Home Retrofit Planning Guide



Consultation Version
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Smarter Homes | LONDON BOROUGH OF RICHMOND UPON THAMES

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NON-TECHNICAL SUMMARY

What is the Home Retrofit Planning Guide?

The Richmond Home Retrofit Planning Guide provides Richmond residents with practical guidance on how to retrofit their homes, with a particular emphasis on explaining when planning permission will and will not be required from the Council, and how to maximise the chances of achieving permission where it is needed.

What is Retrofit?

“Retrofit” means upgrading an existing home using modern materials or technologies, for example by:

- Installing insulation to reduce heat transfer through roofs, walls and floors
- Upgrading your windows to improve their efficiency
- Installing solar panels to generate your own low-carbon electricity
- Replacing gas or oil heating with electric heat pumps

Why does Retrofit matter?

Retrofitting your home helps to:

- Reduce carbon emissions
- Lower household energy bills
- Improve health and comfort by creating better year-round living conditions
- Avoid the need to demolish and rebuild homes by ensuring existing homes can be improved to meet the same standards

Key Facts: Retrofit and Planning



Many home retrofit improvements are classed as ‘Permitted Development’ which means they will not require the Council’s permission as long as you keep within certain criteria. Whilst there are exceptions that you need to be aware of, consulting this guide at an early stage can help you to understand these criteria and any exceptions. Section 3: Retrofit Measures sets out these criteria and exceptions in detail, alongside easy-to-follow diagrams and flow charts.



Whilst slightly stricter criteria apply in conservation areas, and particular care is required with listed buildings, there are still lots of options for retrofitting a home in heritage settings. This guide helps to explain the criteria and specific design considerations that apply in heritage settings.



Even when the Council’s permission is required, the Council aims to take a positive approach to applications for retrofit projects and approves many of the retrofit applications it receives. The Council has included practical guidance throughout this guide to help you make a successful application.



There are a number of general principles that can be applied to any retrofit project to ensure it is successful, regardless of whether permission is required. These include the whole house approach, fabric first principles, and the right ventilation strategy. Together, these principles aim to ensure that retrofit improvements work well together and are carried out in the most effective order. This can help to ensure your retrofit project achieves your goals and that the potential pitfalls of poorly planned retrofit projects, such as heat loss or damp, can be avoided. Detailed advice on these general principles is included in Section 2: First Steps to Retrofitting.

How To Approach Any Home Retrofit Project



The Guide encourages a simple, structured approach to a home retrofit project made up of the following steps.

1. **Understand your goals** (e.g. lowering bills, improving comfort)
2. **Understand your home** (age, condition, planning restrictions)
3. **Choose the right measures and apply the right approaches**
4. **Secure Any Permissions Needed**
5. **Plan, Buy and Install**
6. **Monitor results and improve further if needed**

How To Use This Guide

The Guide is structured into four sections, and you should focus on the sections that apply to your requirements.

1 **Section One: Introduction** provides an overview of the guide and an introduction to retrofitting, the role of the Council, the main retrofit measures available and the planning process.

2 **Section Two: First Steps to Retrofit** provides an overview of the first steps to any retrofit project including understanding your home, how to apply the Whole House Approach and fabric first principles, how to apply circular economy principles, and how to plan for adequate ventilation.

3 **Section Three: Retrofit Measures** provides detailed guidance on insulation, glazing and windows, heat pumps and solar panels, including a summary of the types and application of measures available, when measures will and will not require permission and best practice design principles you should apply, including specific requirements in heritage settings such as conservation areas and listed building.

4 **Section Four: The Planning Process** provides an overview of how to seek pre-application advice and make a planning application for a retrofit project requiring permission, the policies that apply and an overview of the information you will need to submit.

The table overleaf provides a simplified overview of the main home retrofit opportunities and indicative planning requirements. This is intended to demonstrate how many retrofit measures can be carried out without requiring permission. However, as these categories are not always exclusive, and permitted development is subject to criteria, this table should never be relied upon for the purposes of determining if permission is required, and you should always consult the detailed explanation of these criteria and further guidance set out in Section 3 of the guide, which includes easy-to-follow flow charts and detailed design guidance.

Overview of Retrofit Measures and Indicative Planning Requirements

Measure	Home Outside Conservation Area	Home Inside Conservation Area	Listed Building
Internal Insulation (Wall, Cavity, Loft, Floor)	Usually does not require permission	Usually does not require permission	May require Listed Building Consent depending on location and type of insulation
External Wall Insulation	Permitted development, subject to criteria	May require permission if property is covered by an Article 4 Direction. Otherwise, permitted development subject to criteria	Requires Listed Building Consent. May additionally require Planning Permission if not permitted development.
Basic Repairs and Draughtproofing to Windows	Usually does not require permission	Usually does not require permission	Usually does not require Listed Building Consent if advice in guide followed
Secondary Glazing	Usually does not require permission	Usually does not require permission	Usually does not require Listed Building Consent if advice in guide followed
Replacing Windows	Permitted development, subject to criteria	May require permission if property is covered by an Article 4 Direction. Otherwise, permitted development subject to criteria	Usually requires Listed Building Consent. May additionally require Planning Permission if not permitted development.
Air-Source Heat Pump	Permitted development, subject to criteria	Permitted development subject to criteria. Additional criteria apply, including greater restrictions on siting.	Requires Listed Building Consent and Planning Permission
Ground-Source Heat Pump	Permitted development, subject to criteria	Permitted development, subject to criteria	Usually requires Listed Building Consent
Roof-Mounted Solar Panels	Permitted development, subject to criteria	Permitted development subject to criteria. Additional criteria apply, including greater restrictions on siting.	Requires Listed Building Consent and Planning Permission
Wall-Mounted Solar Panels	Permitted development, subject to criteria	Permitted development subject to criteria. Additional criteria apply, including greater restrictions on siting.	Requires Listed Building Consent and Planning Permission
Balcony-Mounted Solar Panels	Permitted development, subject to criteria	Permitted development subject to criteria. Additional criteria apply, including greater restrictions on siting.	Requires Listed Building Consent and Planning Permission

LEGAL DISCLAIMER

While Richmond Council has taken every care in ensuring the accuracy of this Guide, it cannot be held responsible for any loss, damage or inconvenience caused because of any inaccuracy or error within its content.

As with all construction projects, retrofit projects involve a degree of risk and need to be carefully designed, planned and carried out based on a detailed understanding of your particular home and circumstances. This Guide is only intended to provide general planning advice; the exact measures, materials and construction methods that are appropriate for your home should be identified based on detailed surveying and the advice of a suitably qualified and competent person, such as, but not limited to, a PAS2035 accredited Retrofit Co-ordinator. This Guide should never be used as a substitute for the detailed advice, surveys, planning and/or implementation of retrofit projects by a suitably qualified and competent person.

When retrofit measures require Planning Permission or Listed Building Consent, you are strongly advised to:

- Work with a suitably qualified and competent person who can advise you on the appropriate approach for your home;
- Use the Council's free pre-application advice service if your project is more complex or your home is listed or in a conservation area;
- Never commence works before receiving Planning Permission and/or Listed Building Consent;
- Ensure you carry out the works in accordance with any permission, including any conditions attached.

Due to the increasing emphasis placed on home retrofit, the technologies and planning context for retrofit is constantly changing which means the information in this Guide may become out of date from time to time. Richmond Council will endeavour to keep this Guide up to date but any use of this Guide is with acceptance that there may be periods where the guidance set out is out of date pending an update.

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1. Introduction

1.1 What is the Home Retrofit Planning Guide?

The Richmond Home Retrofit Planning Guide provides clear and practical guidance for anyone wishing to improve the energy efficiency and environmental performance of their home.

By publishing this guidance as part of our Smarter Homes range of resources, Richmond Council hopes to encourage as many people as possible across Richmond Borough to retrofit their homes.

Whilst many types of home retrofit project do not require planning permission from the Council, this guide will also help to inform how the Council considers any retrofit planning applications it receives.



This Guide aims to:



Provide general advice on how to approach a home retrofit project, including the principles and approaches that should be applied to maximise success



Provide detailed advice on how best to design and plan for home retrofit projects, including:

- ✓ The types of retrofit improvements available
- ✓ When retrofit improvements will and will not require permission from the Council; and
- ✓ Best practice design principles to ensure retrofit improvements will be effective and any planning requirements will be met



Provide detailed guidance on how to navigate the planning process for a retrofit project to ensure a timely and efficient outcome, where planning permission or listed building consent is required



Signpost to where further information can be found, including wider Council support options, funding sources and more detailed guidance on retrofitting in particular circumstances (such as listed buildings)

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1.2 What is retrofit and what benefits can it bring?

Home retrofit is the process of improving or refurbishing an existing house or flat, usually to reduce its energy consumption and carbon emissions, improve comfort, or to extend its lifespan. This can involve repairing existing features or adding more efficient technologies or materials to homes which were originally built without them.

In an historic borough like Richmond, the need to retrofit is particularly great because most homes were built before these modern technologies or materials were widely available.

Whilst this guide is mainly focused on retrofitting houses and flats, there are many other types of building that are suitable for retrofitting. Much of the advice in this guide, including the types of retrofit measures available and best practice design principles, will often be relevant to non-domestic buildings, particular those that are *house-like*, such as those that were built in a similar architectural style, or originally converted from houses. A common example is local shopping parades in residential areas, which often still use upper floors as houses or flats. However, it is important to be aware that rules on what needs permission are slightly different for non-domestic buildings such as shops and so professional advice should be sought.

From an environmental perspective, retrofitting a home will nearly always be preferable to demolishing and rebuilding a home. This is because the process of demolishing and rebuilding a home, even if the new home is built to a high environmental standard, releases far more carbon than retrofitting an existing home to a high standard. Through a carefully designed retrofit strategy, it will nearly always be possible to achieve substantial improvements to a home's energy performance through retrofitting alone.

Some of the most important reasons for retrofitting a home are listed below.



Retrofitting your home is one of the most direct and impactful ways to respond to the climate emergency. Retrofitting helps to significantly reduce greenhouse gas emissions from homes by reducing the amount of energy you use and swapping higher-carbon energy sources for low-carbon sources.



Retrofitting can also be a very effective way of reducing your long-term energy bills. This can be because you generate more of your energy needs from renewable sources and/or because your heating system requires less energy to keep your home comfortable.



Retrofitting also makes your home more comfortable and healthier to live in. Urban and semi-urban areas like Richmond are more vulnerable to overheating as a result of climate change. Well-planned retrofit helps keep your home warmer on cold days and cooler on warm days. Properly integrated ventilation and heating also help to resolve and avoid issues such as damp and condensation that homes built to older construction methods can suffer.

As shown in Figure 1 below, retrofit measures can include both small and incremental home improvements, such as adding loft insulation or draughtproofing, and more comprehensive home improvements, such as replacing windows, adding external insulation, or the installation of low-carbon energy technologies like heat pumps or solar panels. Retrofit projects are usually best carried out as part of a co-ordinated plan, with multiple complementary measures carried out at the same time.

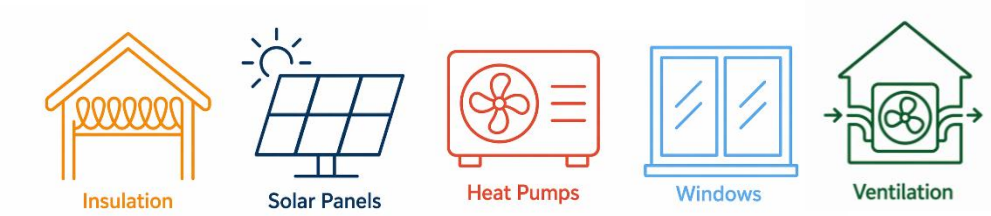
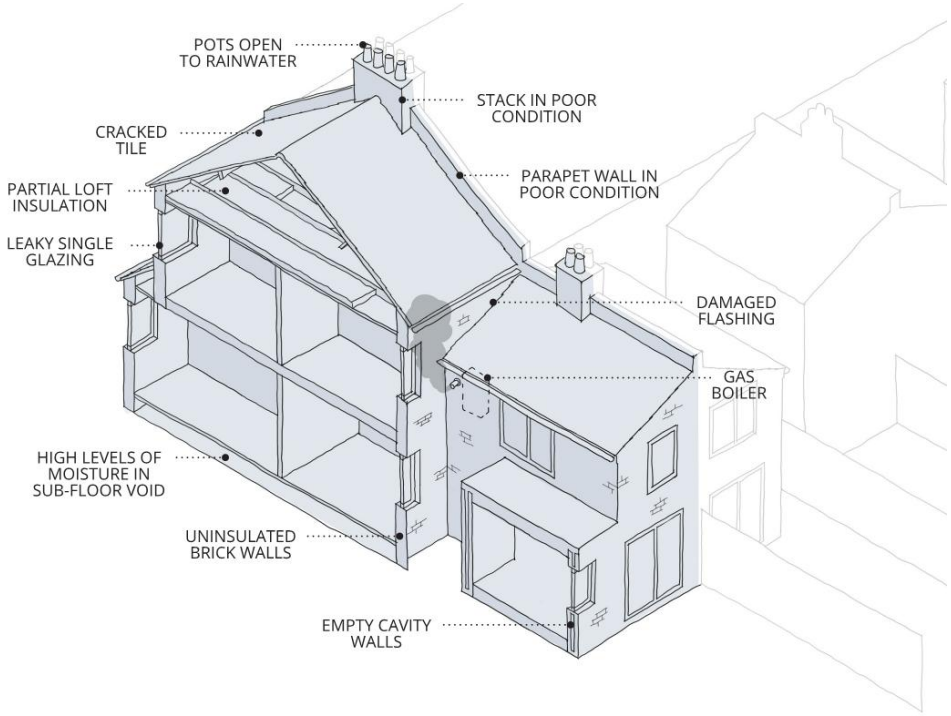
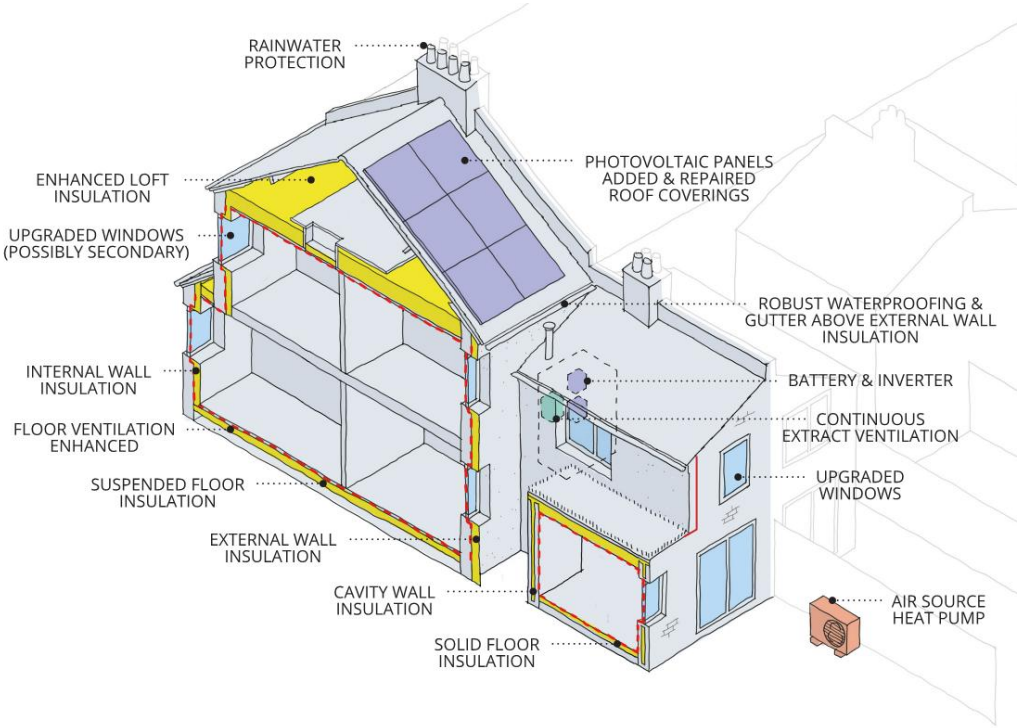


Figure 1: Common Retrofit Opportunities



Pre-Retrofit



Full Set of Retrofit Measures

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1.3 The Council's Commitment to Retrofit

In 2019, Richmond Council declared a climate emergency. We are committed to Richmond being a Net Zero borough by 2043.

This means we need to radically reduce carbon emissions from all sources so that the gap between the greenhouse gases we emit into the atmosphere and the amount we remove from the atmosphere is as small as possible. This will require us to improve the energy efficiency of our buildings, shift away from fossil fuels to renewable energy, increase our supply of renewable energy, and invest in lower carbon heating, lighting and other technology.

Our commitments to respond to the climate emergency are set out in our **Climate and Nature Strategy 2025-2030** with the specific actions we intend to take detailed in our **Climate Action Plan**.

This Home Retrofit Planning Guide plays an important role in responding to the **Richmond Local Plan (2024–2039)** which embeds our sustainability and climate commitments into the heart of local planning policies. This Guide also seeks to align with the Mayor of London's London Plan (2021) and national planning guidance.

This Guide forms part of our wider package of resources, the **Smarter Homes Hub**, which the Council has published to offer basic support to local residents looking to improve the energy and environmental performance of their homes. As part of the Smarter Homes Hub, we have also published our **Smarter Homes Handbook** which provides information on how to make homes more comfortable, greener and cheaper to run, including available funding and support.

Beyond supporting our environmental goals, this Guide helps to ensure that retrofit projects in Richmond, whether they require planning permission or not, are carried out in the most effective way.

Richmond as a Borough is defined by its heritage, with over 80 designated conservation areas and thousands of listed and locally listed buildings. The types of homes in Richmond are themselves very diverse, ranging from Georgian terraces and Victorian villas to inter-war suburban housing and post-war flats. Each type of home has a varied form, set of construction materials, and sensitivity to change.

Through engagement with stakeholders, the Council understands that some of the key barriers that prevent more people from undertaking retrofit projects are perceptions such as:

- ✗ Retrofit projects often require planning permission
- ✗ Planning permission is unlikely to be granted for retrofit projects
- ✗ It is difficult or even impossible to retrofit a home in a conservation area or a listed building

In reality, many home retrofit projects may never require planning permission, even in conservation areas, although you should always check first, by reading this guide or taking advice from a professional.

Although additional considerations apply in conservation areas and to listed buildings to ensure that their historic character is protected, it is still almost always possible to carry out substantial retrofit improvements, regardless of where your home is located or when it was built. You can find specific guidance for listed buildings and homes in conservation areas in Section 3: Retrofit Measures.

Support and Advice

Beyond this Guide, the Council provides a range of support services that are available to those looking to undertake retrofit projects. Accessing these support services early in the process can help reduce delays and improve the quality of any planning application you need to make, where applicable. These services include:

- **Smarter Homes Hub and Handbook**: A resource for local residents with up-to-date information on grants and funding options and guidance on common approaches to retrofitting
- **Free pre-application advice service:** Available to applicants for all sustainability related proposals. This is encouraged especially for projects in sensitive heritage settings.
- **Ecofurb Planning Tool:** Richmond Council has teamed up with Cotality to give Richmond residents access to the Ecofurb Tool. This online tool allows you create a tailored plan for your home, based on your goals and your house type. There is no charge to use the tool. Ecofurb offers optional paid-for services.
- **Planning Webpages:** You may find further information on some of the topics covered in this Guide on the Council's planning webpages.

You may also find it useful to seek support from other organisations who offer retrofit support. Accessing support from these organisations at an early stage can be a useful way of identifying whether any funding may be available, which means you can make sure your retrofit project is designed in a way that is eligible. Organisations offering wider retrofit support include:

- **Greater London Authority (GLA):** Offering London-wide funding, including the Warmer Homes and Solar Together programmes.
- **UK Government:** Offering funding through the Boiler Upgrade Scheme (heat pumps) and Warm Homes Local Grant (WHLG)
- **Local energy advice services:** Impartial guidance available through Energy Saving Trust.

Relationship with Other Guidance

Retrofit is, understandably, a topic experiencing increasing attention in response to national climate change objectives and energy price volatility. A range of organisations have therefore produced helpful technical guidance to explain how home retrofit projects can be approached effectively.

This Home Retrofit Planning Guide aims to summarise the key elements of this wider guidance in a way that is simple and easy to apply in a Richmond context. However, these wider guidance documents provide further technical detail and can be reviewed by those wishing to learn more about retrofit opportunities and challenges.

