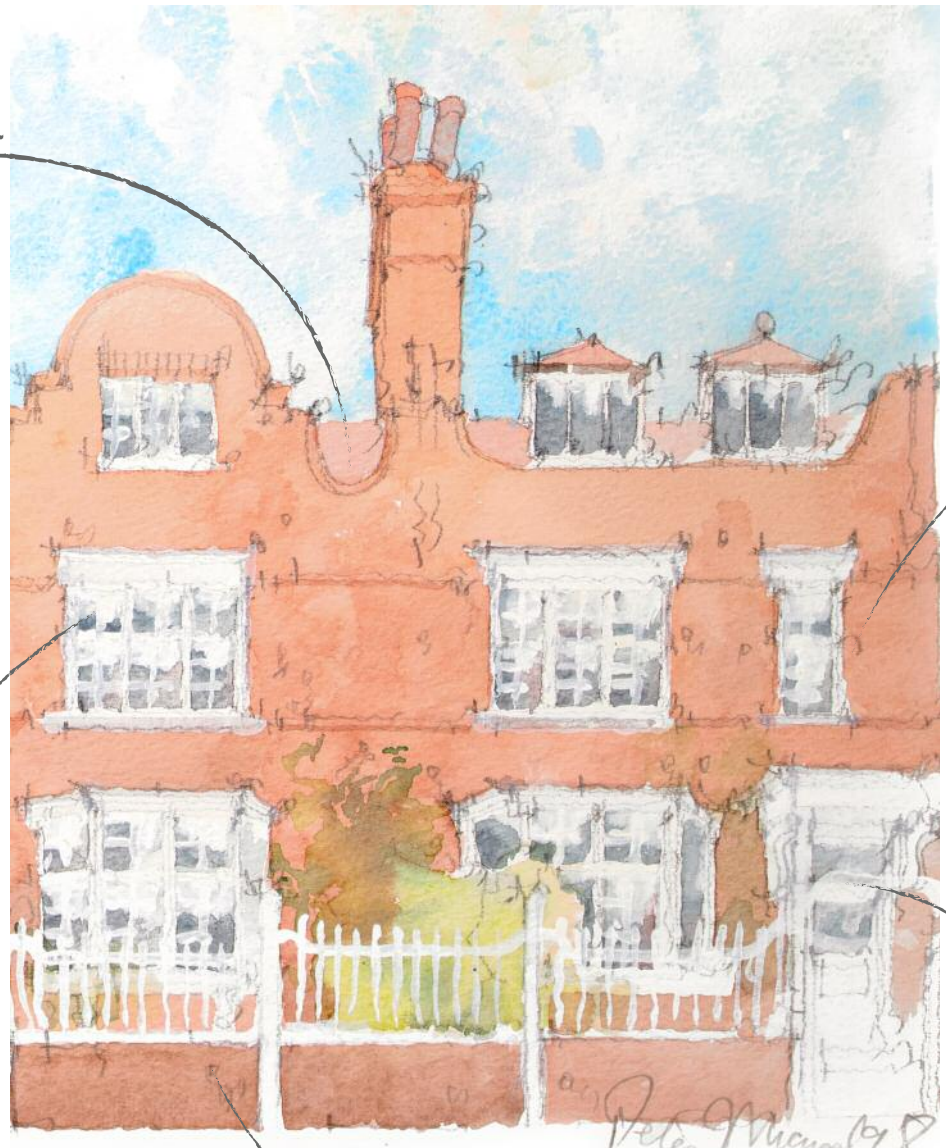
THE BEDFORD PARK SOCIETY

Energy conservation in Bedford Park houses

Ideas for improving energy efficiency in our homes



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This publication has been developed principally to provide information for owners of houses in the Bedford Park Conservation Areas but many of the points, such as retaining the historic fabric, reducing carbon footprint and a "whole building approach" to energy efficiency are relevant to houses of traditional construction in Bedford Park as a whole.

Front cover: typical heat loss from a badly insulated house.

1 Heritage considerations and energy conservation

Today's homeowners are understandably keen to improve the energy efficiency of their homes. This document is designed to help you consider the options available which are likely to be the most effective whilst also acknowledging the architectural history and traditional construction of houses in Bedford Park.

