building research and guidance confirms that correctly draught proofed traditional single glazing has a similar effect to secondary glazing.’ • ‘If double glazed units were to be allowed it would be difficult to resist their use on other properties in the listed terrace and the cumulative visual impact would further erode character to an unacceptable degree.’

Objections may also relate to the following, and may come from either the LPA or external commentators:

- Where the impact on a historic building or the setting of heritage assets has not been recognised or considered by the applicant or has been played down
- Where the application has not demonstrated an attempt to minimise the impact on a building’s appearance (e.g. the use of discreet product design and styles)
- Where inadequate detail has been provided in general, e.g. lack of specification details, no heritage impact assessment/ statement
- Where plans and drawings are not of a professional standard, lack detail or are inaccurate
- Where a relatively high-impact measure (e.g. a solar panel) is proposed and other lower-impact measures have not also been considered or applied.

6 Useful Links

The following links will provide further information and more detailed assistance regarding retrofitting, renewable energy, climate change, energy efficiency and the historic environment.

There are also links to specialist registers and directories which include specialist products suppliers and services. This is not an exhaustive list but includes some of the most up to date and relevant information and guidance available:

National Heritage Organisations & Amenity Societies

www.spab.org.uk/

www.english-heritage.org.uk/
(follow link to *Climate Change*)

www.bath-preservation-trust.org.uk/

www.ihbc.org.uk/

www.historic-scotland.gov.uk/

www.ancientmonumentsociety.org.uk/

www.georgiangroup.org.uk/docs/home/index.php

www.victoriansociety.org.uk/

www.c20society.org.uk/

www.stbauk.org
(Sustainable Traditional Buildings Alliance)

Registers & Directories

www.buildingconservation.com
(see *Directory*)

www.conservationregister.com

www.rics.org
(follow the links to *Services/Find a surveyor/Accreditation*)

www.architecture.com/TheRIBA/TheRIBA.aspx
(follow link to *Find an architect, Conservation Register*)

www.ihbc.org.uk/hespr/

Guidance

www.helm.org.uk/
(see *Guidance Library*, which includes detailed guidance on building regulations, retrofitting measures and renewable energy)

www.climatechangeandourhome.org.uk

www.ucl.ac.uk/sustainableheritage/climate_change.htm

www.cse.org.uk/downloads/file/warmer_bath_june2011.pdf

www.building.co.uk/Journals/2012/09/27/x/u/l/RESPONSIBLE-RETROFIT.pdf

www.english-heritage.org.uk/content/publications/publicationsNew/guidelines-standards/setting-heritage-assets/setting-heritage-assets.pdf

www.bathnes.gov.uk/services/planning-and-building-control/listed-buildings/climate-change-and-historic-environment

This document is an Annex to the **Sustainable Construction & Retrofitting Supplementary Planning Document**

Available online at www.bathnes.gov.uk/greenbuild

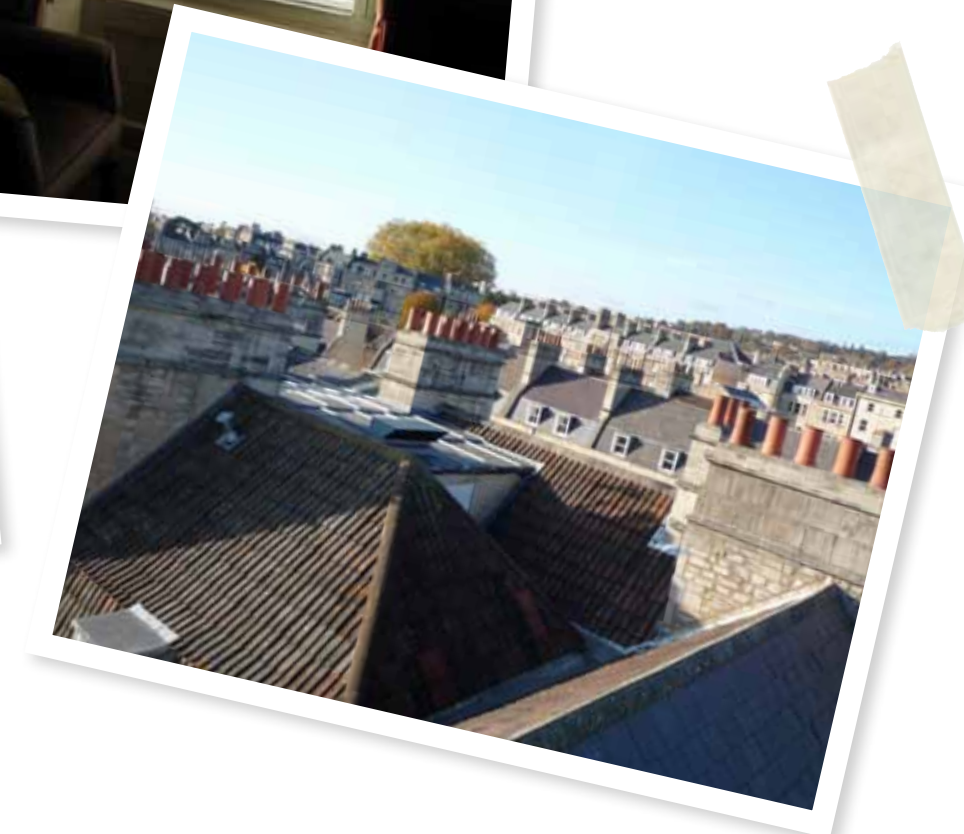
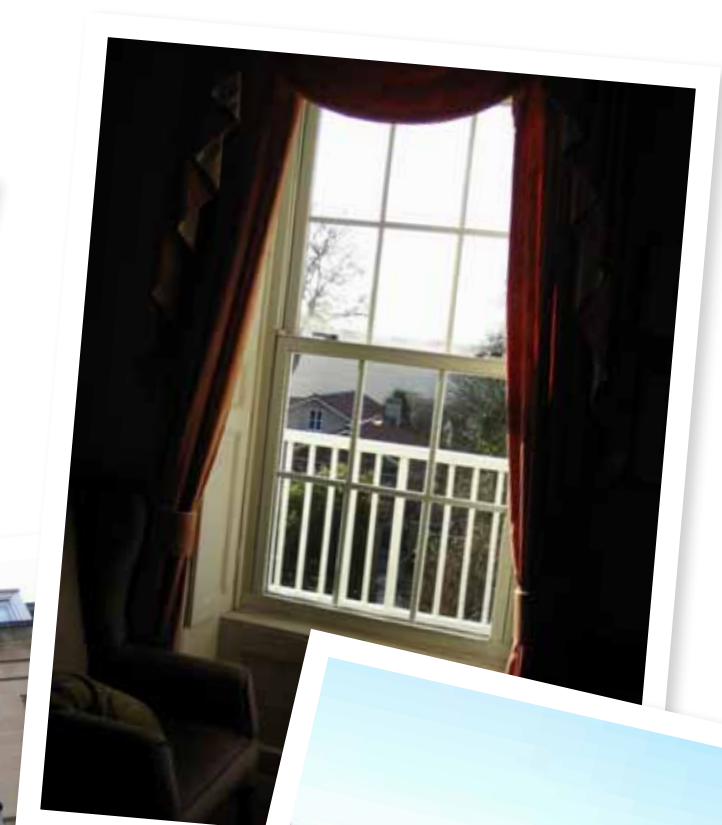


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