Examples of wider guidance includes:

- The **LETI Climate Emergency Retrofit Guide** which includes detailed technical guidance on retrofitting homes, including a comprehensive retrofit roadmap, detailed retrofit targets for homes and case studies
- **Publicly Available Specification (PAS) 2035** which outlines the national standard for home retrofit projects. Working with a Retrofit Co-ordinator accredited under PAS2035 can help to ensure your retrofit project is successful.
- **Historic England guidance on Energy Efficiency and Retrofit in Historic Buildings**, which provides technical advice and guidance on how to approach retrofit projects to historic buildings, including listed buildings.

A full list of helpful resources is set out in Appendix 4 and can be found on the **Smarter Homes Hub**.

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1.4 Introduction to Retrofit Measures

There are a wide range of retrofit measures that can make your home more comfortable, healthier and cheaper to run.

Whilst this guide focusses on four of the most common and impactful types of retrofit where the planning process is most relevant, there are many "DIY" retrofit measures that you can usually do yourself and almost never require planning permission.

Examples of low-cost, low-effort retrofit measures you may be able to undertake yourself include:

- ✓ **Installing foil behind radiators** to reduce the amount of heat lost through walls
- ✓ **Repairing windows, walls and roofs and fixing draughts around the home**, including through windows, floors and doors, to reduce the amount of heat lost from your home
- ✓ **Installing LED lightbulbs** can significantly reduce electricity use and last much longer than halogen bulbs
- ✓ **Reducing your boiler flow temperature and thermostat** can reduce energy uses without compromising on your comfort
- ✓ **Applying solar control film to windows** can reduce the amount of heat that enters your home in warmer months

Further examples and advice on these low-cost, low-effort measures is included in the **Smarter Homes Handbook**.

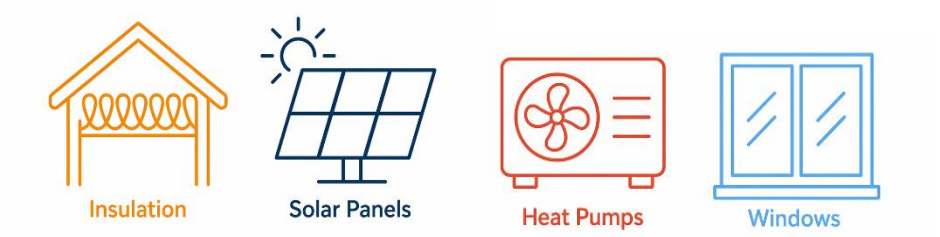


Table 1 provides an overview of the four main retrofit measures that form the focus of this guide. Further guidance on each measure is set out in Section 3: Retrofit Measures, along with best practice design advice and further information on when permission is needed.



Table 2 provides an overview of other retrofit measures that are not a focus of the Guide but nevertheless can be important considerations of any retrofit journey.

Many of the measures in the tables do not require planning permission as long as certain criteria are met, however there are exceptions so you should follow the guidance in this document to check.

For projects that do require planning permission, the Council aims to take a positive approach towards considering planning applications for home retrofit projects. Following this guidance means your project is more likely to be considered and framed in a way that supports Council approval.

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Table 1: Overview of Key Retrofit Measures In This Guide

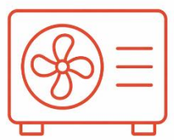
Measure	Description	Typical measures	Key considerations
 **Insulation** Insulation tailored to building age, construction and ventilation	Enhancing the thermal performance of a building often includes appropriate insulation. This can include installing loft and roof insulation to prevent heat loss through the top of the building and installing wall and floor insulation to improve overall energy efficiency. Homes built at different times and in different styles will have varying degrees of existing insulation (some may have none at all) and some types of homes may be more difficult to insulate than others.	• Internal insulation • Loft/roof insulation • Wall insulation (internal/external/cavity as appropriate) • Floor insulation	• Selecting measures that are compatible with the construction and materials of your home • Ensuring insulation is accompanied by appropriate ventilation of air and moisture to prevent damp and mould • Protecting character where the externally exposed masonry – including brickwork – forms part of the special character of historic areas and buildings.
 **Window and Door Upgrades** Upgrades to windows/doors and reduction of draughts to cut heat loss and improve comfort.	Upgrading windows and doors plays a key role in reducing heat loss from homes. This may involve replacing existing single-glazed or draughty windows with vacuum-, double- or triple-glazed windows. Alternatively, it may include secondary glazing, where a second independent pane of glass within a frame is installed on the internal side of the window, in some heritage or conservation settings where historic windows must be retained. These improvements can be complemented by other draughtproofing measures to enhance airtightness and improve thermal comfort.	• Repair and draught-proofing • Secondary glazing • Double/triple glazing where appropriate • Air-sealing gaps with planned ventilation	• Ensuring ventilation requirements are met as airtightness is improved • Protecting character where historic or traditional windows form part of the special character of historic areas and buildings
 **Heat Pumps** Systems that extract energy from the ground or air to provide heating and hot water within the home	To reduce reliance on fossil fuels and save money on energy bills, low-carbon energy systems such as air source or ground source heat pumps can be added to a home. Heat pumps provide energy-efficient heating and cooling to homes and can be paired with solar panels and batteries to create cost-efficient systems.	• Air-source heat pumps • Ground-source heat pumps	• Ensuring that homes are sufficiently insulated and airtight prior to installing heat pumps to maximise their cost, comfort and carbon saving benefits • Designing a system that meets the peak heat demands of your home • Ensuring the location of the heat pump, and any emitters, is appropriate to the design and layout of the home
 **Solar Panels, Thermal Systems and Batteries** Systems that harness solar energy to reduce fossil fuel use and/or generate renewable energy.	Solar photovoltaic (PV) panels and solar water heating can be installed on the roof and, sometimes, walls of homes to generate renewable electricity and/or hot water. These panels help generate renewable, zero-carbon energy within your home, reducing reliance on the national grid and saving money on energy bills. They are often most effective when combined with battery storage and an inverter.	• Solar PV • Solar thermal systems • Battery storage (where appropriate)	• Ensuring orientation and siting of panels maximises efficiency and avoids natural shading • Protecting character where historic or traditional roof rooms and materials form part of the special character of historic areas and buildings.

Table 2: Overview of Other Retrofit Measures to Consider

Measure	Description	Typical measures	Key considerations
 **Internal heating and hot water system upgrades** Modernising heating infrastructure and controls to improve efficiency and comfort.	Where particularly old heating systems remain in use, and it is not possible to install air or ground source heat pumps, replacing outdated gas boilers with high-efficiency new models or electric radiators can still be effective at reducing emissions and lowering costs. It may also be possible to install better heating controls for better temperature regulation, or to install more efficient radiators. These changes each help to reduce energy consumption and improve comfort.	• High-efficiency boiler replacement (where relevant) • Heating controls (zoning/thermostats) • Radiator upgrades • System balancing and pipe insulation	• Using the right size emitters and controls for your home • Optimising system settings to reduce energy use and improve comfort
 **Smart controls** Low-energy comfort measures and controls that reduce overheating and optimise energy use.	Smart controls and energy monitoring can significantly enhance efficiency by allowing systems to respond dynamically to occupancy, temperature, and energy tariffs. This can include heating or electronic systems that only use sensors or smart controls to avoid wasting energy when the home, or particular rooms, is unoccupied. These controls help residents understand and manage their energy use, maximise self-consumption of renewable electricity, and maintain comfortable internal conditions. Passive design measures can also be used to enhance comfort without relying heavily on mechanical systems. These can include the use of shading or tree planting to reduce solar gain or adding natural ventilation to reduce overheating.	• Shading devices • Natural ventilation strategies • Sensor-based heating and lighting • Smart controls (occupancy/tariff optimisation)	• Ensuring design and controls work with the building's layout and your energy needs
 **Greening and natural improvements** Natural enhancements that increase resilience to climate change, improve surface water management and reduce heat island effects	Additional greening around a home can complement energy efficiency improvements and contribute to wider environmental goals. This could include the addition of green roofs and walls, replacement of impermeable surfaces with permeable surfaces, or new planting which promotes climate change mitigation and offers shelter. Further advice on green roofs and walls can be found in our **Biodiversity SPD**. Further advice on native planting can be found in our **Trees and Development SPD**.	• Green roofs and walls • New planting • Replacement of impermeable surfaces with permeable surfaces	• Carefully planning where greening takes place to maximises multiple benefits such as shading and improved drainage • Prioritising native species that support local ecosystems

1.5 Retrofit and Planning

This guide aims to help explain the circumstances in which planning permission, or other permissions such as listed building consent, may be required from the Council.

Many home retrofit projects do not require planning permission from the Council, but this Guide can help you understand when you do. Where **planning permission** or **Listed Building Consent** is required, you will need to apply for permission before starting your project.

Most retrofit improvements that are wholly internal, such as loft insulation, internal wall insulation, or secondary glazing do not require planning permission. In addition, the Government has granted an automatic permission called **permitted development** that means homeowners can carry out certain small-scale external retrofit projects without having to apply for planning permission themselves. This includes installing heat pumps, solar panels, changes to windows and external insulation, subject to meeting certain criteria and restrictions often relating to size, location and materials. Some permitted development rights are not available for flats.

External improvements that do not meet permitted development criteria, especially where a home is a **listed building** or is located within a **conservation area**, will usually require planning permission. There are also some locations in the Borough where permitted development rights for certain retrofit projects have been removed by the Council through an **Article 4 Direction**. This usually relates only to conservation areas. If your project would usually be permitted development but you live in an area covered by an Article 4 Direction that removes those permitted development rights, you will need to apply for planning permission. Further guidance on understanding if you are affected by an Article 4 Direction is provided in later sections.

If your home is a listed building, a separate type of permission called listed building consent is also likely to be required whether your improvements are internal or external depending on the extent to which the work would impact the **significance** of the listed building. Further guidance is provided in later sections.

Guidance on when retrofit improvements are likely to require planning permission or listed building consent, including easy-to-follow flow charts, are available in Section 3: Retrofit Measures.

If your improvements do require planning permission or listed building consent, see Section 4: The Planning Process for guidance on how to prepare a successful application.

Where a technical term is highlighted in **blue bold,** you can find a detailed definition in Appendix 4: Glossary.



2. First Steps to Retrofitting

2.1 The Retrofit Journey

Everyone's retrofit journey will be different based on things like:

- ✓ The existing condition and energy performance of your home
- ✓ The character and appearance of your home and of the wider neighbourhood your home is in
- ✓ Whether your home, or the neighbourhood it is in, is of historical or architectural significance
- ✓ Your own priorities
- ✓ Your budget

Working with a retrofit co-ordinator can be a useful place to start, particularly if your project is more complex. Depending on your project, this might be a person with a background in surveying, architecture, building or installation. They can assist you with creating a Whole House Plan, which is a detailed survey and a retrofit roadmap for your home, outlining the measures you need to make your home as energy efficient as possible and achieve your retrofit goals.

When looking for advice on retrofitting, it can be helpful to use a PAS 2035 registered professional. PAS 2035 refers to the British Standard for retrofitting dwellings, provides a specification for the energy efficiency of home retrofit projects and sets out best practice guidance. The Trustmark website has a 'Find a local Tradesperson' function where you can search under terms such as "Retrofit" and "PAS 2035".

A Whole House Plan usually includes:

- **A Detailed Survey** – survey of heat loss, existing conditions, insulation, heating systems, moisture and ventilation analysis, significance and any constraints.
- **Prioritised retrofit measures** – advice on which retrofit measures would be most effective at improving the energy performance of your home and the order in which they be implemented.
- **A phased approach** – the plan should detail smaller and easier steps as well as larger and more complex works. The plan could break the project down into steps which might start with some 'easy wins'
- **Compliance with building regulations and planning guidance** - working with professionals will help you navigate the planning and building regulations process

If your retrofit project is more straightforward or your budget is more limited, you may be able to undertake some of the early stages of your retrofit project yourself. Following the advice in this Guide is an important way of ensuring that your improvements are effective and your expectations will be met.

Figure 2 outlines the simple steps that should be taken in a typical retrofit journey. This has been designed to broadly align with other industry guidance. If you wish to understand each step in greater technical detail, please consider reviewing the LETI Climate Emergency Retrofit Guide and the PAS 2035 Specification.

Figure 2: Steps to Home Retrofit

No matter your goals or budget, following consistent key steps that can put you on the right course to achieve your retrofit goals.

1 **Understanding Your Goals**
- Identify your motivations
  - Reducing emissions?
  - Reducing bills?
  - Improving indoor comfort?
- Consider appointing a PAS2035 Retrofit Co-ordinator
- Set your budget and apply for grants

2 **Understanding Your Home**
- Identify the period and construction of your home
- Identify whether your home is listed or in a conservation area
- Undertake energy and condition surveys
- Revisit Your Goals if necessary

3 **Identify the Right Retrofit Measures**
- Consider available options and relative benefits using advice in Section 3
- Apply the Whole House Approach and Fabric First Principle
- Apply Circular Economy Principles
- Plan for Adequate Ventilation
- Work with your co-ordinator or advisors to design your project

4 **Secure Any Permissions Needed**
- Check if planning permission or listed building consent is required.
  - If so, seek pre-application advice where appropriate, and apply to the Council following the guidance in Section 4.

5 **Plan, Buy and Install**
- Use accredited suppliers and installers to implement your retrofit project

6 **Monitor Success and Set Further Goals**
- Monitor changes to energy bills and comfort
- If room for improvement, consider new goals or implementing further retrofit improvements



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2.2 Understanding Your Home

Understanding your home is an important first step in identifying the right retrofit measures for it. Working with a PAS2035 Retrofit Co-ordinator or other professional can help you understand the characteristics of your home and the measures that are most suitable.

A good starting point is to identify the type or period of home that you live in. Some aspects may be fairly obvious, such as whether your home is a house or a flat, and whether it is detached, semi-detached or terraced. This information can be important to understanding what will and will not require permission. Similarly, whilst many homes have been substantially altered after they were constructed, there are general trends within different period of homes, such as the materials or construction methods used, that can help in understanding the retrofit opportunities. For example, homes built before about 1920 very rarely have cavity walls, which limits the types of wall insulation available. The London Building Age Map can be a useful place to start but may not always be accurate for your specific home. More information is provided in Appendix 1: Typical Retrofit Opportunities By House Type.

You should also identify if your home is a listed building or located in a conservation area. This is relevant to understanding whether you will need permission. The quickest way to check is by using our interactive online map where you can search for your property. If your home is in a Conservation Area, it is also a good idea to use the same map to check if it is covered by an Article 4 Direction. Where your property is covered by an Article 4 Direction, you can find out which permitted development rights are removed by clicking on it and reading the information in the pop-up box. You should note this information for use with the flow charts provided later in this guide.

If you are planning to improve the fabric of your home, **it can be a good idea to carry out energy and condition surveys early**. British Standard 40104 has introduced a standardised approach to carrying out some elements of a retrofit survey. The purpose of an energy survey is to understand how efficiently energy is used within your home and how heat might be escaping. This can involve simply reviewing energy bills, particularly if you have a smart meter which logs use over time, EPC ratings or use of tools such as thermal imaging cameras. The purpose of a condition survey is to check the condition of your home's structure, particularly where this is having an impact on energy efficiency. This might include identifying the extent and performance of your existing insulation, or any gaps or damage to your home's windows, wall or roof through which heat escapes. It may also include checking whether the condition of your home's walls, floor or roof are suitable for different retrofit measures, such as mounted solar panels or additional insulation. Further guidance on surveys is set out in the Smarter Homes Handbook.

If you already have a good idea of the measures that you are interested in, it can also be a good idea at this stage to think about whether your home presents any particular opportunities or challenges when it comes to installing different measures. These can be used to inform how you apply the guidance in the following sections.

For example:

- Do you have a discreet garden shielded from public view, or is your garden more visible (e.g. a corner plot)? More discreet locations are usually preferred for heat pumps but other options are possible
- Which orientation do your roofs slope? South is usually best for solar panels, but east and west are also good
- Do you have any outbuildings, such as a detached garage, which might be able to support solar panels?

2.3 Applying the Whole House Approach and Fabric First Principles

The Council strongly encourages anyone looking to undertake home retrofit to follow a **Whole House Approach**.

A Whole House Approach means thinking about your home as one interconnected system and recognising that changes in one area can significantly affect another. This approach helps to achieve lasting improvements while minimising the risk of unintended consequences. There are several pitfalls linked to not following the Whole House Approach which can undermine the goals of retrofitting your home. For example, upgrading your home's insulation or windows without providing for adequate ventilation can significantly increase the risk of condensation and mould if moisture cannot effectively escape. Similarly, installing heat pumps without checking if your home's heating system is compatible may lead to unexpected costs if your heating system needs to be upgraded later.

The Whole House Approach is particularly important in Richmond, where there are a high number of older properties, homes built using traditional materials or construction methods and particularly sensitive townscapes. These factors mean the most effective approach to retrofit may vary significantly between different types of home.

Whilst the Whole House Approach is important, it is equally important to remember that following it does not mean you need to retrofit your whole house at once

Linked to the Whole House Approach is the **Fabric First Principle**. By fabric first, we mean prioritising repairs and improvements to the physical fabric (materials) of the building, including the walls, roof, cladding, windows, doors, and airtightness. Prioritising the fabric first helps to ensure that the retrofit measures you install later will be as effective as they can be. For example, your new heat pump may be much less effective if much of the heat it generates is being lost through draughty windows or uninsulated walls.

Table 3 below identifies key steps to a retrofit project which can be used as the starting point for considering the right approach for your home. The table demonstrates the ideal order in which different retrofit measures should be planned and implemented.

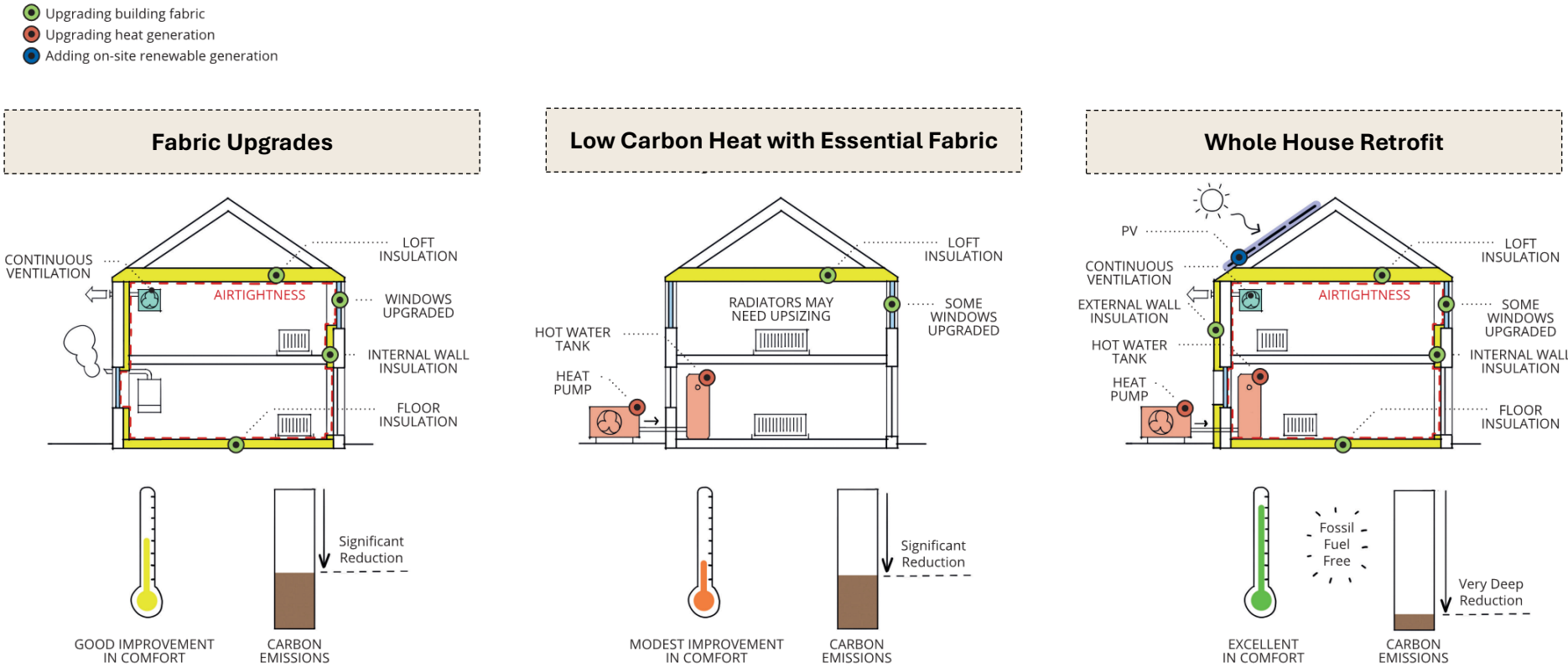
Whilst the fabric first principle is important, it should not be seen as strict rule and the approach that is right for your home will always depend on your specific circumstances, including the performance of the existing fabric and the availability of funding at that time (whether grant funding or your own). If your insulation and windows are not performing well, repairing or upgrading them first is likely to mean other measures such as heat pumps work much more effectively. However, solar panel performance will not be directly improved by fabric improvements and installing a heat pump to a home with imperfect fabric is still likely to achieve significant benefits. Sometimes the most effective approach to retrofit will need to be slightly opportunistic, as funding may only be available for one measure, or you may already be planning certain improvements to your home which means it makes sense to add a heat pump or solar panel at the same time. Figure 3 shows how different measures can be combined in different orders to deliver different benefits.