In the context of global energy conservation, the planning and heritage authorities adopt the principle that listed buildings and those in a Conservation Area comprise such a small proportion of the total building stock that their potential contribution does not warrant any compromise of their historic value. The exact interpretation and implementation can differ between the authorities implementing the guidance, but currently most authorities, including LB Ealing and LB Hounslow, consider the fabric and details of houses of traditional construction too crucial to be compromised by unsuitable changes.

As a result, when considering how to improve the energy efficiency of a house in the Conservation Areas, there is an over-riding presumption by the authorities of the importance of retaining the historic fabric rather than alteration.

Whole building approach

Historic England (HE), the Society for the Protection of Ancient Buildings (SPAB) and other experts strongly recommend adopting a "whole building" approach when addressing the thermal efficiency of older and historic buildings like those in Bedford Park, so that any changes made to improve energy efficiency do not lead to possible unintended consequences such as moisture accumulation, overheating or fabric damage. It is important to understand the way an individual house performs as an integrated environmental system. Links to relevant documents published by HE and SPAB on their websites are provided at the end of this document.

Condensation in a room with poor ventilation.
© Douglas Kent, courtesy of the Society for the Protection of Ancient Building (SPAB)

The benefits of "quick wins"

Although there are inevitably constraints relating to measures which can be taken to improve the energy efficiency of Bedford Park houses, there are, nevertheless, a surprising number of measures householders can take to enable them to live comfortably in their historic home and reduce the carbon emission from and energy consumption of their house, with minimal or no impact on the historic fabric of the house.

These measures are set out in more detail below and fall into three categories:

- Practical day-to-day measures in the way we live in our historic houses
- Relatively simple ways to reduce heat/energy loss from our historic houses
- Measures to improve the efficiency of energy generation in our historic houses

How we live in our Bedford Park houses

Most of the general measures promoted by the Government and other interested parties to help householders reduce their energy consumption are effective in houses of traditional construction and have no impact on the historic fabric. These might seem very obvious but are well worth implementing and are likely to lead to a significant reduction in energy consumption. They include lagging pipes, installing thermostatic radiator valves to control the heat in individual rooms, reducing the boiler flow, installing a smart meter, installing an advanced control system for your heating system, changing to LED light bulbs, closing internal doors, ensuring front doors are draught-proofed, and many more which can be found on various websites. All these measures can have a significant impact on energy consumption and the environmental footprint of a Bedford Park house.

2

Simple ways to reduce heat and energy loss

There are two relatively straightforward but effective measures to consider which reduce the energy consumed with very little or no change to either the appearance or historic fabric of houses in the Conservation Areas and, therefore, will be within Ealing and Hounslow planning guidelines.

- Draught-proofing
- Installing secondary glazing

The thermal efficiency of our houses can be improved greatly without replacing the windows that contribute so much to the historic significance and visual appeal of Bedford Park. In addition, removal of old windows carries a high carbon cost. After removal, windows have to be disposed of either as landfill or be burned (with an even greater carbon cost for the manufacture of new windows); trees cut down; glass heated to shape it; raw materials and the finished product transported to the site; plus labour for each element of the process. Heat escapes through windows both by direct fabric heat loss through the glass and by excessive ventilation by draughts.

Draught-proofing

Draught-proofing is one of the most cost-effective and least intrusive ways of improving comfort and reducing energy used for heating with little or no change to a building's appearance and little or no impact on the historic fabric. It has the added benefit of helping reduce noise, rattling and keeping dust out. Recent research has shown draught-proofing can reduce air leakage from windows by between 33 and 50%, significantly reducing the energy requirement needed for heating.

A brush pile seal being inserted into a sash window.
© Core Sash Windows

Traditionally this was achieved by heavy curtains, but there is a lot that can be achieved by a combination of adjustment, maintenance and fitting draught excluders. This is work that can be undertaken without making any noticeable change to the appearance of windows.

Sliding sash windows are the most difficult to draught-proof, and whilst it is possible to do the work from first principles with commercially obtainable materials including beads with integral brush seals (eg from Reddiseals), it is recommended to have the work done by specialist providers (such as Ventrolla or the London Box Sash Window company or numerous others).

Sash windows can be refurbished from almost any level of disrepair, and for both practical, environmental and heritage reasons it is almost always preferable to do this instead of total replacement.