Ultimately, working with a PAS2035 Retrofit Co-ordinator or other qualified person can help design the right plan for your home.

Table 3: Steps to the Whole House Approach

Stage	Strategy	What it involves	Examples (Typical Measures)	Objectives
1	**Repair and restore the building fabric**	Repairing and fixing any existing issues with the home's existing fabric Must be combined with a proper ventilation strategy to compensate for improved airtightness	• Repair and draughtproof windows and doors • Repair any damage or gaps in walls, floors and roofs •Airtightness improvements with adequate ventilation	✓ Creates the proper foundations for all further retrofitting ✓ Reduces heat loss ✓ Cuts existing energy bills ✓ Ensures further retrofitting measures can be efficient
2	**Upgrade the building fabric**	Upgrading insulation, windows/doors and airtightness further to a high standard Must be combined with a proper ventilation strategy to compensate for improved airtightness	• Loft/roof insulation • Wall/floor insulation (where appropriate) • Secondary glazing • Upgrading windows to more efficient glazing	✓ Reduces heat loss even further ✓ Makes any future heating system more efficient and cheaper to run
3	**Upgrade heat generation**	Replacing gas/oil heating systems with more efficient, low-carbon heat pumps	• Air-source or ground-source heat pump • Hot water cylinder upgrades • Low-temperature emitters (radiators/UFH) where needed • Smart controls and balancing	✓ Heats home with low-carbon electricity, rather than gas or oil ✓ Requires less energy to heat home ✓ Reduces running costs of home heating system
4	**Add on-site renewable generation**	Installing renewable technologies (such as solar panels) to generate electricity/heat on your home	• Solar PV (often with battery storage where appropriate) • Solar thermal for hot water • Smart controls / tariffs to maximise self-use	✓ Helps off-set home electricity use with low-carbon sources ✓ Reduces dependency on the national grid ✓ Reduces energy bills further

Figure 3: Achieving Cumulative Benefits from a Fabric First Approach



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Applying Circular Economy Principles

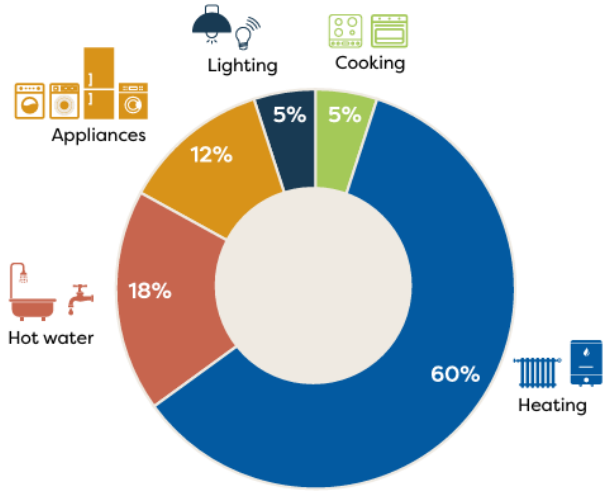
One of the Council's main ambitions in supporting local residents to retrofit their homes is to help reduce the Borough's overall carbon footprint. Reducing both operational and embodied carbon through retrofitting existing buildings is essential to achieving Richmond's net-zero target by 2043.

Whilst **circular economy principles** will not usually be assessed as part of any small-scale planning application, following the advice in this section can help you minimise the operational and embodied carbon of your retrofit project and contribute to the Council's climate ambitions.

Historically, the main source of carbon emissions from homes was **operational carbon**. Operational carbon means the carbon used to "operate" homes, such as the carbon used in heating them or to carry out day to day activities. As shown by Figure 4, around 78% of a home's typical energy use comes from heating water, whether centrally or for washing. Whilst operational carbon remains high, it has significantly fallen due to improved energy efficiency of homes and the decarbonisation of the national grid. Retrofitting offers a great opportunity to reduce operational carbon further, by improving the energy efficiency of your home (i.e. the amount of energy it takes to heat your home to a comfortable temperature) through insulation and airtightness, by replacing gas for electricity, and by generating low-carbon energy on-site, through a heat pump or solar panels.

On the other hand, **embodied carbon**, the emissions generated by producing and transporting the construction materials, remains significant. You can help ensure your retrofit project minimises embodied carbon by following the circular economy principles set out in the box and expanded on the next pages.

Figure 4: Typical Energy Use in a Home



Following circular economy principles means minimising the lifecycle impacts of materials and construction by:

- ☑ Prioritising repair over replacement,
- ☑ Reusing materials,
- ☑ Sourcing materials from responsible sources, and
- ☑ Choosing materials that are naturally lower in embodied carbon.

Prioritising Reuse and Repair

Reusing and repairing existing features and materials almost always results in the lowest carbon impact. Where existing materials are structurally sound, repair should take priority over replacement.

Where retrofit projects require planning permission, it can be helpful to briefly document how you have prioritised reuse and repair as part of your application.

In practice, prioritising reuse and repair means:

- ☑ Retaining and refurbishing existing brickwork, joinery, windows, doors and roof coverings
- ☑ Reusing materials on site, for example, salvaged bricks or tiles reused in landscaping or extensions
- ☑ Sourcing reclaimed or surplus materials from local reclamation yards or circular-supply platforms.

Selecting Low-Carbon and Reusable Materials

When using new materials, the selection of materials can play an important role in their environmental performance. In general, lower carbon materials include:

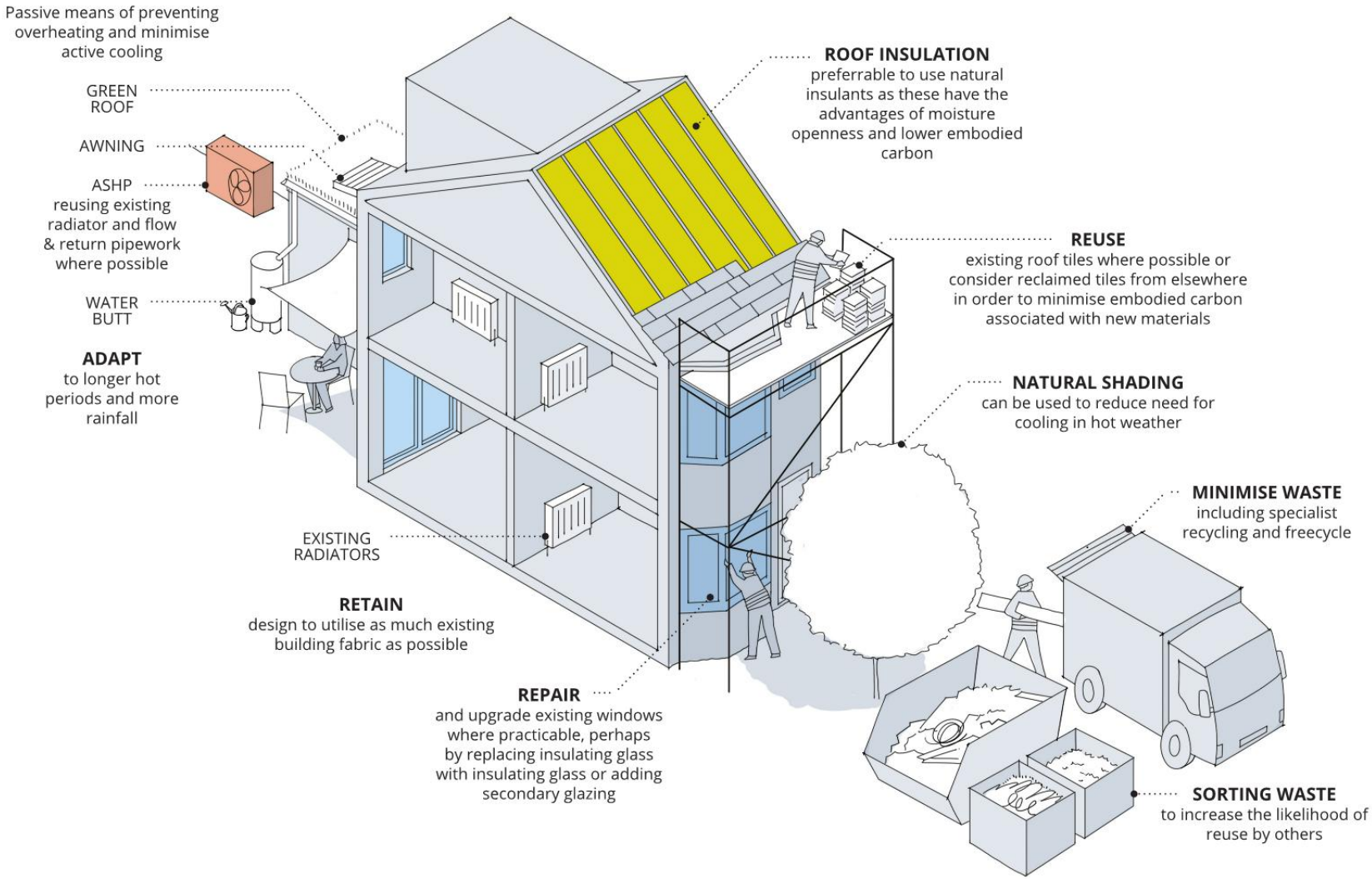
- Natural or recycled products (timber, lime plaster, cellulose or wood-fibre insulation)
- Locally manufactured items to reduce transport emissions
- Low-impact alternatives to concrete and petrochemical products, such as limecrete or recycled aggregates.

Environmental Product Declarations (EPDs) or third-party verified data can be an effective way of comparing material options.

The table below gives some examples of the indicative carbon reduction potential of lower-carbon materials. Further guidance on materials is included in the relevant sections on different improvements.

Higher Carbon Material	Typical Low-Carbon Alternative
Conventional concrete	Limecrete or recycled aggregate concrete
Foam insulation	Wood-fibre, hemp, or cellulose insulation
PVC window frames	Timber or aluminium-clad timber frames
New brickwork	Reclaimed bricks or lime-mortared re-use

Figure 5: Circular Economy Principles for Retrofit



2.5 Planning for Adequate Ventilation



Whilst repairing and upgrading the "fabric" of your home is a crucial part of any retrofit project, doing so can change how air and moisture flows in, out and through your home.

Moisture is a natural and unavoidable feature of all homes. It comes from a number of sources, including bathrooms and kitchens in which water is most used, but also simply breathing.

A good way to think about the role of ventilation is to remember that the ways in which heat is lost from your home may also be the way in which air and moisture circulate in and out of your home. Whilst preventing heat loss is necessary to increase the energy efficiency of your home, doing so can also close off routes for air and moisture to escape. Without adequate alternative ventilation, this can lead to increased risks of condensation and mould. This can pose health risks and traditional construction materials can be vulnerable to damage from moisture build up in the long-term.

Generally, the appropriate ventilation approach for your retrofit project will vary based on how well ventilated your existing home is and the materials it is built from. It is important to work with a PAS 2035 Retrofit Co-ordinator or other professional who can survey your home and advise on the appropriate ventilation approach. They can also ensure your ventilation meets Part F of the Building Regulations which set out the technical requirements for ventilation in homes.

In many cases, ventilation improvements will not need planning permission in their own right if they do not affect the external appearance of your home, however you may need permission if new external outlets are required, such as for Mechanical Extract Systems.

Since ventilation will usually be accompanying wider retrofit improvements, it is likely it can be considered as part of the same application.

Whilst the appropriate ventilation approach will depend on your home and particular circumstances, there are a number of general principles that can be applied to successful ventilation:

- ☑ For buildings pre-dating 1920s construction, prioritising the use of breathable and permeable materials for insulation to allow moisture to flow
- ☑ Having your home surveyed prior to upgrading insulation or windows to understand existing moisture flows and to identify any "thermal bridges" (where cold parts meet warm parts) that attract condensation and moisture. This means insulation and windows can be installed to resolve and avoid thermal bridges.
- ☑ Ensuring any draughtproofing or airtightness improvements to your home's walls, roof, windows or doors are accompanied by improvements to ventilation where required, such as new trickle vents, air bricks or mechanical extractor systems

Further advice on planning for adequate ventilation is included in the detailed guidance on retrofit measures set out later in this section, where relevant. The Council's Smarter Homes Handbook also includes further guidance on how to maintain and improve ventilation in your home.

Table 4 below provides a simplified overview of some examples of ways in which ventilation can be incorporated into retrofit projects. In many cases, these options may be combined as part of a system.

Table 4: Overview of Ventilation Options for Retrofit Projects

Type of Ventilation	Description	Considerations
Trickle Vents 	Trickle vents are small, often manually opened, vents, that can be installed within or around windows and doors to allow some air to flow even when the window or door is closed	Trickle vents can be important to consider when undertaking draughtproofing or airtightness improvements, or upgrading or replacing windows or doors, to ensure that air can continue to flow. They will generally be suitable for most modern windows but may be inappropriate for some historic windows or particularly in listed buildings, where brush seals may be more appropriate.
Air Bricks 	Air bricks can be installed on certain external walls to allow air to flow into the home, particularly in cavity walls and under timber floors	Air bricks may be useful to ensure proper ventilation when undertaking upgrades to wall insulation but their suitability will depend on the materials used in the construction of the home. Smart air bricks are available which open and close intermittently based on environmental conditions, which can help balance moisture control and heat loss.
Continuous Extractor Systems 	Extractor systems are often used in kitchens and bathrooms to cycle air in and out of the room. They can be controlled directly or be installed using a sensor for intermittent demand	Continuous extractor systems can be an effective way of managing moisture in one particular room, particularly where there are other sources of fresh air such as trickle vents. Sensor controlled systems can help ensure energy is only used to operate the system when needed for moisture control.
Whole House Mechanical Ventilation and Heat Recovery (MVHR) 	A mechanical system, often installed in loft space with ducts through the whole home, that cycles fresh air from outside and recovers heat before exhaust air is released.	A MVHR is a sophisticated system that is likely to be suitable for whole house retrofit projects and can be co-ordinated around other improvements such as insulation or upgrades to heating systems. An MVHR can recover a significant amount of the wasted heat in a room, helping to deliver substantial moisture control and energy efficiency improvements to the home. Systems requiring external changes may require planning permission and will need to aim to minimise impacts on the appearance of the building and surrounding area. MVHR systems are less likely to be appropriate for listed buildings where they require significant changes to historic fabric, unless for example, historic internal fabric has already been lost.

3. Retrofit Measures

3.1 Insulation

3.1.1 Introduction to Insulation

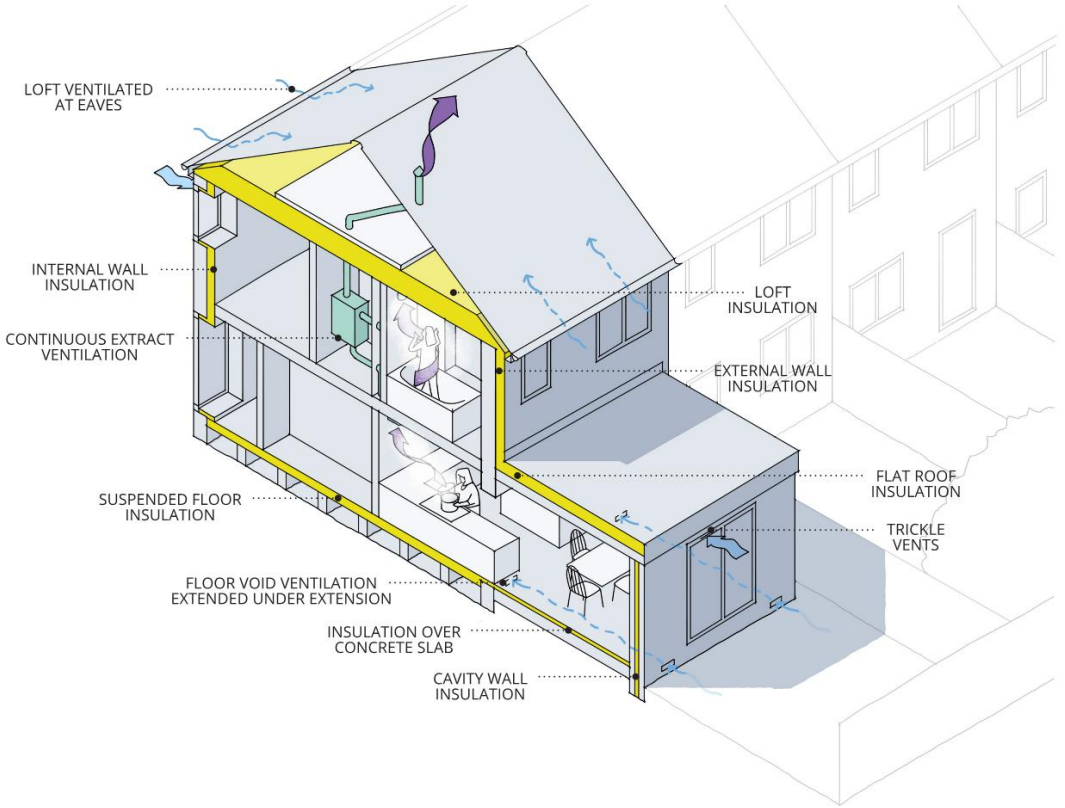
Improving the insulation of your home is one of the first steps to a retrofit project following the fabric first approach. By improving the fabric of your home, you lower its overall energy demand. This means that when low-carbon energy sources like heat pumps are installed, they operate at lower cost, as they do not need to use as much energy to meet heating needs. Insulation helps to control the comfort of your home in two main ways. It keeps heat inside your home during the colder months, and it keeps heat outside your home during the warmer months.

Improving insulation and airtightness without adequate ventilation can trap moisture indoors, resulting in mould and damage to the building. A successful retrofit project therefore needs to accompany any new or upgraded insulation with adequate ventilation.

There are significant benefits to installing insulation wherever your home loses most heat. As a general guide, an uninsulated home typically loses approximately 35% of its heat through the walls, 25% through the roof, and a further 10% through the floor. The best application of insulation for your home will depend on the design and construction of your home and the presence or quality of existing insulation.



Figure 6: Different Insulation and Ventilation Options for a Home



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3.1.2 Types and applications for Insulation

There are a range of different ways you can insulate your home which vary between whether the insulation is added internally (i.e. inside the fabric of your home) or externally (i.e. to the outside of your home), as well as the area of your home that the insulation targets.

Table 5 sets out an indicative comparison of the main types of insulating material available in terms of their thermal performance, breathability and embodied carbon. Choosing appropriate materials for different applications will vary depending on factors such as whether the material will be installed internally or externally, the installation method and the space available.

Some forms of insulation only come available in pre-constructed boards or rolls, whilst others are available as sprays or mixtures. The characteristics of insulation that should be prioritised are its thermal performance and breathability, to ensure it is effective and avoids accumulating moisture. Prioritising an insulating material with a lower embodied carbon intensity can help further reduce your carbon impact, however some materials with relatively high embodied carbon intensity may be best performing overall in some circumstances.

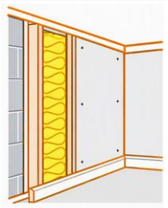
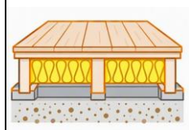
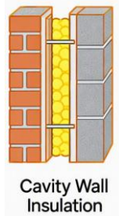
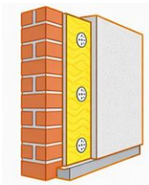
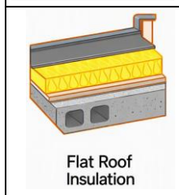
Working with a retrofit co-ordinator or qualified insulation installer will help you understand the range and performance of materials that may be suitable for your project and ensure that you have an appropriate ventilation strategy in place.

Table 6 provides a comparison between the main types of insulation that can be installed within a home.