Casement (hinged) windows can be similarly adapted, and while the work is simpler it is essential that the moving parts are suitably adjusted to allow for the new seals.

Secondary glazing

The addition of secondary glazing can reduce heat loss by nearly 60% (and is also effective in reducing sound transmission). Secondary glazing involves no alterations to the window but adds another layer of glass inside it. This can be in the form of another timber framed window, but it is more often achieved with an aluminium framed system for minimal aesthetic impact. It provides a thermal buffer in the form of the air trapped between the two windows, and the effective draught-proofing of the inner

Secondary glazing can provide considerably higher thermal performance than draught-proofing alone.

Vertical sliding secondary sashes used with a double hung sash window.
Courtesy of Historic England

system achieves the same objectives as draught-proofing covered earlier. A typical system can be found on the website of Selectaglaze under Heritage and Listed Buildings.

It is worth bearing in mind that secondary glazing has a visual impact, particularly from inside, usually eliminates the internal window sills, and makes it more awkward to open the windows as both layers have to be operated. Cleaning can be more difficult, and it can lead to condensation in the space between the windows, potentially resulting in mould and damp.

The benefits of secondary glazing are that it can be cleanly and easily fitted without extensive work or harm to the original woodwork and it is completely reversible. It is also more effective than either draught-proofing (previous page) or sealed double glazing (next page) in mitigating nuisance noise, for which the larger spacing of the glass layers is a critical factor.

There are temporary lightweight systems on the market which you can fit, remove and store easily during the summer months.

High quality plastic secondary glazing held in place with magnetic strips. © Roger Hunt

3

Measures to improve the efficiency of energy generation

Upgrading your boiler to a more efficient product is usually a particularly effective way to improve the way energy is generated in your house, especially if your boiler is very old. There are many websites which can help with the choice of type of boiler, make and model, though you might wish to commission advice from a heating engineer to ensure an efficient system. From a conservation perspective, replacing a boiler is highly unlikely to alter or destroy the historic fabric of the house, though some care might need to be taken in routing the boiler vent.

Limited scope for renewable solutions

The potential for renewables in Bedford Park is unfortunately very limited:

- solar panels: the aesthetic impact is largely unacceptable on listed houses, and on non-listed houses they should not be visible from the street or public spaces.
- ground source heat pumps: these require extensive and expensive excavation, which can pose problems in the context of relatively small Bedford Park gardens.

Air source heat pumps

- air source heat pumps: these require thorough insulation of the house to be fully effective. Also, when used as the sole energy source pipes and radiators are larger, which can affect the historic fabric significantly. Care should be taken in siting the pumps as they can be visually intrusive and noisy.

It should be remembered that there is no universal solution for any of these options, and each case will be considered by the local authorities on its own merits. The impact on neighbours, the Conservation Areas as a whole, and the setting of listed houses in particular will be factors.

4

Measures with a higher impact on the historic fabric of a house

There are four other types of measure householders often wish to undertake. Each of these has a higher impact on the historic fabric of a house and should, therefore, be considered carefully and sensitively.

These measures are:

- Loft insulation
- Flat roof insulation
- Insulation of ground floors
- Installation of sealed double-glazing units

These measures are explored below but need to be considered in the context of the importance of avoiding condensation in an historic house by ensuring sufficient ventilation.

Heat loss from buildings occurs in two ways:

- transmission of heat through the fabric (addressed by improving insulation)
- loss of heat carried away by air movement (addressed by controlling ventilation)

To make things more complicated, both are inextricably bound up with the control of unwanted moisture, and the avoidance of condensation with its many problematic results. The control of moisture is doubly important in an old building which is not entirely waterproof, and where the natural and unavoidable *ingress* of moisture has to be balanced by an equal or greater natural *removal* of moisture by ventilation.

This is a complex subject, but it is important to be aware that it is important! Incomplete insulation installation and the stopping-up of healthy ventilation can cause more problems than it solves. Helpful guidance can be found on the website of the Society for the Protection of Ancient Buildings and Historic England. There is a good case for professional advice except in the simplest of situations.

The essential principles are:

- Insulate where you can but be aware that the 'cold' side of insulation is the likely point for condensation, and it must be ventilated by free passage of air or otherwise mitigated.
- Avoid inconsistencies or gaps in insulation, called 'cold bridges', that produce isolated cold places where condensation is concentrated.
- Natural, breathable materials for insulation (eg treated sheep's wool and wood fibre products) are more likely to be tolerant of variable condensation conditions than are synthetic materials.
- The building needs some air movement (ventilation) to maintain a healthy balance and you should not stop up all the draughts without introducing and managing controlled ventilation.
- Never block up the ventilation of floor voids and roof voids, where to do so may upset the overall moisture balance of the building with nasty consequences (rot, mould, wood boring insects are all reliant to a large degree on damp conditions).

The most common problems resulting from poor ventillation are condensation and black mould © Roger Hunt

- Think twice before blocking up a chimney as this provides an important method of ventilation. Chimney balloons can be effective in preventing energy loss through chimney flues. Although they can cause problems by limiting ventilation in a flu and/or restricting ventilation of the rest of a room and are best avoided where ventilation is more important than heating, they can be worthwhile in some circumstances after taking expert advice.

5

Loft, roof and floor insulation

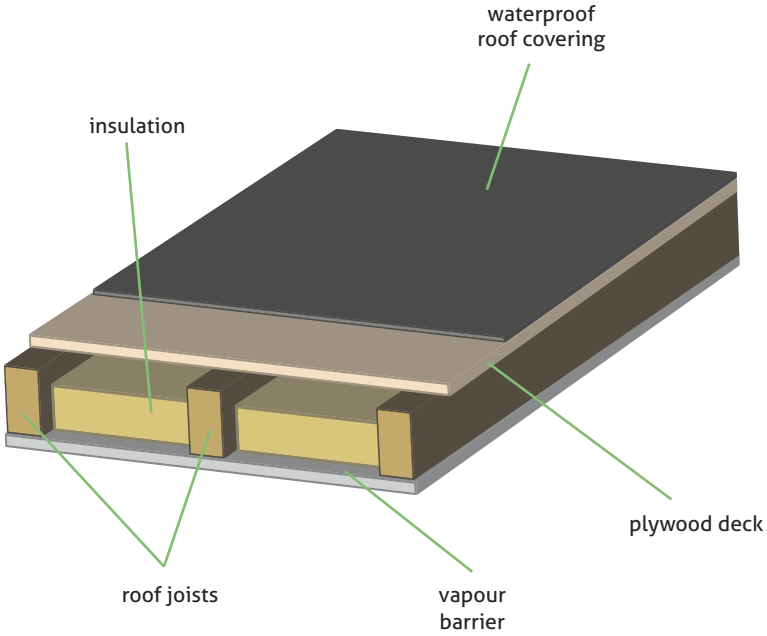
Loft insulation

Insulating a loft can be achieved internally without affecting the external appearance of the house and without destroying internal original features. Generally, it is easier to achieve insulation to slopes when re-roofing than by working from the inside. Bear in mind though that many Bedford Park houses have a second floor in the roof space, so the extent of possible roof insulation is limited.

Ideally, traditional loft insulation should be laid both between and over the ceiling joists for full coverage and avoidance of cold spots. Loft voids on the cold side of the insulation should be well ventilated, and this can be a problem in, for example, attics where the sloping ceilings allow only the depth of the rafters to work within. This is mitigated by modern 'breathable' roofing felt, but not with older impervious roofing felts.

Flat roof insulation

Unless there is a well-ventilated air path through the roof structure between the insulation and the roof covering, this is a highly technical subject and should be approached with sound advice. Most workable solutions either involve insulation placed outside the waterproof membrane or a rigorously detailed vapour barrier under the insulation to prevent the passage of water vapour from within. Manufacturers of flat roof systems often provide a free advice service and recommended details.



A conventional cold roof
Insulation is located between the joists

Ground floor insulation

The addition of insulation between the joists under timber floors can be relatively simple and will in addition help to reduce draughts between floor-boards. It can be achieved easily if the floorboards can be lifted, but where there are floorboards that cannot be lifted (for example the original narrow pitched pine boards with steel tongues in many listed Bedford Park houses, which should be preserved and therefore cannot be lifted) it is only really possible to install it where the void below is deep enough for working access to the underside.

It is essential to maintain the subfloor ventilation to the space below the insulation where there is a risk of condensation, and it is important that the insulation does not unintentionally transfer moisture from damp walls or adjacent ground to timber joists.