Table 5: Indicative Comparison of Insulation Materials

Insulation Material	Example Applications	Thermal Performance	Breathability	Embodied Carbon Intensity
Wood fibre	Walls, roofs and lofts	Medium	High	Low
Cellulose	Lofts and cavity walls	Medium-high	High	Low
Lime plaster	Walls, roofs and floors	Medium	High	Low-medium
Hemp	Walls, roofs and floors	Medium	High	Low
Cork	Walls, roofs and floors	Medium-high	High	Low
Glass or rock wool	Walls, roofs and lofts	Medium-high	Medium	Low-medium
Spray foam	Cavity walls and lofts	High	Low	High
Expanded Polystyrene	Walls, roofs and floors	Medium-high	Low	High
Polyisocyanurate	Flat roofs	High	Low	Medium-High

Table 6: Types and Applications of Insulation

Insulation Type	Energy Saving Potential	Description	Typical Applications	Considerations for All Applications	Considerations in Heritage Applications
 Internal Wall Insulation	**High – up to 35% of heat is lost through walls**	Insulation installed on the inside surface of the exterior walls of your home. There are several different internal wall insulation products, varying from rigid insulation boards fixed to the existing wall, timber stud frames filled with insulation and insulated plasters.	Any home with solid walls	• Adequate ventilation is required to avoid condensation on internal walls • Checking and ensuring the face of the wall is sound and free from defects • Internal wall insulation can reduce the floor area of rooms in which it is applied • Use breathable paints or wallpapers to ensure moisture can dissipate through insulation.	Unlikely to be the first priority where historic interiors, finishes and fittings remain in place, as internal wall insulation can cause these to be lost. However, internal wall insulation may be suitable for buildings where the historic interiors have already been lost or standard homes in conservation areas where internal work does not require permission.
 Floor Insulation	**Medium – up to 10% of heat is lost through floors**	Insulation involving adding material to the construction of your floor. It is usually installed only on the ground floor. In the UK there are typically two types of floors – suspended timber floors found in period and early 20th century homes and concrete floors found in post-war and modern homes. The approach to floor insulation will depend on the type of floors you have.	Any home	• Adequate ventilation below the floor is required to avoid moisture and condensation. • Floor insulation is particularly important when you are looking to install underfloor heating loops as part of a new heat pump system	Insulation is entirely internal and, provided it is installed appropriately, can generally avoid impacts on historic building fabric. Floor insulation will be less appropriate in cases where historic floor surfaces survive in place underneath a modern floor. Reversible and permeable insulation should be prioritised.
 Cavity Wall Insulation	**Medium to High – up to 35% of heat is lost through walls**	Insulation installed in the cavity between two external walls. The most common way of insulating cavity walls is by drilling a series of small holes into the mortar and injecting the insulation material into the cavity. Cavity wall insulation can typically be fitted in homes built after the 1930s.	Only homes with cavity walls (typically built after the 1930s)	• Adequate ventilation is required to avoid condensation. • Insulating the edges of cavities may need additional care as the installation process for cavity wall insulation can make it difficult to exactly place or contain the insulation in situ, leading to cold spots.	Any home with modern cavity walls is generally likely to be suitable for cavity wall insulation. Where more historic buildings have gaps between external wall surfaces, cavity insulation could be an option, particularly where it involves replacing existing material with higher performing insulation. However, some historic buildings with early examples of cavity walls need to be treated as a solid wall.
 External Wall Insulation	**High – up to 35% of heat is lost through walls**	A layer of insulating material added to the outside walls of a building and coating this with a protective render or cladding. The total depth of this layer typically ranges from around 50mm to 130mm, depending on the system used.	Homes built post-war and some older homes where restricted to walls not visible from public spaces	• Adequate ventilation is required to avoid condensation. • Care needs to be taken to avoid thermal bridging and cold spots where external insulation meets windows, party walls and edges.	External wall insulation obscures and may damage external building fabric which is likely to harm significance. External wall insulation is unlikely to be the priority for listed buildings and some homes in conservation areas. However, there may be more flexibility to externally insulate walls that are not visible from public spaces in conservation areas.
 Loft Insulation	**High – up to 25% of heat is lost through roofs**	Insulation laid in between and over the floor joists. Standard loft insulation is suitable for most homes and is typically supplied in rolls. If you have a pitched roof, then loft insulation will usually be sufficient unless you intend to make the loft into a habitable room. Some loft insulation can be installed by the homeowner themselves.	Any home	• Adequate ventilation in the loft is required to avoid condensation, including to avoid supercooling in winter, having regard to British Standard 5250 • Care needs to be taken when installing loft insulation to avoid heat loss in the corners of the loft and around the loft hatch.	Insulation is entirely internal and generally avoids impacts to historic building fabric. Reversible and permeable insulation should be prioritised.
 Flat Roof Insulation	**High – up to 25% of heat is lost through roofs**	Insulation installed as an overlay to the existing roof covering (only if the roof structure is sound) or as a total renewal where the roof is insulated above the structure and a new roof covering is installed.	Homes with flat roofs	• A vapour control layer may be required on the warm side to prevent moisture build up and damage.	Appropriateness will depend on historic significance of existing roof and extent to which materials require removal. Where appropriate, reversible and permeable insulation should be prioritised.

3.1.3 When is permission required?

Internal Insulation (Wall, Cavity, Floor or Loft)

Planning permission is not normally required for fitting internal insulation where there is no change in your home's external appearance. Installing internal wall, cavity, floor or loft insulation therefore does not usually require planning permission.

If your home is a listed building, you will often need listed building consent for internal insulation. You can find out more in Appendix 2: Guidance on Insulating Listed Buildings

External Wall Insulation (EWI)

For external wall insulation, what requires permission varies depending on specific circumstances:

- **If your home is a flat**, you will always need planning permission to install external insulation.
- **If your home is a listed building,** you will need listed building consent to install external insulation.
- **If your house is not in a conservation area,** you will not need planning permission as long as the materials used are of a similar visual appearance to those used in the construction of the existing house. You will need planning permission if you wish to use materials that are of a different visual appearance to your existing house. Further guidance is available in the next section.
- **If your house is in a conservation area not covered by an Article 4 Direction**, planning permission is not required for external insulation as long as the materials used are of a similar visual appearance to those used in the construction of the existing house and your external insulation would not involve cladding your home in stone, artificial stone, pebble dash, render, timber, plastic or tiles. If you plan to clad your home in any of these materials, you will require planning permission.
- **If your house is in a conservation area that is covered by an Article 4 Direction**, you will need to use the Council's online Article 4 map to check whether the Article 4 Direction affects all walls or only those fronting on a highway (e.g. a road or footpath) or an open space. Where the Article 4 Direction affects all walls, any external insulation will need planning permission. Where the Article 4 only affects certain walls, you will only need planning permission if you plan to install external insulation on those walls.

A flow chart to help explain whether your insulation is likely to require permission is included on the next page.

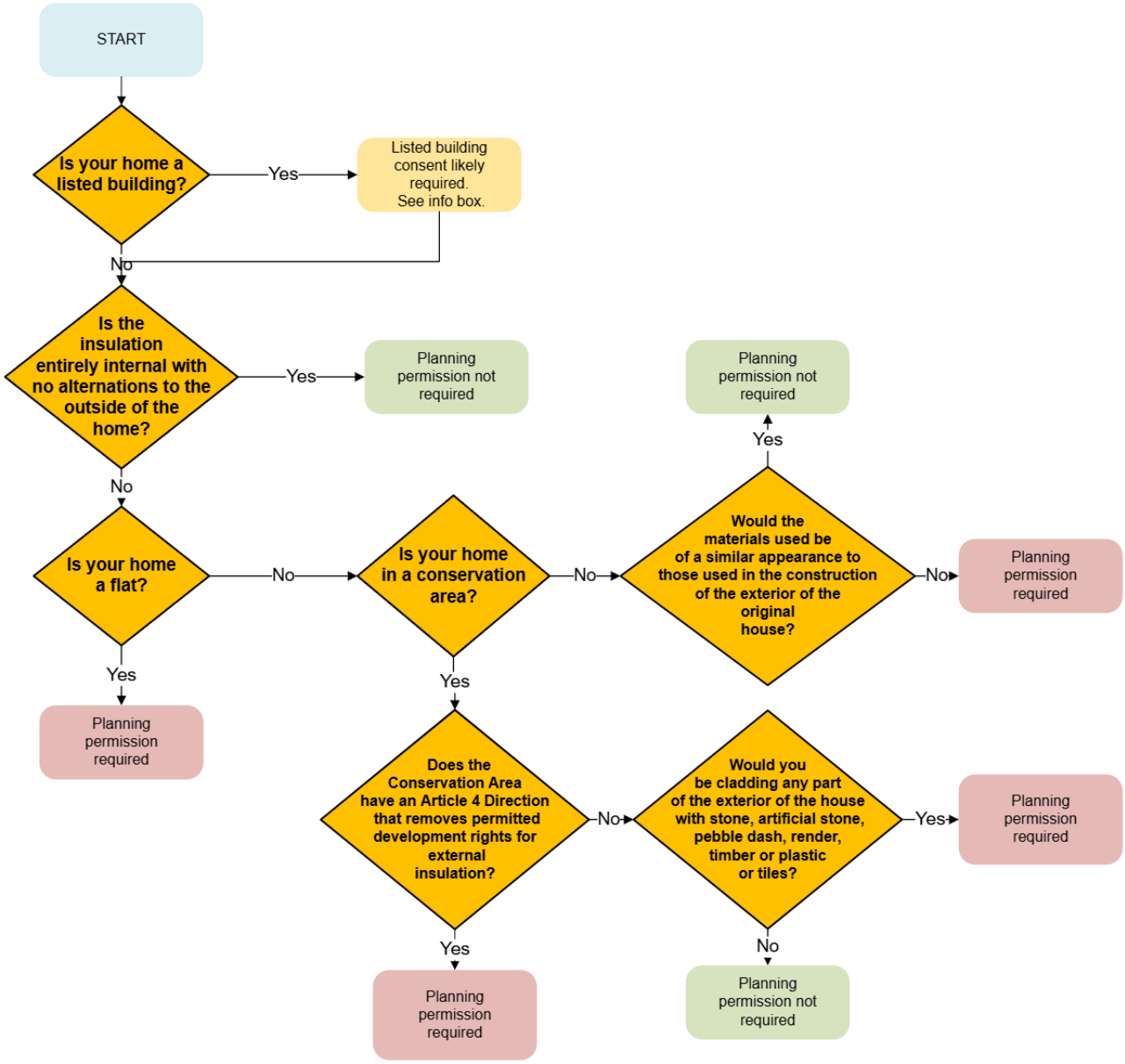
What if my insulation needs permission?

If your insulation needs permission, you will need to make an application to the Council before you carry out your project. Further advice on making an application for planning permission or listed building consent is set out in Section 4: The Planning Process.

The next two sections provide detailed advice which can be used to maximise your chances of having permission approved. The first provides general advice on best practice in relation to design and the second provides more specific advice on how to approach insulation in heritage settings.

Don't forget: If you believe your proposed external insulation works do not need planning permission, but you would like the comfort of written confirmation from the Council that this is the case, you may wish to apply for a Lawful Development Certificate. Further advice on Lawful Development Certificates is included in Section 4: The Planning Process.

Flowchart: Does my insulation need permission?



Useful Tips

Certain forms of internal insulation may not require listed building consent if they do not interfere with or affect the 'fabric' of the building. This can include loft insulation, for example. Further guidance is set out in Appendix 2: Guidance on Insulating Listed Buildings.

If your home is covered by an Article 4 Direction, you can use the interactive Article 4 Map to identify whether permitted development rights for external insulation have been removed for your home.

Please note, some Article 4 Directions only remove permitted development rights for external insulation fronting onto a highway or open space. In practical terms, this means insulation on the outside of a wall or roof that faces onto a highway (such as a road, footpath or other passage over which the public can travel) or an open space (such as a park or public garden). If your home is affected by this type of Article 4 Direction, any insulation that would front onto a highway or open space will require planning permission. Any insulation that would not front onto a highway or open space should follow the "No" branch to determine if permission is required.

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3.1.4 Best Practice Design Guidance for Insulation

Internal Insulation

As internal insulation does not usually require planning permission, you are unlikely to need to consider specific planning considerations when developing an insulation strategy. Instead, you should work with a Retrofit Co-ordinator or other professional to develop an insulation strategy that works best for your home. Your insulation strategy should have regard to the guidance on ventilation, thermal bridging and choice of materials set out in this section, and you should confirm with your installer that your insulation will satisfy Part L of the Building Regulations.

External Insulation

Outside of conservation areas, external insulation will only require planning permission if you choose materials that are not visually similar to those used in the external finishes of your existing home. For example, if your home is constructed from red bricks then external wall insulation added without planning permission will also need to be finished with red brick.

A key consideration for external insulation that requires planning permission is visual impact. When done badly, external insulation can detract significantly from the design of your home and harm the character of the neighbourhood.

The characteristics the Council will consider when assessing proposals for external insulation requiring planning permission include:

Positive Characteristics of External Wall Insulation	Negative Characteristics of External Wall Insulation
Avoids excessive prominence beyond existing walls	Excessively prominent from existing wall
Uses materials that match existing house or which are in-keeping with the character of the area and are of a generally high-quality finish, such as brick slips or a neutral-coloured smooth render	Uses materials that are not in-keeping with the character of the area or which are a generally poor-quality finish, such as plastic-looking cladding, blockwork or coarse plaster[1]
Preserves architectural detailing or features of existing home	Obscures or damages architectural detailing or features of existing home
Well-designed and neat joins between insulation and other features such as windows, doors and eaves	Disjointed or harsh joins between insulation and windows, doors and eaves
Improves visual appearance of building, including buildings in Conservation Areas that are later additions or which have already been substantially altered in an unsympathetic way	Harms visual appearance of building, including buildings in Conservation Areas which make a positive contribution to its historic character and appearance

As a general rule, external insulation should aim to be relatively low-profile so as not to create excessive recesses to doors and windows, particularly to the front of the home or elevations that are visible from the street.

[1] Unless coarse plaster can be shown to be a positive aspect of the character of that area

If materials are not proposed to match the existing house, care should be given to choosing materials that are in-keeping with and contribute positively to the character of the area and are of a generally high-quality finish. Where appropriate to a neighbourhood, the Council encourages the use of bricks or brick slips, or smooth render finishes. Both types of finish can typically be applied on the outside of the insulation and improve durability.

Opportunities to avoid covering or damaging decorative or architectural detailing in the existing external walls of the house are encouraged, however in some cases it is recognised that some degree of covering or damage will be unavoidable. In such cases, consider whether decorative architectural detailing can be introduced in the finish of the external insulation, provided this makes a positive addition to the design and are in-keeping with the wider style of home. In all cases, external insulation should aim to avoid irreversible damage to any underlying architectural features wherever possible.

Care should also be given to how external insulation interacts with existing features including windows, doors and eaves. The edges of insulation should aim to not be abrupt or easily visible and insulation should ideally cover all parts of the walls that are visible. Changes to the fabric of the existing home may be needed to accommodate the insulation effectively and to manage the relationship between the insulation and the eaves in particular. This may include extending the eaves or roof features, capping of insulation and refitting of guttering. These essential details should be included in any application for planning permission, where permission is required.



Smarter Homes

3.1.5 Specific Advice for Insulation in Conservation Areas and Listed Buildings

External Wall Insulation in Conservation Areas

In conservation areas, comprehensive internal insulation should be prioritised before considering external wall insulation to the front of a home or on other walls that are visible from the street. This is because external wall insulation often obscures the design and materials of the home which can harm the character of the conservation area.

However, it may be possible to add external wall insulation to a home in a conservation area where:

- Adding external wall insulation does not require planning permission; or
- The external wall insulation is only applied to walls that are not visible from public spaces and any architectural details which contribute to the special interest of the conservation area would not be obscured or lost; or
- The form of external wall insulation proposed can be shown to not meaningfully change the appearance of the building; or
- Your home makes a negative or neutral contribution to the conservation area and the external wall insulation can be shown to have a positive or neutral impact on the special interest of the conservation area.

In the latter two cases, these circumstances would need to be demonstrated through a Heritage Statement prepared by a specialist and submitted with your planning application. Please see Section 4: The Planning Process for more detail.

Unless these circumstances apply to your home, the Council recommends prioritising comprehensive internal insulation for homes in conservation areas. This helps to avoid any harm to the significance of the conservation area and avoids potential challenges in receiving planning permission.

For a planning application for external wall insulation in a conservation area to be successful, the choice of materials will be extremely important. Carefully follow the design guidance set out in the previous section and use traditional materials that match the existing building, or the prevailing materials of the conservation area. For homes within Conservation Areas, the Council's Conservation Area Appraisals can be a good source of information for the types of materials that are supported in your area. Particular interest will also be paid to the presence of any materials or architectural details that contribute positively to the significance of the conservation area and the extent that these would be covered or damaged by the installation of external wall insulation.

Insulating Listed Buildings

Listed buildings include a diverse range of building types spanning many different eras of architecture and construction methods.

Whilst some listed buildings are more modern, many were constructed using traditional methods, featuring solid masonry, earth-based structures, timber frames, or mixtures of these forms. From the 19th century onwards, some buildings began to include early, narrow cavity walls but cavity walls did not become the norm until the 1930s.

If your home is a listed building, the good news is it will likely be possible to achieve listed building consent to improve its internal insulation, provided that the insulation strategy is right for your home, having regard to its listed status.

Guidance on insulating listed buildings is included at Appendix 2: Guidance on Insulating Listed Buildings, with links provided to detailed Historic England guidance.

3.2 Glazing and Windows

3.2.1 Introduction to Glazing and Windows

Glazing, such as windows and doors, play a crucial role in the energy efficiency and comfort of homes.

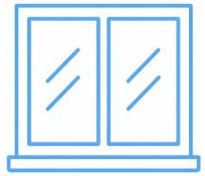
The amount of heat lost through windows in a typical home is around 10%, but this can be much higher in older homes. Single glazed windows can be particularly poor at retaining heat within the home. Natural air leakage, through draughts, can arise from several causes, including gaps between frames and casements or sashes. Even if those gaps were not there when originally installed, the shrinkage or wear-and-tear of materials over time can lead to gaps, and many types of seals are prone to eventually breaking down. Another source of heat loss can be through the glazing itself.

Improving windows often reduces natural air leakage which increases energy efficiency by retaining more of the energy being used to heat your home within your home.

When balanced effectively, window improvements can deliver:

- ☑ Higher internal temperatures and reduced draughts
- ☑ Reduced noise from outside sources
- ☑ Lower heating demand, and
- ☑ Improved security.

Upgrades to windows need to be carefully balanced with ventilation. Many of the benefits that come from upgrading windows come from the reduction in airflow through and around them. However, without suitable airflow from other sources, such as trickle vents or mechanical extraction, humidity can build up, particularly in 'wetter' rooms, leading to condensation, mould and damage.



Upgrading windows can take many forms, from simple repairs and draughtproofing, to complete replacement. Many upgrades to windows do not require permission, particularly where these are 'like for like'. However, windows can be an important part of the historic character of buildings and areas, particularly where original windows, such as timber-framed and sash windows, remain in place. In these cases, upgrades to windows must be done sensitively to balance the benefits they bring with the need to preserve original historic features. More information can be found under 3.3.5.

The selection of materials can also be a key factor for any retrofit project involving windows. Table 7 compares the relative thermal performance, embodied carbon intensity and recyclability of different window frame materials. The Council generally encourages the use of timber given its high thermal performance, low embodied carbon intensity, recyclability and its key contribution to Richmond's historic character, but the right choice of window material for your project will depend on your home.

Table 7: Comparison of Window Materials

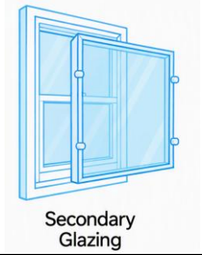
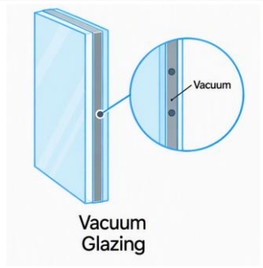
Window Material	Thermal Performance	Embodied Carbon Intensity[2]	Recyclable?
Timber	High	Low	Yes
uPVC	High	Medium	No
Aluminium	Low-Medium	High	Yes

[2] The Embodied Carbon Emissions of Construction and Retrofit Materials for Traditional Buildings | Historic England

3.2.2 Types and Applications for Retrofitting Windows

Table 8 below sets out some of the most common and effective retrofit methods for glazing and windows, including their relative benefits and their applicability to different scenarios.

Table 8: Types and Applications for Retrofitting Windows

Glazing Type	Energy Saving Potential[3]	Description	Typical Applications	Considerations for All Applications	Considerations for Heritage Applications
 Repairs and Draughtproofing	**Medium-High** • **Depends on age, material and construction of original window** • **Aim is to reinstate performance of original window**	Repairs to the structure of windows involves fixing damage, gaps or cracks in the frames or glazing, usually on a like-for-like basis. Draughtproofing can involve a range of different measures, but often involves installing seals around windows, such as: • Compression or wiper seals fitted around the perimeter of the window • Mastic or tape where glass meets the frame or around any gaps or cracks • Self-adhesive weather-strips where frames meet the surround	All homes	• Reduces heat loss but increased airtightness may require alternative ventilation • Requires existing windows to be in reasonably good state to facilitate repair and draughtproofing • Allows for retention of original windows where necessary in heritage settings • Less suitable when combined with secondary glazing as can lead to moisture build up between the secondary and outer windows	Repairs and draughtproofing should be the first priority, particularly for historic windows. It allows for the thermal performance of windows to be improved whilst retaining historic window features and minimising visual changes.
 Secondary Glazing	**High** • **Up to 4x reduction[4]** • **Target U-Value of around 1.0[5]**	The installation of additional glazing on the inside of the existing window Secondary glazing comes in a variety of styles including horizontal or vertical sliding, hinged or removable panels	Georgian and early Victorian terraces	• Substantially reduces heat loss and sound transmission • Lack of externally visible change makes more suitable for historic buildings • May be necessary to avoid sealing existing windows to avoid moisture build up	Where repairs and draughtproofing are insufficient to achieve thermal improvements, or it is not possible to fully repair an external window, secondary glazing can usually be added within the existing internal window space, allowing for the existing historic window to be retained and minimising external visual changes. It is important that the secondary glazing is designed to not interrupt the glazing pattern of the existing window.
 Vacuum Glazing	**High** • **Up to 4x reduction[3]** • **Target U-Value of around 1.0[5]**	Vacuum, or evacuated, glazing uses two panes of glass with an insulating near-vacuum between them Vacuum glazing can often be installed within existing frames or installed as a new set of windows where necessary	Victorian and Edwardian villas and mansion blocks	• Highest reduction in heat loss where existing frames must be retained • Slender profiles makes more suitable for historic buildings • Requires combination with a ventilation strategy, such as trickle vents, to avoid moisture build up	Vacuum glazing is generally of a slimline design that may be suitable to install within existing frames where the existing glass is not of historic significance and historic features such as existing slender glazing bars can be retained. Use of vacuum glazing can achieve significant improvements to thermal performance whilst allowing existing historic window frames to be retained and external visual changes to be minimised.
 Double or Triple Glazing	**Medium-High** • **Between 3x and 5x reduction[6]** • **Target U-Value between 0.8 and 1.8[7]**	Double- and triple-glazing uses two to three panes of glass with an insulating Argon layer between them Slimline double glazing can often be installed within existing frames. Double or triple glazing can be installed as a new set of windows where necessary.	Inter and post-war semi-detached and suburban homes	• Substantially reduces heat loss relative to single-glazed windows • Requires combination with a ventilation strategy, such as trickle vents, to avoid moisture build up	Double- and triple-glazed windows are often bulkier and require wider and thicker frames which makes them challenging to fit within original window frames. They are often visually distinguishable and may harm significance of historic windows. However, some slimline products are available which are capable of installation within original window frames and can be an appropriate solution.

[3] [4] Compared to single-glazed windows; London Councils (2025) How to Assess Retrofit Measures

[5] Single-glazing has typical U value of 5.8. Lower is better

[6] Relative to single-glazing. Triple glazing offers greater energy saving potential than double-glazing

[7] Single-glazing has typical U value of 5.8. Lower is better. Triple glazing has lower U-value than double-glazing.

3.2.3 When is permission required?

Some improvements to windows do not require planning permission regardless of whether your home is a house or a flat, and regardless of where it is located. These include:

- Basic repairs and draughtproofing
- Installation of secondary glazing inside your home
- Like-for-like replacement of your windows

A like-for-like replacement of your window means replacement with an exact replica of your window in relation to style, appearance, dimensions and materials. However, a like-for-like replacement can include replacing single-glazing with more efficient glazing, such as vacuum glazing, provided that the windows appear identical.

Replacement of windows that are not like-for-like may need planning permission depending on specific circumstances:

- **If your home is a listed building**, replacing your windows will require Listed Building Consent. However, repairing or draughtproofing windows, or installing secondary glazing, usually does not if carried out in accordance with this Guide.
- **If your home is a flat,** replacing your windows with anything but like-for-like replicas will require planning permission.
- **If your home is a house outside of a conservation area**, replacing your windows will not require planning permission as long as you replace them with windows of a similar appearance and materials to the original house. Guidance on what the Council considers to be of a similar appearance is in the following section.
- **If your house is a house inside a conservation area**, you will need to check whether your home is covered by an Article 4 Direction which removes permitted development rights for replacement windows. Some Article 4 Directions only affect windows facing onto a highway (e.g. a road or footpath) or an open space. You can check whether your home is subject to an Article 4 Direction, and exactly what restrictions are in place, by using the online Article 4 Map.
    - If your home is covered by an Article 4 Direction which removes permitted development rights for all windows, replacing any window will require planning permission.
    - If your home is covered by an Article 4 Direction which only removes permitted development rights for windows facing onto a highway or open space, you will only need planning permission if you plan to replace these windows.
    - If your home is not covered by an Article 4 direction, you will not need planning permission as long as you replace your windows with windows of a similar appearance and materials.

A flow chart to help explain whether your window improvements are likely to require permission is included on the next page.

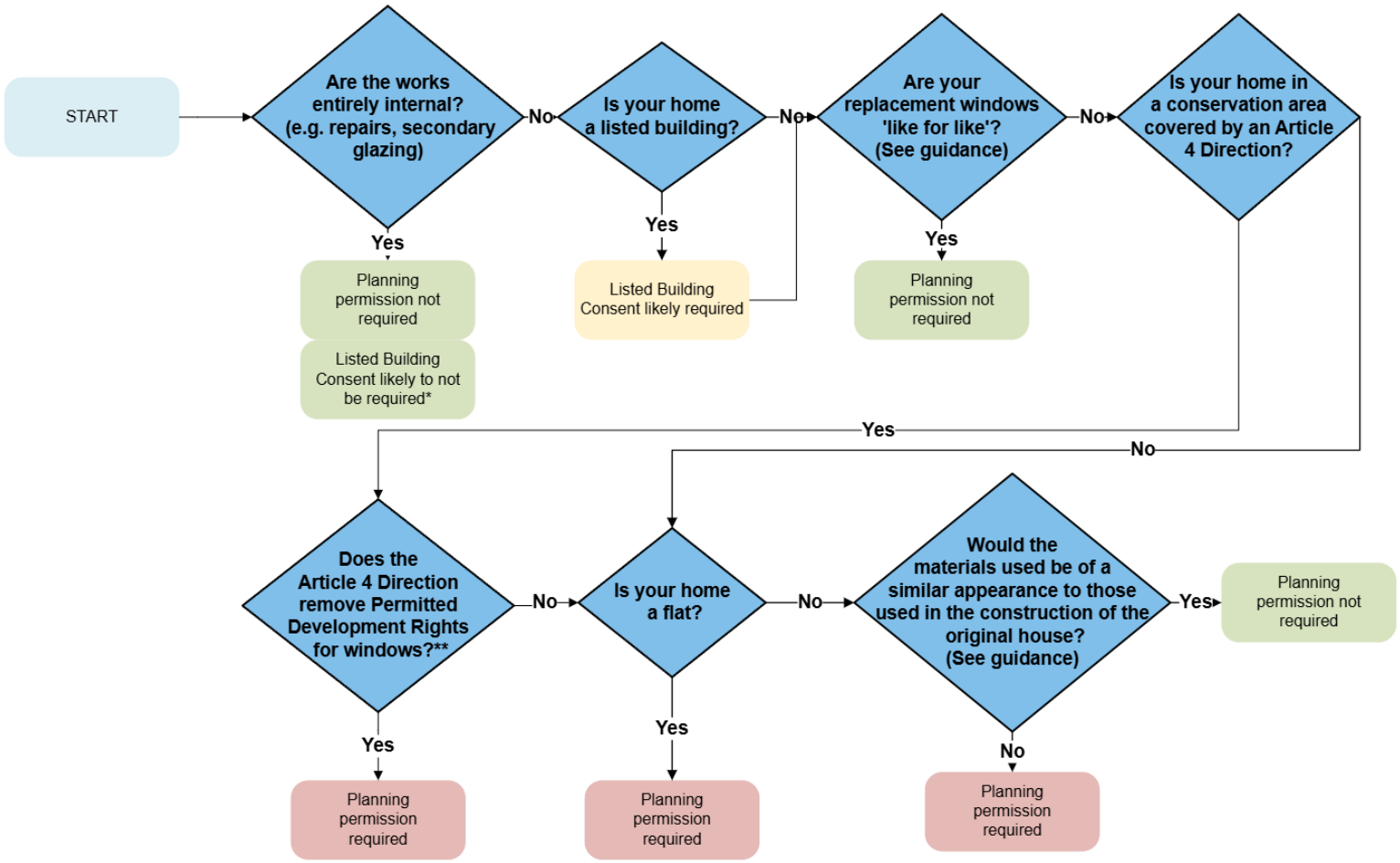
What if my upgraded windows need permission?

If your upgraded windows need permission, you will need to make an application to the Council before you carry out your project. Further advice is set out in Section 4: The Planning Process.

The next two sections provide detailed advice that can be used to maximise your chances of having permission approved. The first provides general advice on best practice in relation to design and the second provides more specific advice on how to approach new windows in heritage settings.

Don't forget: If you believe your proposed window improvements do not need planning permission, but you would like the comfort of written confirmation from the Council that this is the case, you may wish to apply for a Lawful Development Certificate. Further advice on Lawful Development Certificates is included in Section 4: The Planning Process.

Flowchart: Do I need permission to retrofit my windows?



USEFUL TIPS

*Listed Building Consent is usually not required for repairs or draughtproofing of windows in a listed building, or for the installation of secondary glazing provided it is carried out in accordance with the guidance in the next section.

**If your home is covered by an Article 4 Direction, you can use the online Article 4 Map to identify whether permitted development rights for windows have been removed for your home.

Please note, some Article 4 Directions only remove permitted development rights for windows fronting onto a highway or open space. In practical terms, this means windows in a wall or roof that face onto a road or footpath or a park or public garden. If your home is affected by this type of Article 4, any windows that would front onto a highway or open space will require planning permission. Any windows that would not front onto a highway or open space should follow the “No” branch to determine if permission is required.

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3.2.4 Best Practice Design Principles for Window Upgrades

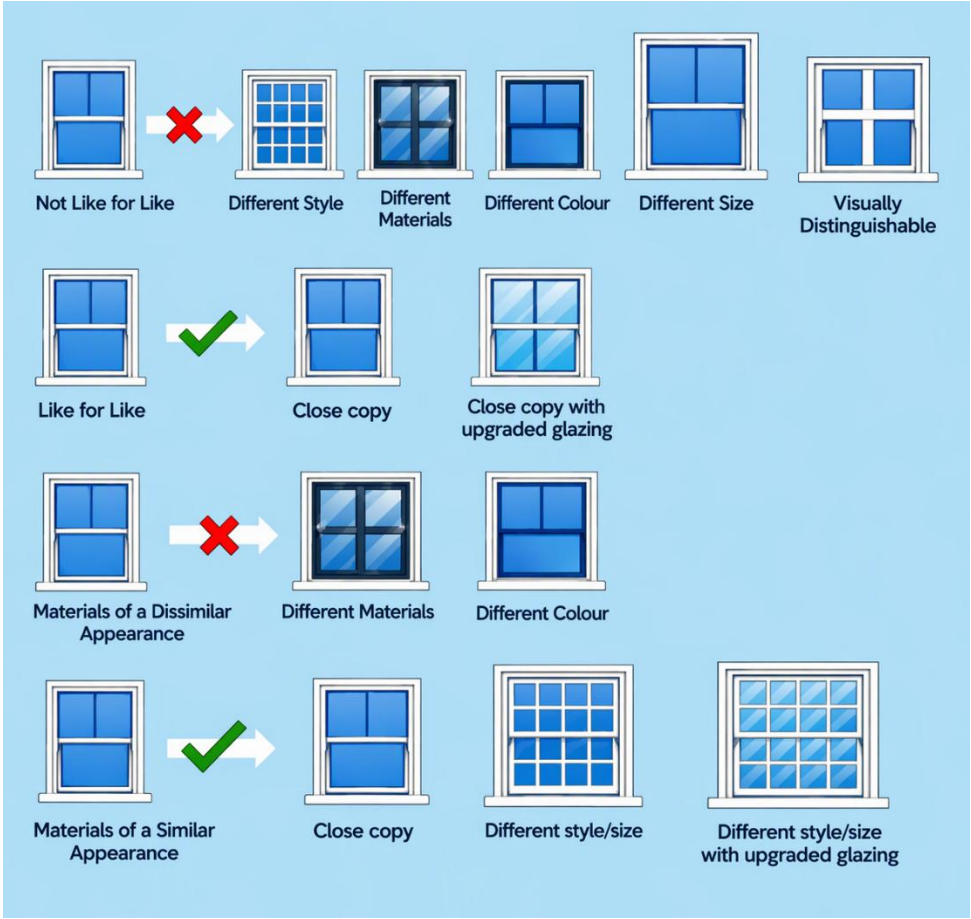
Windows on the front of houses are often defining features of Richmond's streets and neighbourhoods, especially in more historic areas. The starting point for upgrading windows should be to consider whether you can achieve your goals simply by carrying out repairs and draughtproofing. Repairs and draughtproofing will not require planning permission but should be carried out by a qualified glazier. Where repairs and draughtproofing are not sufficient or feasible, you will usually be able to upgrade your windows to be more efficient.

Replacing your windows with like-for-like replicas will usually not require permission but is likely to require listed building consent if your home is listed. In order to be like-for-like, replacement windows should be the same style, material, size, shape and colour and visually indistinguishable. **If you are installing like-for-like replicas, you can still upgrade the glass to a more efficient type** (for example upgrading single glazing to vacuum glazing or slimline double glazing), as long as this does not require thicker frames or glazing bars or other clear visual differences.

Where your home is outside of a conservation area, and is not listed, it is likely that you can replace your windows on a not like-for-like basis without planning permission as long as the new windows use materials that are of a similar appearance to those used in the construction of the house. This means they do not need to be of the same style, size or shape, but should generally match the materials and colour of the existing house. As with like-for-like replicas, the need to use materials of a similar appearance does not prevent you from upgrading the glass to a more efficient type. Where your existing windows are of a traditional style, using vacuum glazing or slimline double glazing can still help to minimise any visual differences.

Figure 7 below provides visual examples of what like-for-like and using materials of a similar appearance is likely to mean.

Figure 7: Understanding Window Upgrades



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Whether permission is required or not, where your existing windows are of a traditional style such as timber-framed sash windows or original steel-framed (e.g. “Crittall”) windows, it is particularly important to retain this style and materials in any upgrade. Replacing traditional windows with the same style and materials but with upgraded glazing can be an effective way of balancing both retrofit and heritage objectives. Specific advice on window upgrades in historic settings is provided in the next section.

Where permission is required, applying the principles below can help to maximise your chances of receiving permission:

- ☑ **Maintain consistent detail**: in most cases, you should use the same kind of window throughout, with the proportions and sizes of new window openings generally matching the existing
- ☑ **Line up new details with existing** – new lintel and cill heights should line up with those around existing openings
- ☑ **Maintain consistent proportions** – changing the internal divisions (mullions, transoms and pane shapes and sizes) within the window can completely alter the effect of the overall proportions, so aim to ensure that new windows reflect the style and details of the existing windows.
- ☑ **Avoid mixing styles** – mixing different window styles should be avoided, particularly to the front of a home
- ☑ **Prioritise traditional materials and styles** – since most of Richmond’s homes were built, new window materials, particularly uPVC, have become common. However, timber windows are preferred as they last longer, are more sustainable and help maintain a traditional characterful appearance.

Further design advice on windows is included in the Council’s House Extensions and External Alterations SPD.

3.2.5 Specific Advice for Window Upgrades in Conservation Areas and Listed Buildings

Traditional windows are a particularly important feature of the Borough’s conservation areas and listed buildings. Many of these feature traditional timber framed sash windows or original steel-framed windows, which have a positive impact on the appearance of individual buildings and the wider area, as do later replacement windows in a matching material.

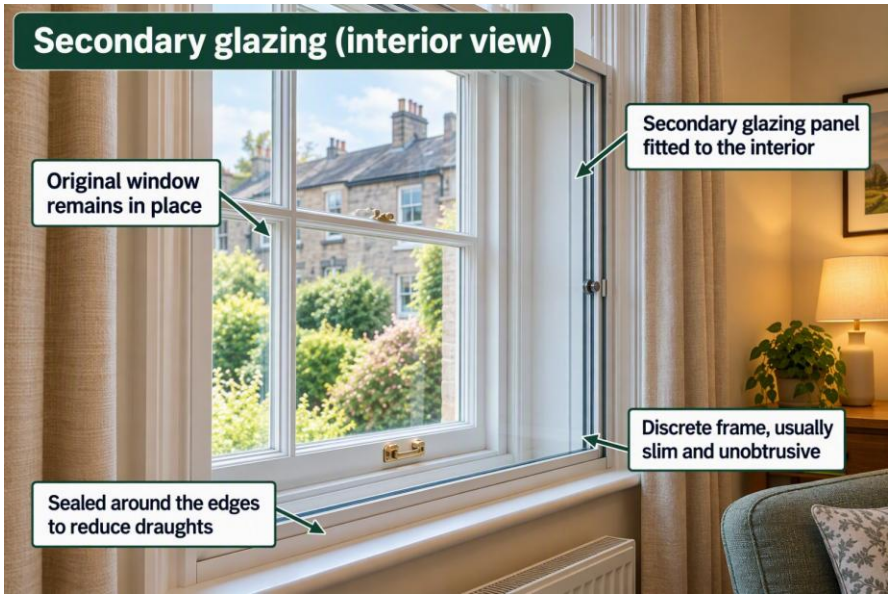
However the Council recognises that a balance needs to be struck between achieving retrofit goals and the goal of conserving historic buildings. It therefore aims to take a positive approach to opportunities to upgrade windows in historic settings, but expects the following priorities to be applied wherever possible.

As a first preference, retaining and repairing existing original timber or steel-framed windows is usually best for the environment, for the character and appearance of the area, and is often a much less expensive alternative to complete replacement. Simple modifications can often be carried out internally which improves the weatherproofing of a window without impacting its external appearance or requiring planning permission.

Windows in Conservation Areas

In conservation areas where original or historic-style windows remain in place, internal secondary glazing should be prioritised where repairs and draughtproofing are inadequate to achieve retrofit goals. Secondary glazing can usually be installed without planning permission and ensures that existing windows can be retained and minimises external changes.

Where secondary glazing is to be installed, frames and glazing bars should line up with the existing window so that they are not visible from outside, and the colour and finish of the frame should be a close match for the existing window. Working with a professional can help ensure that the secondary glazing product you choose is compatible with the characteristics of your existing window, including the window reveal and surround



If internal secondary glazing is insufficient, priority should then be given to upgrading the glass within existing frames. Vacuum or slimline double glazing can usually be installed within traditional frames. This again allows for original windows to be kept in place and for any impacts to the external appearance of the home to be minimised.

If replacing the entire window is unavoidable, because, for example, the original windows are unsound and unrepairable, all aspects of the window should be considered including opening type, glazing bar pattern, horns to sashes, and depth.

Where replacement windows are to be installed, the preference is for the materials used to be of a similar appearance to those used in the original construction of the home. The design of the replacement windows should also be similar in terms of glazing pattern and style. Advice on understanding what a similar visual appearance means is included in the previous section.

In some cases, windows in conservation areas may have already been replaced with more modern looking windows. In these circumstances, there is more flexibility to continue to use more modern looking windows but opportunities to re-introduce traditional looking windows, alongside upgraded glazing, are strongly welcomed.

However, plastic-looking UPVC windows will generally not be considered acceptable in conservation areas, particularly where these are proposed to the front of a home or as a replacement for traditional windows. This is because they do not replicate the traditional construction detail or materials found in the conservation area. It may be acceptable to install new UPVC windows where this would be to replace existing UPVC windows, but opportunities to re-establish more traditional looking windows are strongly welcomed.