Solid concrete floors can be insulated either above or below the concrete, but both these involve a deeper floor build-up that involves considerably more work, and in most cases, insulation cannot be retrofitted to an existing solid floor. Altering a finished floor level is likely to cause problems at the bottom of stairs, doors and skirting boards. Excavating and replacing solid floors is subject to listed building consent, which can be contentious if the floors have historic finishes.

Original slim bars: external and internal

6 Sealed double glazing

When it comes to double glazing, government regulations on energy emissions reduction exempt historic buildings because modern systems cannot (currently) replicate exactly the materials and appearance of older windows. The vast majority of modern windows are made with a single frame and sealed double-glazed units that contain either an inert gas or a vacuum. Frames are always fitted with draught excluders and sometimes incorporate insulation. Current Building Regulations cannot be met with anything less than this specification.

For the heritage sector this has always been a problem, as the edge seals and thickness of the units preclude their being fitted into a traditional timber section, and in particular into a slim glazing bar. As a result, a double-glazed window of this type, even of matching configuration, could never achieve the same delicacy of appearance of a single-glazed original.

Developments have been made in recent years that address this in part: slim units with a narrow edge strip can be fitted into a slightly modified narrow glazing bar section, and they are available with a black separation strip that is less prominent.

However visual and constructional anomalies remain:

- The edge seals can react with oil-based glazing putty, which means that they have to be bedded in a different compound and overlaid either with a putty or a timber bead. The latter impacts subtly but negatively on the window's appearance.
- The deeper glazing unit means that the depth (front to back) of the rebate needs to be bigger, and that in turn compresses the internal moulding.
- The two sheets of glass form a double reflection under some lighting conditions which is clearly visible.
- The additional weight of the glass (doubled) can pose difficulties, particularly in respect of sash weights and cords.
- Where the original glass remains in place in a listed house, replacement of the glass, whether for single or double glazing, should be avoided, if possible.

Further, whereas simple window glass has an almost indefinite lifespan, sealed double glazed units do not. Standard (thick) units last only about 25 years before the edges break down and condensation begins to form between the glass panes. This reduces the energy benefits of double glazing over the whole lifecycle of the product, taking account of the energy which has gone into making the double-glazing units. Slim units are less robust and failure in a shorter period is not unusual.

Within Bedford Park, the exact detail and character of joinery (internal and external) is a major component of the particular character of the Conservation Areas. For the listed buildings this is so significant that the loss of any detail without compelling justification is not deemed acceptable by either councils.

To date neither have considered that double glazing for energy reasons is sufficient justification for changes to joinery detail. Proposed changes to joinery of non-listed houses in the Conservation Areas should be considered very sensitively. Double-glazing has been accepted for **some** new extensions of listed houses where certain conditions have been met, such as the relationship with the other original glazed elements. Both councils allow and support the other ways of improving energy performance outlined in earlier sections that do not impact on the character or appearance in the same way.

With advances in technology, new slimmer products are coming onto the market but the technicalities and their appropriateness for Bedford Park windows have not yet been ascertained.

7 Rooflights

Installing rooflights can compromise the thermal performance of a roof and therefore should only be considered where essential, for example in habitable rooms, not in bathrooms or stores. This applies to both pitched roofs and flat roofs.

The thermal performance of overly large roof lanterns is very poor, and they generate light pollution, which affects neighbours and has an environmental impact.

EPC and the thermal performance of an historic house

The EPC (Energy Performance Certificate) rating of their house is often the starting point for homeowners seeking to reduce the carbon footprint and improve the thermal efficiency of their home. It is worth noting that research indicates that the method of calculating EPCs leads to an inaccurate rating for historic buildings. The rating is based on modern building methods, and the real performance of an old house is almost certainly better than the EPC indicates, because the traditional building methods used lead to higher thermal performance than modern construction methods. In other words, the thermal efficiency of your Bedford Park house is quite probably better than that predicted by the EPC rating, so your baseline for improvements might be higher than you think!

8 The statutory obligations and consents

Planning permission and Listed Building Consent

Beyond minor works of like-for-like repair all alterations to windows and other fabric of listed houses are subject to Listed Building Consent, and matters affecting the external appearance of any house in the Conservation Area are subject to planning permission. In terms of heritage protection, even very slight differences in the appearance or materials can be significant.