Replacement timber frames will usually be the most favoured option. Timber is a natural material that helps reduce the use of single-use plastics, often found in other windows. Timber windows also have the benefit of being more cost effective, being much more durable and repairable than alternatives, and there are options to maintain their appearance while introducing energy saving and noise reducing features. Where secondary glazing or vacuum glazing is not possible,

slimline double glazing can be inserted into timber frames which helps maintain a more visually acceptable appearance.

There is usually greater flexibility on the style and materials of windows not visible from the street or other public spaces, such as to the rear of a property, where this can be shown to not harm the character or appearance of the area.

Windows in Listed Buildings

If you are considering changes to windows in a Listed Building, Historic England's guidance should be used as a starting point for considering how changes to windows must be carried out. It contains detailed guidance on:

- Repairing historic windows
- Draughtproofing historic windows
- Adding secondary glazing to historic windows
- Adding double glazing to historic windows
- Full replacement of historic windows

The approach to upgrading windows in listed buildings should follow Historic England's five principles:

1. Where historic windows make a positive contribution to the significance of a listed building they should be retained and repaired where possible. If beyond repair, they should be replaced with accurate copies.

2. Where historic windows have already been replaced with windows whose design follows historic patterns, these usually make a positive contribution to the significance of listed buildings. When they do, they should therefore be retained and repaired where possible.

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

4. Where historic windows have already been replaced with ones whose design does not follow historic patterns, these are unlikely to contribute to the significance of listed buildings. Replacing such windows with new windows of a sympathetic historic pattern, whether single glazed or incorporating slim-profile double glazing or vacuum glazing, may cause no additional harm. Glazing bars should still be integrated in modern replacements. It also provides an opportunity to enhance the significance of the building, which is the desired outcome under national policy.

5. Where a new window or re-glazing is agreed, the reflective properties of secondary and double glazing as compared to modern, polished single glazing, will not usually harm the significance of the building. But when new multi-paned windows are proposed, the desirability of reproducing broken reflections by individually glazing each pane should be considered. Where the aesthetic value of the building is high, then the impact on the whole of the relevant elevation should be considered, including the desirability of accurately matching other windows.

3.3 Heat Pumps

3.3.1 Introduction to Heat Pumps

Heat pumps are one of the most effective technologies for cutting household carbon emissions and can reduce long-term energy bills, particularly when the electricity used to power the pump comes from renewable sources, such as solar panels.

Unlike boilers, which burn fuel to generate heat, heat pumps transfer existing heat from the air or ground into the home. They work much like a fridge but in reverse; they work by cycling a liquid or gas called a refrigerant which absorbs heat from outdoors and then releases it indoors at a higher temperature.

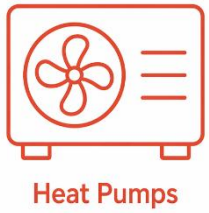
Because heat pumps operate at lower temperatures than traditional boilers, they perform best in well-insulated, airtight homes. As set out in the Fabric First section, depending on the performance of your existing home, installing heat pumps as part of a wider strategy to improve the insulation, windows and ventilation can help to maximise the benefits. This ensures that the system is efficient and comfortable in operation. However, installing a heat pump to even a moderately insulated home can still achieve significant benefits.

Working with a Retrofit Co-ordinator or MCS accredited heat pump installer is important to make sure your heat pump is appropriately sized and integrated within your home's heating system. Sometimes it may be necessary to change elements of your existing heating system, such as the size of radiators or size of pipes.

There are two main types of heat pump that may be suitable for your home retrofit project. These are **air-source** and **ground-source**.

3.3.2 Types and applications for heat pumps

Air Source Heat Pumps



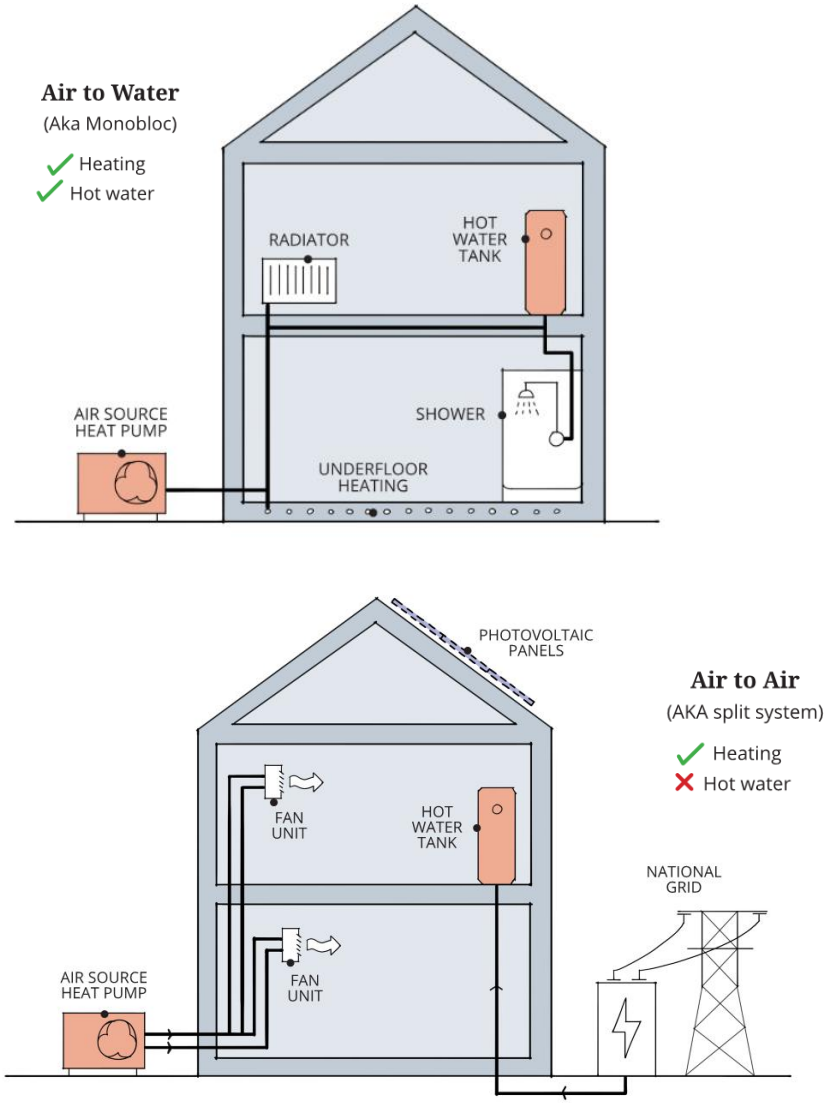
Air Source Heat Pumps (ASHPs) extract heat from the outside air, even in freezing conditions, and transfer it indoors through a compressor and heat exchanger. They are the most common type used in Richmond, as they are suitable for most urban and suburban homes.

There are two main types of ASHP. These are an air-to-water pump and an air-to-air pump. An air-to-water pump uses heat from the air to heat water that can then be used in your home for both heating and hot water. An air-to-air pump uses heat from the air to heat air in your home and can also cool the air by working in reverse. Whilst air-to-air pumps can be effective at heating or cooling small to medium-sized rooms, you may need multiple units or internal pipework throughout your home to ensure good coverage and because an air-to-air pump does not heat hot water, you will need an alternative source of energy, such as an electric system or solar thermal system, for hot water.

A typical ASHP has an external fan unit, about the size of a washing machine but sometimes smaller, located outside the building, and an indoor control unit connected to the heating and hot-water system. The technology can operate effectively down to around –10°C, with efficiency improving in milder conditions.

A typical ASHP achieves a Coefficient of Performance (COP) between 3.0 and 4.0**.** This means they generate three or more units of heat for every unit of electricity used to power them. A typical ASHP can output between 8–12 kW which for a moderately insulated 3-bed home is likely to be more than sufficient**.**

Figure 8: Example Air Source Heat Pump Setup



Ground Source Heat Pumps

Ground Source Heat Pumps (GSHPs) draw heat from the soil, which maintains a steady temperature of around 10–12°C throughout the year. They are more efficient than air source systems and extremely quiet once installed, though they are relatively rare in single homes as they require far more space and typically cost more.

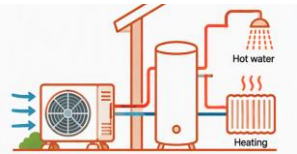
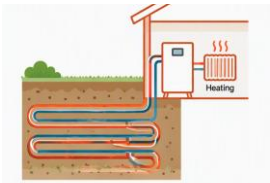
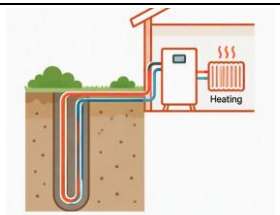
A GSHP uses a network of buried pipes filled with a water and antifreeze mixture that absorbs heat from the ground. This heat is transferred into the home through a heat pump unit located indoors.

There are two main types of GSHP. A horizontal loops system involves loops buried in trenches one to two metres deep, spread across open ground. A vertical boreholes system involves boreholes drilled 50–150 metres deep and are usually preferred where space is limited.

Typical systems achieve a Coefficient of Performance (COP) of 3.5–4.5, which means they generate around three to four units of heat for every unit of electricity used to power them. They provide consistent performance year-round, unaffected by weather. Horizontal loop systems generally need at least 300m^2 of garden area, whilst the average garden size across Richmond is around 200m^2. This means horizontal loops systems will tend to only be suitable for homes with larger gardens. Vertical boreholes require only about one square metre per borehole, though drilling costs are higher.

As a general guide, a family-sized home with moderate heat demand might need three 50–100 m boreholes, or a 500 m^2 garden area for horizontal loops. Homes on smaller plots may not have enough space for trenches, but boreholes can often be installed if vehicle access for drilling equipment is available.

Table 9: Types and Applications of Heat Pumps

Heat Pump Type	Energy Saving Potential[8]	Description	Space Requirement	Visual Impact	Typical Applications	Considerations in Heritage Settings
 Air-to-Air Heat Pump	High 3.0-4.0 COP	Extracts heat from the air using an external fan unit, located outside, which connects to an indoor unit that heats air within the home. Separate hot water system will be needed.	Lower – external unit can usually be sited in a private garden of any size; suitability for flats can vary depending on access to private space or suitability of wall or roof mounting.	Low to medium depending on placement of external fan unit	All homes, but particularly smaller homes or flats	Usually suitable, but may require sensitive placement of external pump and routing of pipework
 Air-to-Water Heat Pump	High 2.5-4.0 COP	Extracts heat from the air using an external fan unit, located outside, which connects to an indoor control unit and the home's water system to provide both heating and hot water to the home	Lower - external unit can usually be sited in a private garden of any size; suitability for flats can vary depending on access to private space or suitability of wall or roof mounting. Internal space for a new water tank may also be required.	Low to medium depending on placement of external fan unit	All homes	Usually suitable, but may require sensitive placement of external pump and routing of pipework
 Ground Source Heat Pump (Horizontal Loops)	High 3.5-4.5 COP	Extracts heat from the ground using a network of buried pipes. This heat is transferred into the home with no externally visible equipment and provides heating and hot water	Higher - at least 300m^2 of private garden typically required	Very low post-installation as the system is buried	Homes with larger gardens	Impacts limited by minimal visible changes although groundworks may be inappropriate in some settings
 Ground-Source Heat Pump (Boreholes)	High 3.5-4.5 COP	Extracts heat from the ground using a series of boreholes. This heat is transferred into the home with no externally visible equipment and provides heating and hot water	Moderate – around ~1 m^2 of private garden required per borehole	Very low post-installation as the system is buried	Homes with smaller gardens	Impacts limited by minimal visible changes although groundworks may be inappropriate in some settings

[8] Measured as an average ratio between electricity generated and used across the year. Upper / lower bounds may be exceeded in warmer / colder outdoor temperatures.

3.3.3 When is permission required?

Most householders are unlikely to need planning permission to install a heat pump as long as permitted development criteria are met.

Air-Source Heat Pumps

You will only need planning permission for an air-source heat pump if it fails to meet any of the criteria below.

- For any type of home, your pump:
  - Must not be installed on a pitched (sloping) roof
  - Must not be installed within 1m of the edge of a flat roof
  - Comply with MCS Planning Standards. You should ask your supplier or installer to certify this.
- **If your home is a house**, your pump's outdoor compressor unit must be less than 1.5m^3 in size, measured in the way described in Figure 10. **If your home is a flat,** your pump's outdoor compressor unit must be less than 0.6m^3 in size.
- **If your home is a detached house**, you may have up to two pumps. **If your home is not detached or is a flat**, you may only have one pump. Any more requires permission.
- **If your home is not in a conservation area**, any pump cannot be installed above the ground-floor level if the wall it is attaching to faces onto a highway (e.g. a road or footpath). Please see Figure 11 for more information.
- **If your home is in a conservation area**, any pump must not be installed on any wall or roof that fronts a road or footpath regardless of height. Your pump should also not be located closer to a highway (e.g. a road or footpath) than the closest part of your home. Please see Figure 12 for more information.
- Any pump must not be installed on a building within the curtilage (grounds) of a listed building

In addition, Air-Source Heat Pumps installed without planning permission should:

- Not be used solely for cooling purposes
- Be removed as soon as reasonably practicable, when it is no longer needed
- Be sited, so far as is practicable, to minimise its effect on the external appearance of the building and its effect on the amenity of the area

If your home is listed, you are likely to require both planning permission and Listed Building Consent for any air-source heat pump.

Figure 9: Understanding Size Limits on Air-Source Heat Pumps

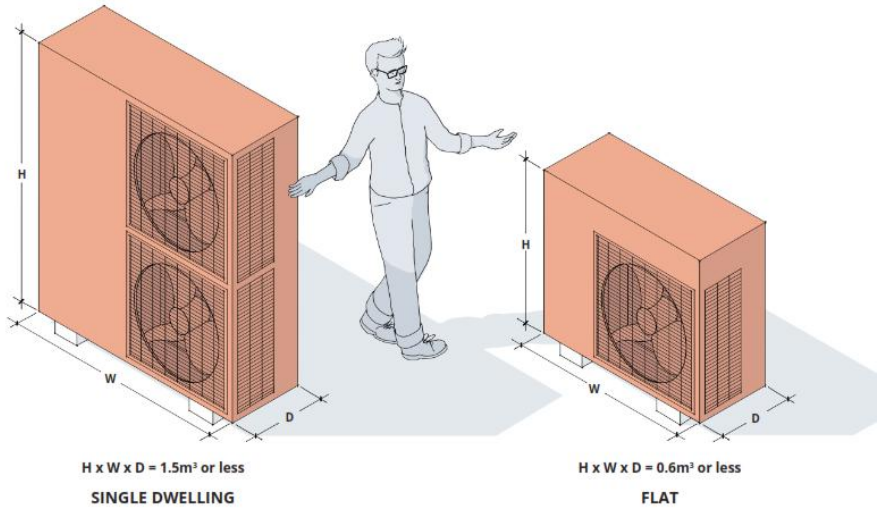


Figure 10: Guidance on Siting of Air-Source Heat Pumps

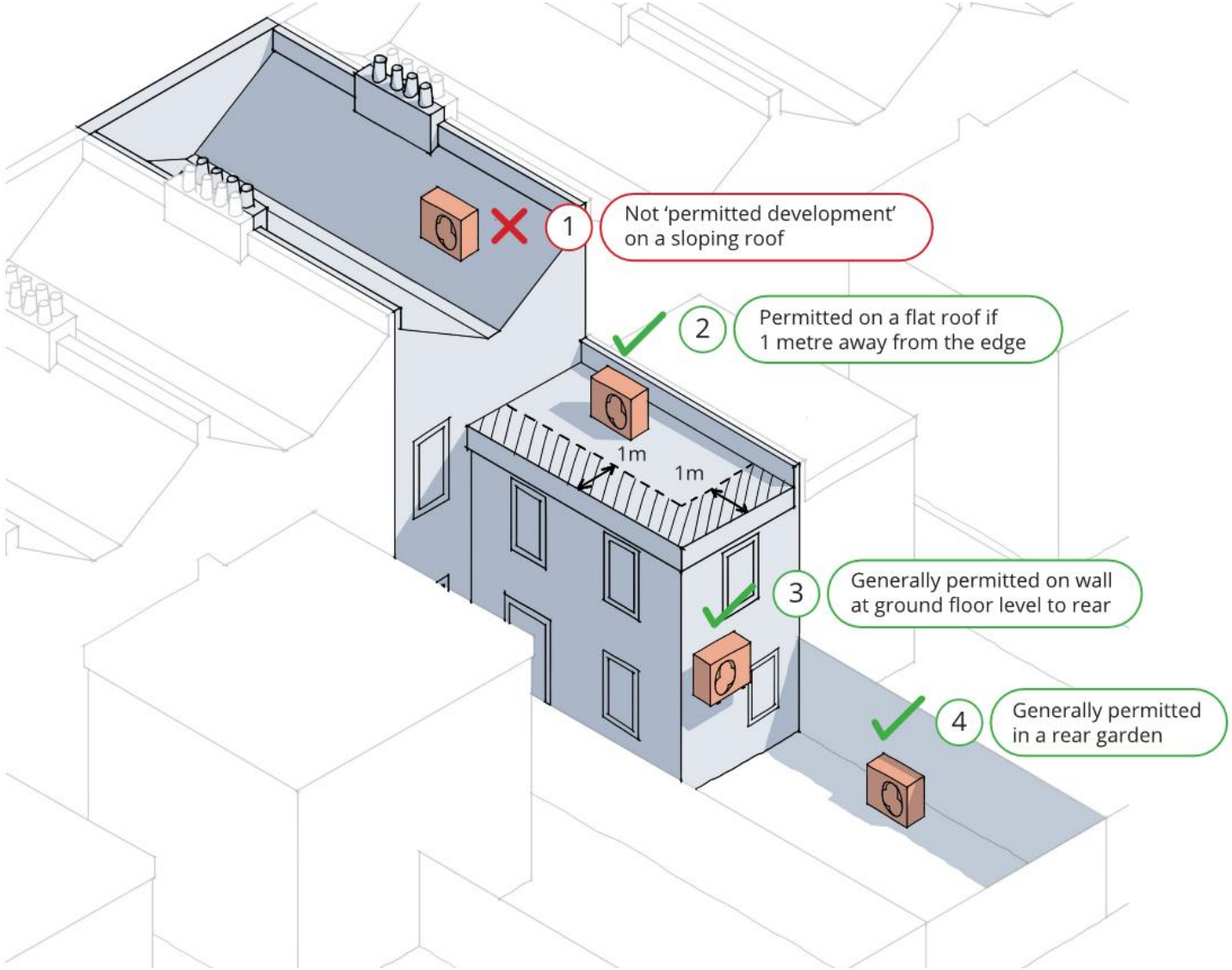


Figure 11: Siting Restrictions for Air-Source Heat Pumps Outside of Conservation Areas

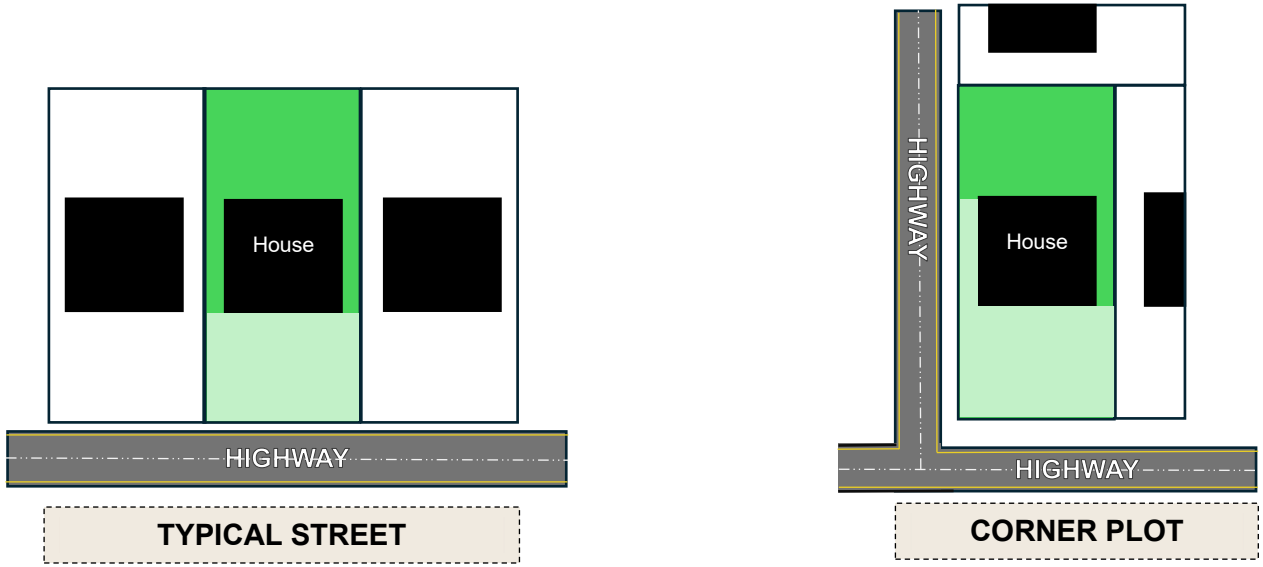
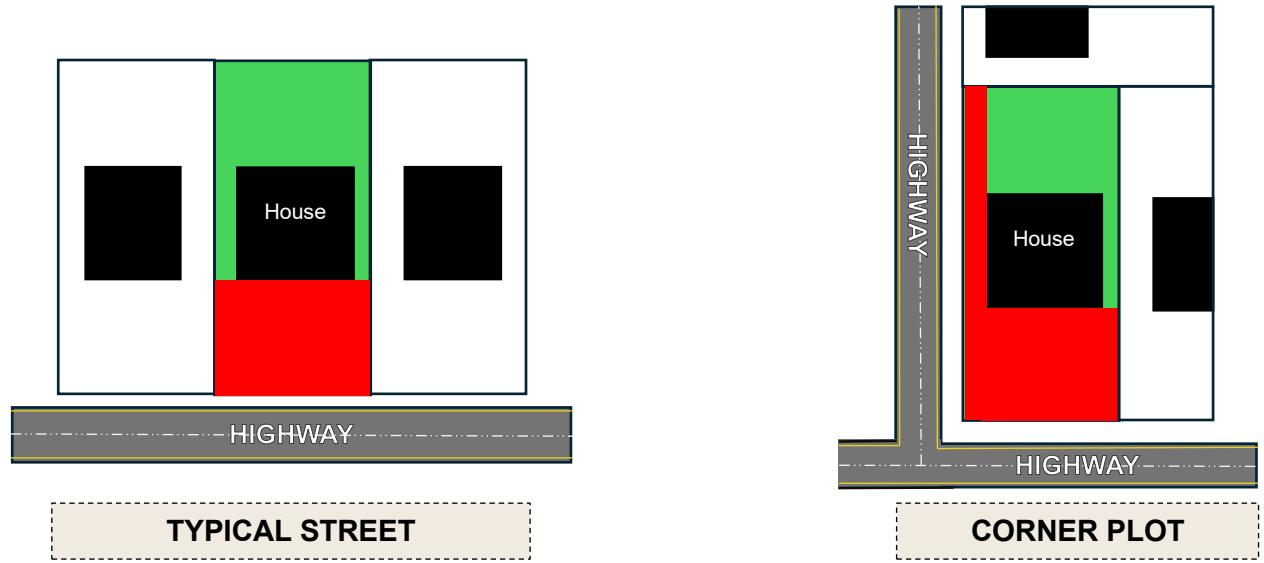


Figure 12: Siting Restrictions for Air-Source Heat Pumps Within Conservation Areas



Note: Although the examples shown are detached houses, the same rules on siting apply for semi-detached and terraced houses, and blocks of flats

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Ground Source Heat Pumps

Ground source heat pumps will nearly always not require planning permission, but if your property is listed, you are likely to require Listed Building Consent.

A flow chart to help explain whether your heat pump is likely to require permission is included on the next page.

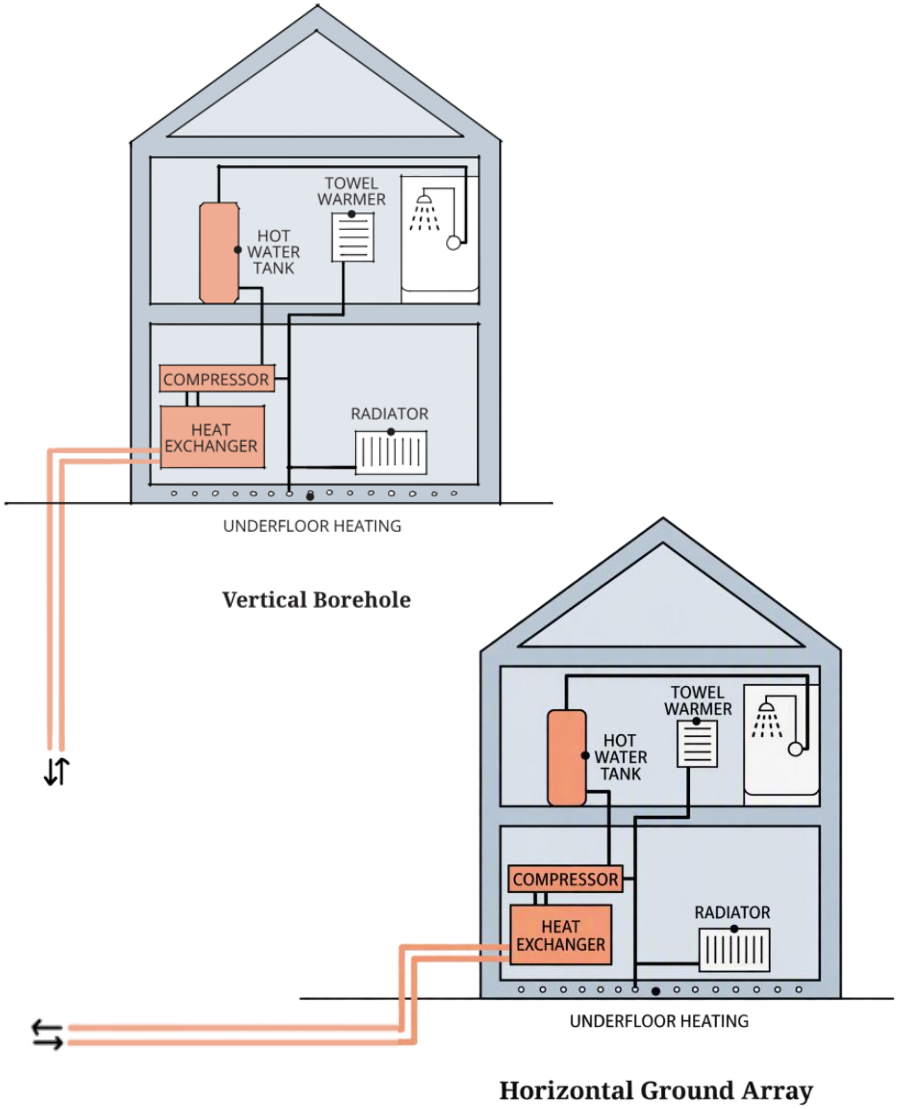
What if my heat pump needs permission?

If your heat pump needs permission, you will need to make an application to the Council before you carry out your project. Further advice on making an application for planning permission or listed building consent is set out in Section 4: The Planning Process.

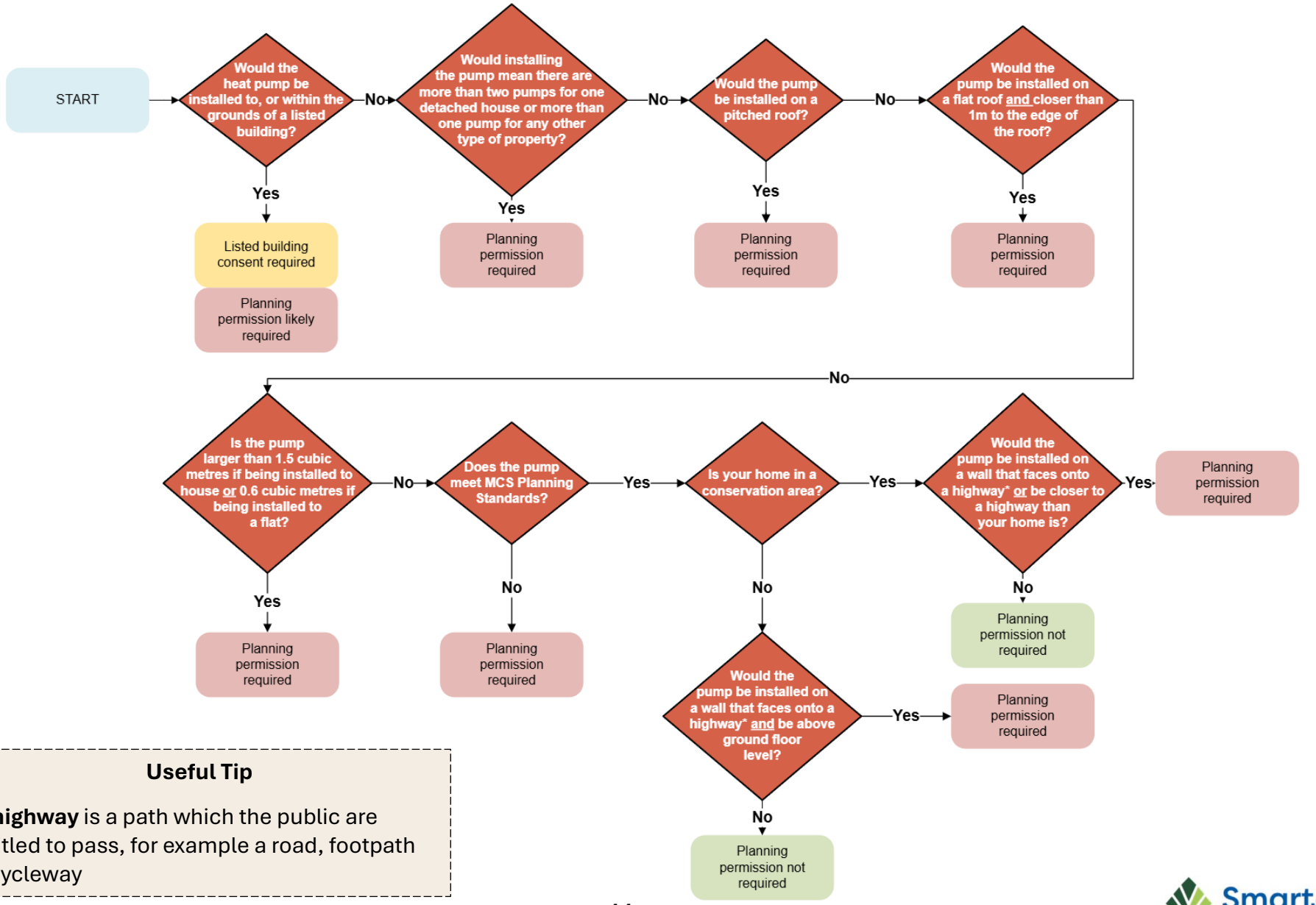
The next two sections provide detailed advice which can be used to maximise your chances of having permission approved. The first provides general advice on best practice in relation to design and the second provides more specific advice on how to approach heat pumps in heritage settings.

Don't forget: If you believe your heat pump does not need planning permission, but you would like the comfort of written confirmation from the Council that this is the case, you can may wish to apply for a Lawful Development Certificate. Further advice on Lawful Development Certificates is included in Section 4: The Planning Process.

Figure 13: Example Ground Source Heat Pump Setup



Flowchart: Does my Air-source Heat Pump need permission?



Useful Tip

*A **highway** is a path which the public are entitled to pass, for example a road, footpath or cycleway

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3.3.4 Best Practice Design Principles for Heat Pumps

Air Source Heat Pumps (ASHPs)

If you are planning to install an Air Source Heat Pump (ASHP), the following guidance can help you install your ASHP effectively and avoid impacts on your neighbours or local area. These principles should be applied whether your ASHP requires permission or not.

As a first preference, ASHPs should ideally be positioned at ground-floor level in rear or side gardens, where they would not be visible from the street or other public spaces.

If it is not possible to position your ASHP at ground-floor level in a rear or side garden, you should consider mounting the ASHP on the roof of a single-storey flat roof extension. An ASHP on a flat roof should be located more than 1 metre from any edge of the flat roof but within 2 metres of the main building, avoiding proximity to windows wherever possible. Existing roof features such as parapets can be used to effectively screen the ASHP.

Where it is not possible to achieve either of the above, installing your ASHP above ground-floor level to the rear of your home may be acceptable where it would not be visible from the street or there are no realistic alternatives, which may be the case with some flats.

Installing your ASHP at the front of your home (or at the side on a corner plot) or above ground floor level where it would be visible from the street should be avoided unless there are no alternatives.

Where your ASHP requires planning permission, any proposal to install your ASHP in a location that is visible from the street will require strong justification, particularly where it is above ground-floor level.

This justification will need to demonstrate why it is not possible to locate your ASHP in a more discreet location and that you have reduced the visual impact of the ASHP as far as is possible.

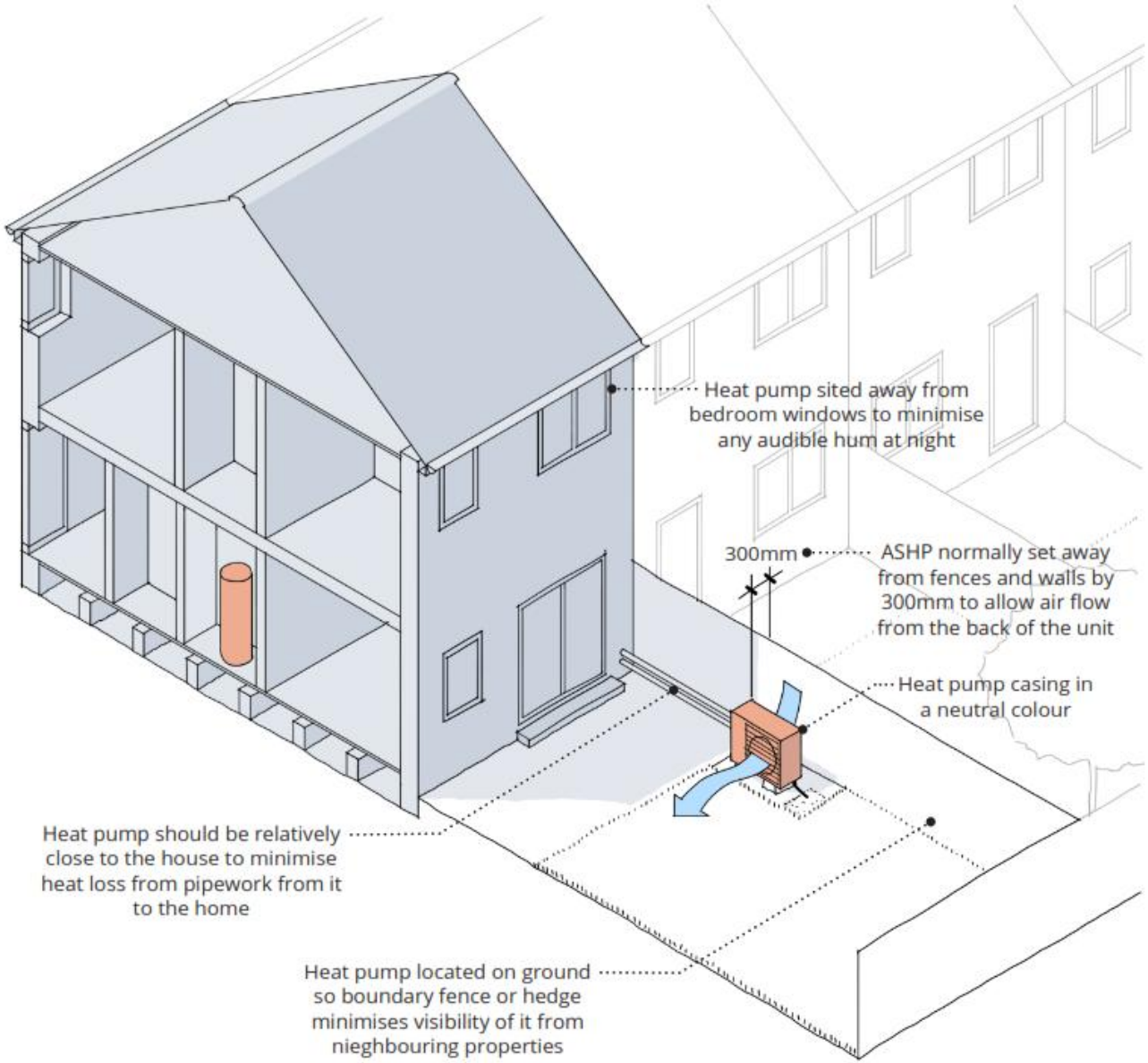
Wherever possible, ASHPs should be kept clear of boundaries to reduce potential noise impacts upon neighbours, and care should be taken to route pipework discretely along existing service runs.

ASHPs should ideally be screened with planting or discreet screening. This helps to protect them from direct sunlight or excessive wind, whilst also minimising visual impact. However, any planting or housing should be designed so the external unit retains at least two metres of free space for airflow and maintenance.

Compact, neutral-coloured units are recommended, and external units should be designed to be fully removable at end of life.



Figure 14: Best Practice Design for Air Source Heat Pumps



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Ground Source Heat Pumps (GHSPs)

Ground source heat pumps require fewer design considerations as they generally have few or no external features. However, they do require significant groundworks, likely in your garden, to install boreholes or horizontal loops. Whilst your ground source heat pump is unlikely to require planning permission, you should make sure any trenching or drilling avoids harm to mature trees, root zones, archaeological features, and historic garden layouts.

Some trees in Richmond have extra protections, either because they are in a conservation area or because they are subject to a Tree Preservation Order (TPO). Regardless of whether your heat pump requires planning permission, the Council's permission is required to cut down a protected tree; if your garden contains a protected tree you should design your ground source heat pump to avoid its loss or damage, including to its root zone. Further information on protected trees is available on the Council's website.

Boreholes should be at least five metres from buildings and two metres from boundaries. Once installed, all ground loops are invisible and maintenance-free, making them particularly suitable for homes with larger gardens.

3.3.5 Specific Advice for Heat Pumps in Conservation Areas and Listed Buildings

Air Source Heat Pumps (ASHPs)

The general design principles set out in the previous section are even more important to follow in conservation areas. In conservation areas, it is particularly important that ASHPs are installed out of public view wherever possible.

In practical terms, this means:

- Prioritising ground floor locations in rear or side gardens, wherever possible
- Avoiding installation on any wall or roof that is visible from the street, unless there are no alternatives
- Avoiding installation above the ground-floor level, wherever possible
- Using compact neutral-coloured units
- Routing pipework and cabling as discreetly as possible
- Using planting or shrouding to minimise the visual impact of the external unit, particularly where placement in a visible location is unavoidable.

For listed buildings, Historic England's detailed guidance on installing heat pumps to historic buildings should be used to ensure the type of heat pump, its placement and installation techniques are appropriate to the building. Specialist advice will be needed to ensure compatibility between the heat pump and the existing heating system.

Where a listed building has an outdated or inadequate heating system, significant works may be needed to ensure the pump can operate effectively which could involve the loss, damage or other change to internal historic fabric.

In addition to the other criteria set out in this section, ASHPs for listed buildings should be:

- Sited in a discreet, well-shrouded location
- Installed in a way that is reversible
- Installed in a way that avoids the loss or damage of the historic fabric of the building (both internal and external)
- Sensitively integrated with existing or proposed internal heating apparatus, such as radiators or heat emitters that are themselves located and installed in a way that avoids the loss or damage of internal historic fabric

Ground Source Heat Pumps (GSHPs)

As GSHPs have no external features, there are fewer specific considerations which apply in conservation areas. However, the general design principles set out in the previous section remain important. This includes ensuring that any trenching or drilling avoids harm to mature trees, root zones, archaeological features and historic garden layouts. All trees in conservation areas are protected automatically and require permission to cut down. GSHPs in conservation areas should always be designed to avoid the loss or damage to trees, including their root zones.

For listed buildings, Historic England's detailed guidance on Heat Pumps in Historic Buildings should be used to ensure the type of GSHP and installation techniques are appropriate to the building. Whether a GSHP is an appropriate solution for a listed building will depend greatly on specific circumstances. There are numerous examples of where GSHPs have been installed successfully in the grounds of listed buildings but since they require the digging of trenches and boreholes, GSHPs will not always be suitable. There may also be archaeologically important assets underground that would be disturbed or damaged by trenching or boreholes.

Where GSHPs are a suitable solution for a listed building, they should be installed in a way that avoids the loss or damage of the historic fabric of the building. You will need to take particular care if you plan to make changes to the heating system within the building, such as installing underfloor heating, and where the pipework enters the building.