As noted above, the generally held position of both Ealing and Hounslow planning departments is that the installation of windows with sealed double-glazed units is unacceptable in the original parts of specific locations of **listed houses**, but that carefully designed and specified windows of that type can be installed in new construction of extensions etc. Installation of double-glazing in certain **non-listed houses** in the Conservation Areas will only be allowed if the timber frame has the same external profile details as the existing/original profiles, and individual panes are glazed. Large panes with applied glazing bars are not normally acceptable to either council. Householders considering this are advised to consult a specialist with regard to feasibility. Each case is considered on its own merits.

Permanently fitted secondary glazing is likewise subject to consent but is likely to be uncontentious.

The fitting of draught excluders to windows is a matter outside the listed building controls, but only if it involves no physical changes to the joinery. In more sophisticated systems, such as those marketed for sash windows, it should be a matter for an application, but the expectation would be that it is allowed.

Loft insulation can often be installed without making alterations to the fabric of the house, and in that case, it is not subject to permission. More invasive works will require consent and will be assessed on their merits as to whether they affect the character of the listed building. This is unlikely to be an obstacle to loft or flat roof insulation. It is most unlikely that the addition of wall insulation, either externally or internally, would be considered acceptable for a listed building.

Building Regulations

Although energy conservation and insulation requirements are now quite demanding, Building Regulations include an exemption for listed buildings and buildings of traditional breathable construction where the addition of insulation will compromise either the appearance or character controlled by listed building consent, or the overall performance of the building as a breathable structure. The obligation is to take *reasonable steps* to minimise energy consumption within the other constraints – and this applies to all houses in the Bedford Park Conservation Areas, whether listed or non-listed.

Most Building Control Officers will interpret this as requiring the addition of insulation within the existing depth or thickness of walls, roofs and floors, but not where other controlled elements or finishes would need to be removed, for example it would not be expected that original ceilings would be removed in order to fit insulation, but if a ceiling were to be removed with permission for other reasons, then insulation should be fitted. To an extent common sense should prevail.

9

Assessment of measures to improve the energy efficiency of a Bedford Park house

This table sets out the relative effectiveness of measures to improve the energy efficiency of a Bedford Park house and their impact on the historic fabric of the house. There are some differences between listed and non-listed houses which are highlighted in the section on statutory obligations and consents on page 7

Measures highlighted in green are recommended for implementation before considering other more invasive measures. The information on each of these measures contained elsewhere in this document should be taken into consideration as well as the section on Statutory Obligations and Consents before implementing any measures.

Measures
Relatively simple ways to reduce
Lag pipes
Install thermostatic radiator valves to control the heat in individual rooms
Install a smart meter
Change light bulbs to LED
Close internal doors
Ensure front doors are draught-proofed
Reduce the boiler flow
Install an advanced control system for your heating system
Draught proof windows
Install secondary glazing
Measures to improve efficiency of
Upgrade your boiler to a more efficient type and/or model
Solar panels
Ground source heat pumps
Air source heat pumps
Other more intrusive measures –
Loft insulation
Flat roof insulation
Insulate floors
Install sealed double-glazing units

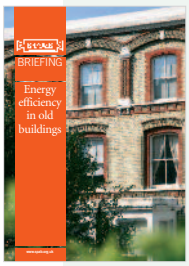
10

Conclusions

- Upgrade thermal performance where you can, first by insulation and then by reducing and controlling, but not eliminating, air flow.
- Be aware of the risks of condensation and consider taking professional advice.
- Go for the easy wins: draught excluders to windows, loft and ground floor insulation. Avoid trying to replace the historic windows in a listed house, which are usually simple to repair, unless beyond repair.
- Ensure that any changes comply with the Planning and/or Listed Building Consent process.

	Effectiveness	Impact on historic fabric	Additional information
energy loss:			
	HIGH	LOW	
	HIGH	LOW	
	HIGH	LOW	
	HIGH	LOW	
	HIGH	LOW	
	HIGH	LOW	
	HIGH	LOW	
	HIGH	LOW	
	HIGH	LOW	Can reduce air leakage in windows by between 33% and 50%. Note, must be carried out carefully in such a way that the design of the window is not altered.
	HIGH	LOW	Can reduce heat loss by nearly 60% and is also effective in reducing sound transmission. Has little or no impact on the historic fabric, but does have a visual impact, especially from inside the house.
f energy generation:			
	HIGH	LOW	Highly unlikely to alter or destroy the historic fabric of the house, though some care might need to be taken in routing the boiler vent.
	LOW	MEDIUM	The aesthetic impact is largely unacceptable on listed houses, and on non-listed houses they should not be visible from the street or public spaces. The benefit is likely to be low given the limited parts of rooves on which these could be installed.
	LOW	LOW	These require extensive and expensive excavation, which can pose a problem in the context of relatively small Bedford Park gardens. The benefit will be reduced in the context of a small size garden available for excavating for the installation.
	MEDIUM	HIGH	These can be noisy and visually intrusive and require a thoroughly insulated house for full effectiveness.
to be considered with care:			
	MEDIUM	MEDIUM	In some houses, can be achieved internally without affecting the external appearance of the house and without destroying internal original features. But many Bedford Park houses have a second floor in the roof space, so the extent of possible roof insulation is limited. Professional conservation advice is needed.
	MEDIUM	MEDIUM	Highly technical subject, approach with sound advice. Manufacturers of flat roof systems often provide a free advice service and recommended details.
	MEDIUM	MEDIUM in some houses, HIGH in others	Can be achieved easily if the floorboards can be lifted, but the original narrow pitched pine boards with steel tongues in many Bedford Park houses should never be removed. Excavating and replacing solid floors is subject to listed building consent, which can be contentious if the floors have historic finishes.
	HIGH	HIGH	Not currently permitted by either council except in very limited circumstances in new extensions.

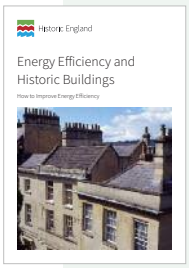
Information sources



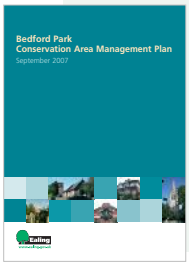
The Society for the Protection of Ancient Buildings (SPAB) is a leader in how to look after historic houses and offers guidance and free-to-download explanatory notes on energy efficiency, loft insulation, ventilation under timber floors, draught exclusion in windows, and double and secondary glazing.

The general briefing on energy efficiency in a historic house can be found on its website www.spab.org.uk under "SPAB Briefings" and includes a section specifically on the importance of ventilation for the health of an historic building. Although the guidance is illustrated largely with 16th Century cottages the principles are the same for any house build prior to 1925.

The SPAB explanation of the need for a building to breathe can be found in its Technical Advice Note "The Need for Old Buildings to 'breathe'".



The **Historic England** guidance for improving the energy efficiency of traditional and historic homes can be found on its website www.historicengland.org.uk under its advice section "How to Save Energy in an Older Home" where a range of free-to download documents can be found.



The **LB Ealing and LB Hounslow** Bedford Park Conservation Area Management Plans explain the planning context and the principles they apply in assessing applications for development in the Conservation Areas.

They are published on the respective council websites under Planning. Ealing Council has developed a generic Management Plan that sets out those generic policies and guidelines that apply to all Ealing's Conservation Areas in addition to the specific design guidance (2017) applying to Bedford Park, which will be updated in due course.

The **Government Building Regulations** relating to conservation of fuel and power in existing dwellings can be found on the assets.publishing.service.gov.uk website: *Requirement L 1 Conservation of fuel and power.* The regulations state that listed buildings and buildings in Conservation Areas are exempt from these regulations, although Requirement L applies to new extensions, and technical guidance provided by Historic England should be followed.

While the Bedford Park Society supports the position currently taken by the Planning Authorities to date, it is not the originator of it nor is it the decision-making body.

Images shown in this document are purely for illustrative purposes and many were not originated in Bedford Park.

The information contained in this document was correct at the time of publishing (January 2024).

Please feel free to contact the Bedford Park Society: information@bedfordpark.org.uk if you have any questions about the information in this guide.

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Since 1963 we have been working to preserve and enhance the character of Bedford Park and its buildings – their setting, maintenance and development – and on community issues affecting residents. Please become a member to support our efforts and enjoy our events, keep up to date with our regular E-news and receive our exclusive publications about the history, people and architecture of Bedford Park. For more details, check our website: **www.bedfordpark.org.uk**

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