3.4 Solar Panels

3.4.1 Introduction to Solar Panels

Solar photovoltaic (PV) panels allow people to significantly reduce their demand for fossil fuels and, in some cases, become a net contributor of energy to the grid. They do so by harnessing the sun's energy to generate electricity which can then be used within your home, and, depending on set-up, exported onto the national grid.

Most people looking to add solar to their home will be looking at solar PV, however another system is also available called a solar thermal system. A solar thermal system uses the sun's energy to heat water for use within your home but does not generate electricity.

A well-designed solar PV system typically generates 2,800–4,200 kWh per year, similar to a home's annual electricity demand, and cutting emissions by around 1–1.5 tonnes CO_2 per year. Modern panels retain over 80% of their performance after 25 years and work well alongside electric heating and vehicle charging.

3.4.2 Types and Applications for Solar Panels

Most solar PV around a home can be mounted on the house itself, usually on its roof but sometimes on a wall. In some circumstances, it may also be possible to mount on to an outbuilding, such as a detached garage, or to install a standalone solar array in a garden.

There are lots of different types of solar PV available. Which will be most appropriate for your home depends on different factors including the area you have available for installation, the amount of energy you are aiming to generate, the character of your home and area, and funding available. Further guidance on options can be found in the Smarter Homes Handbook.


Solar Panels

Richmond's buildings have a varied roofscape both in terms of the natural differences in orientation you will see from street to street, and in terms of specific architectural roof designs which can be a key feature of historic character. Different roof forms and shapes present different opportunities and challenges for a solar PV system, including orientation, slope, profile, size, materials and strength.

Orientation is a key determinant of the effectiveness of your solar PV systems. Solar panels installed on south-facing roofs receive the greatest amount of sunlight and achieve the highest annual output. Roofs that face southeast or southwest still perform very effectively, typically around 90% of south-facing panels, while east- or west-facing panels can still achieve around 75-80%, making them viable in most domestic settings. Roof pitch also influences efficiency. A tilt of around 30–40 degrees is generally ideal for Richmond's latitude, allowing panels to capture solar energy throughout the year.

The London Solar Opportunity Map (LSOM) can be a useful tool to understand the potential suitability of your home for solar panels. It uses radar technology to analyse the roof size and orientation of buildings across London and identifies potential solar panel output down to individual home and building scale.

There are four main types of solar PV available, as shown in Table 10. Working with a qualified supplier will help you identify which type is most suitable for your home, but where your solar project requires planning permission, the guidance later in this section can also mean one type is more suitable than others.

As a rough guide, 1 kWp of panels requires around 6-8 m^2 of space and can generate around 900-1,000 kWh per year depending on orientation and siting. A 3-4 kWp photovoltaic system will have an annual production which exceeds the annual electricity use of a 3 bed home, however seasonal fluctuations in demand typically mean an overproduction in summer, which can be exported back to the grid or stored in batteries, and an underproduction in winter.

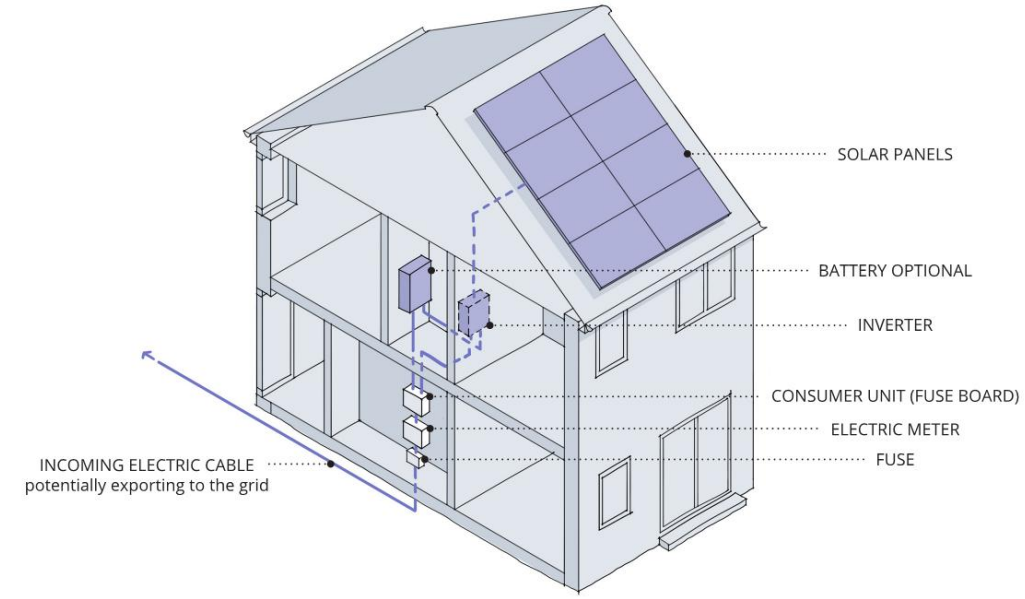
If you are installing solar panels, you will need an inverter in order to use the power in your home, and you may wish to invest in a battery to store any excess power you generate so that you can use it later. More advice on how you can maximise the benefits of your solar PV system can be found in the Smarter Homes Handbook. It will usually be possible to locate your battery system indoors, in your house itself or in an outbuilding such as a detached garage.

The table below identifies indicative space requirements and annual generation of different sizes of system. You should always work with a qualified supplier to design a system that's right for your home, as the number of panels, approximate roof area and annual generation capacity can vary substantially depending on the exact design.

System Size (kWp)	Approx. number of panels	Approx. Roof Area	Approx. Annual Generation (kWh)	Indicative Carbon Saving (tCO_2/yr)
2.0	6	12–15 m^2	1,800–2,200	~0.6
3.5	8	20–25 m^2	2,800–3,200	~1.0
5.0	12	30–35 m^2	4,000–4,500	~1.5

Plug-in solar panels are a relatively new option for householders which differ from conventional solar panels in that they plug directly into a plug socket in your home. They then work in much the same way as conventional solar panels by contributing renewable electricity to your home, reducing the need to import electricity from the national grid. Plug-in solar panels are limited to around 800W output (~700kWh over a year) but they can be a good alternative for those on a budget or who cannot install conventional solar panels (for example, renters). If you are considering plug-in solar, there are additional requirements outside the planning process, including a need to register them. Further information can be found on the Energy Saving Trust website.

Figure 15: Indicative Layout of a Home Solar PV System



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Table 10: Types and Applications of Solar Panel

Type	Energy Generation Potential	Description	Visual Impact	Typical Applications	Considerations in Heritage Settings
 **Rail-Mounted Solar**	**High** **450W per panel**	Removable PVs are installed on rails just above the tile line. The rails and panels protrude from the roofslope. Rails are fastened to the roof rafters and new tiles added so the roof is waterproof.	Medium - rail mounted panels sit on top of the existing roof, although many are low profile	All homes Suitable for pitched or flat roofs, walls or standalone	Whilst more prominent, they are generally more suitable for heritage settings, particularly when installed out of public view. Rail-mounting does not require removal of roof materials and are removable at end of life with limited permanent damage to roof
 **Sunken Tray Solar**	**Medium-High** **5-10% less than a rail mounted panel per square metre**	Solar PV is mounted in trays that sit flush with the roof slope. The panels essentially replace removed material, e.g. tiles, from the roof finish	Lower – sunken trays sit flush with the tiles of the roof which can reduce prominence	Homes with existing pitched tiled roofs where retention of original roof materials is not necessary. Generally suitable for pitched roofs only	More suitable where roof materials do not contribute to historic significance as they are less visually prominent, particularly when installed out of public view Less suitable where roof materials do contribute to historic significance as they require removal of roof materials to install and are less reversible
 **Solar Tiles**	**Medium** **20-40% less than a rail mounted panel per square metre**	PV roof tiles replace original roof tiles and can be a very discreet option. These work well for slate roofs, but can be used with other roofing materials, blending in with the existing roof design.	Varies - good quality solar roof tiles can blend in with the existing roofscape, however solar tiles tend to be modular so can have a negative impact where they do not match the size or configuration of the existing slate.	Homes with existing pitched tiled roofs where retention of original roof materials is not necessary. Generally suitable for pitched roofs only	More suitable where roof materials do not contribute to historic significance as they are less visually prominent, particularly when installed out of public view Less suitable where roof materials do contribute to historic significance as they require removal of roof materials to install and are less reversible
 **Plug-in Solar**	**Lower** **Home plug-in solar systems are capped at 800W in total**	Plug-in solar panels plug directly into a plug socket within your home. They are theoretically portable but are usually installed onto brackets on balconies, walls or roofs. They have a lower capped output relative to other solar panels but can be an attractive choice for those who cannot install conventional solar panels, such as those with a lower budget or those living in flats or rental properties.	Varies – their portability provides opportunities to place in locations which minimise visual impact such as ground floor locations or shed roofs. However, they are often an attractive choice for those residing in flats for their ability to be installed on balconies. In these instances, the visual impact may be higher, particularly on taller blocks.	All homes, including flats Suitable for balconies, roofs, walls or ground installation depending on available brackets	Their portability can provide opportunities to limit visual impact which can make them less impactful than conventional solar panels. This could include greater flexibility for ground-floor siting as an alternative to siting on prominent roof slopes. Where plug-in solar can be installed without the need for fixed or intrusive brackets, they can be help limit the impact on the fabric of older buildings. This could include ground-mounted arrays in rear gardens, for example.

3.4.3 When is permission required?

You are unlikely to need planning permission to install solar panels or a solar thermal system, including in conservation areas, as long as permitted development criteria are met. However, installing solar panels or equipment on a listed home or one that falls within the grounds of a listed building, will always need listed building consent.

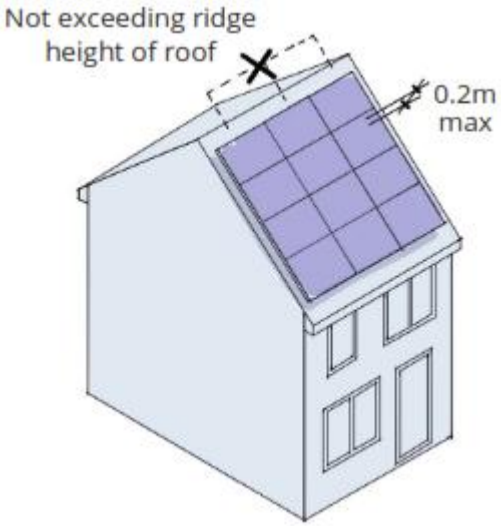
Different permitted development criteria apply based on where you are proposing to mount your solar panels or solar thermal equipment, as explained below.

Solar panels on pitched roofs, whether as part of your home or an outbuilding, do not need planning permission as long as the panels:

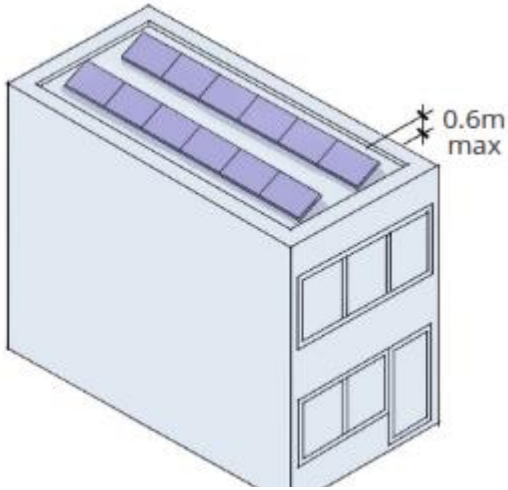
- Would not protrude more than 0.2m (20cm) from the roof
- Would not exceed the overall height of the roof (excluding any chimney)
- Would not be installed on a building that is a listed building, or is within the curtilage (grounds) of a listed building

Solar panels on flat roofs, whether part of your home or an outbuilding, will not need planning permission as long as the panels:

- Would not exceed the overall height of the flat roof (excluding any chimney) by more than 0.6m (60cm)
- Would not be installed on a building that is a listed building, or is within the curtilage (grounds) of a listed building
- Would not be installed on a building within a conservation area, unless you have first sought to the Prior Approval of the Council (please see the box on Page 55 for more information)



Pitched Roof



Flat Roof

Smarter Homes

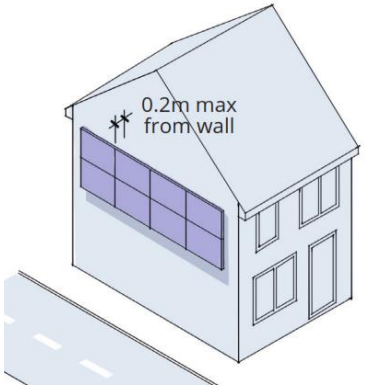
Solar panels on walls, whether part of your home or an outbuilding, will not need planning permission as long as:

- If your home is a flat, the panels would not protrude more than 0.2 (20cm) from the wall
- If your home is a house (not a flat), the panels would not protrude more than 0.2m (20cm) from a wall that is next to a highway[9], or more than 0.4m (40cm) from any other wall.
- The wall does not face onto a highway[9] if your home is located in a conservation area
- The panels would not be installed on a listed building or a building within the curtilage (grounds) of a listed building
- In the case of plug-in solar, the panels would not be installed on a wall that is made of, or clad, in wood

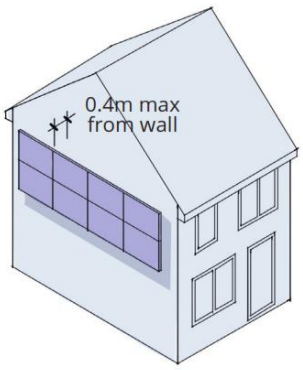
Solar panels on balconies or roof enclosures do not need planning permission as long as:

- If your home is a house (not a flat), the panels would not protrude more than 0.2m (20cm) from a balcony or roof enclosure that is next to a highway[9], or more than 0.4m (40cm) from any other balcony or roof enclosure
- If your home is a house in a conservation area (not a flat), the balcony or enclosure does not face onto a highway[9]
- The panels would not be installed on a listed building or a building within the curtilage (grounds) of a listed building
- In the case of plug-in solar, the panels would not be installed on a balcony or roof enclosure that is made of, or clad, in wood

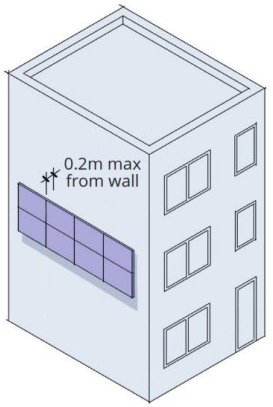
[9] A highway is a path which the public are entitled to pass, for example a road, footpath or cycleway



Wall-Mounted
(Houses where the wall is next to a highway)

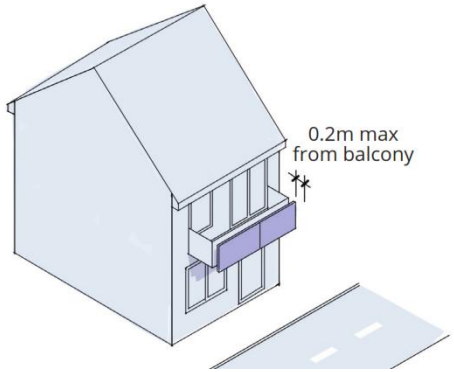


Wall-Mounted
(Houses where the wall is not next to a highway)

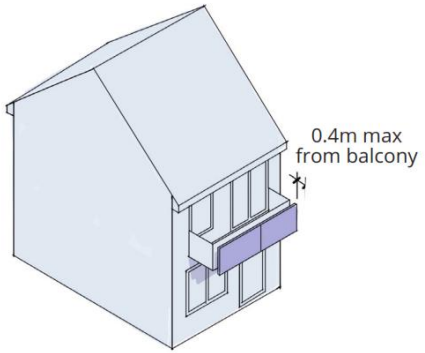


Wall-Mounted
(Any flat)

Please note, if your home is in a Conservation Area, installing panels on a wall which faces onto a highway will need planning permission, regardless of depth.



Balcony-Mounted
(Houses where the balcony is next to a highway)



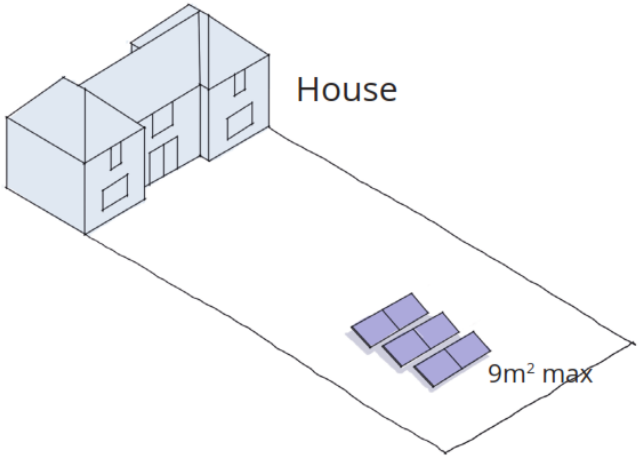
Balcony-Mounted
(Any other balcony)

Please note, if your home is a house in a Conservation Area, installing panels on a balcony or enclosure which faces onto a highway will need planning permission, regardless of depth.

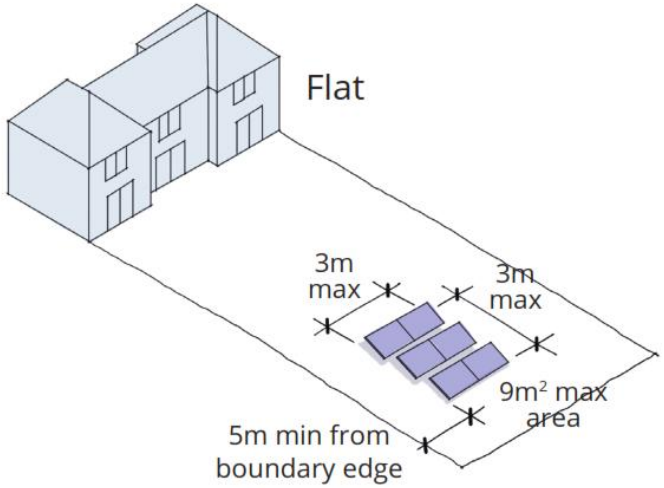
Smarter Homes

Standalone solar panels do not need planning permission if:

- Your home is a house and:
  - Is not a listed building or within the grounds of one
  - The surface area of the panels would not exceed 9m^2
  - The height of the panels would not exceed the lowest applicable limit below:
    - 1m, if any part of the panels would be installed in front of the front wall of your home and within 5m of your boundary
    - 2m, if any part of the panels would be within five metres of the boundary of your boundary
    - 2m, if any part of the panels would be installed in a conservation area and the distance between the panels and a highway[9] is less than between your home and a highway; or
    - 4m, in any other circumstance.
  - Where the 1m or 2m height limit applies, you have first sought the Prior Approval of the Council. Please see the box on the next page for more information.
  - In the case of plug-in solar panels, the panels are not being installed on a wooden fence, gate or wall



- Your home is a flat and:
  - Is not a listed building or within the grounds of one
  - You do not already have a standalone solar panel anywhere in your curtilage (grounds)
  - The panels are not being installed within 5m of your boundary
  - The surface area of the panels would not exceed 9m^2 and any dimension of the panel itself would not exceed 3m
  - The height of the panels would not:
    - Exceed 2 metres, if your home is located in a conservation area and the distance between the panels and a highway[9] is less than between your home and a highway, or
    - Exceed 4 metres in all other cases.
  - Where the 2m height limit applies, you have first sought the Prior Approval of the Council. Please see the box on the next page for more information.
  - In the case of plug-in solar panels, the panels are not being installed on a wooden fence, gate or wall



Any solar panels installed under permitted development are subject to important conditions. These conditions require that all solar panels and solar thermal equipment, wherever they are mounted, are sited to minimise their effect on both the external appearance of your home and the wider area. The next section contains a checklist for making sure your project meets these requirements.

Permitted development rules also require that solar panels or solar thermal equipment are removed as soon as reasonably practicable when no longer needed.

See the flow chart on the next page to determine whether or not your solar project requires permission.

Don't forget: If you believe your solar panels do not need planning permission, but you would like the comfort of written confirmation from the Council that this is the case, you may wish to apply for a Lawful Development Certificate. Further advice on Lawful Development Certificates is included in Section 4: The Planning Process.

What if my solar panels need permission?

If your solar panels need permission, you will need to make an application to the Council before you carry out your project. Further advice on making an application for planning permission or listed building consent is set out in Section 4: The Planning Process.

The next two sections provide detailed advice that can be used to maximise your chances of having permission approved. The first provides general advice on best practice in relation to design and the second provides more specific advice on how to approach solar projects in heritage settings.

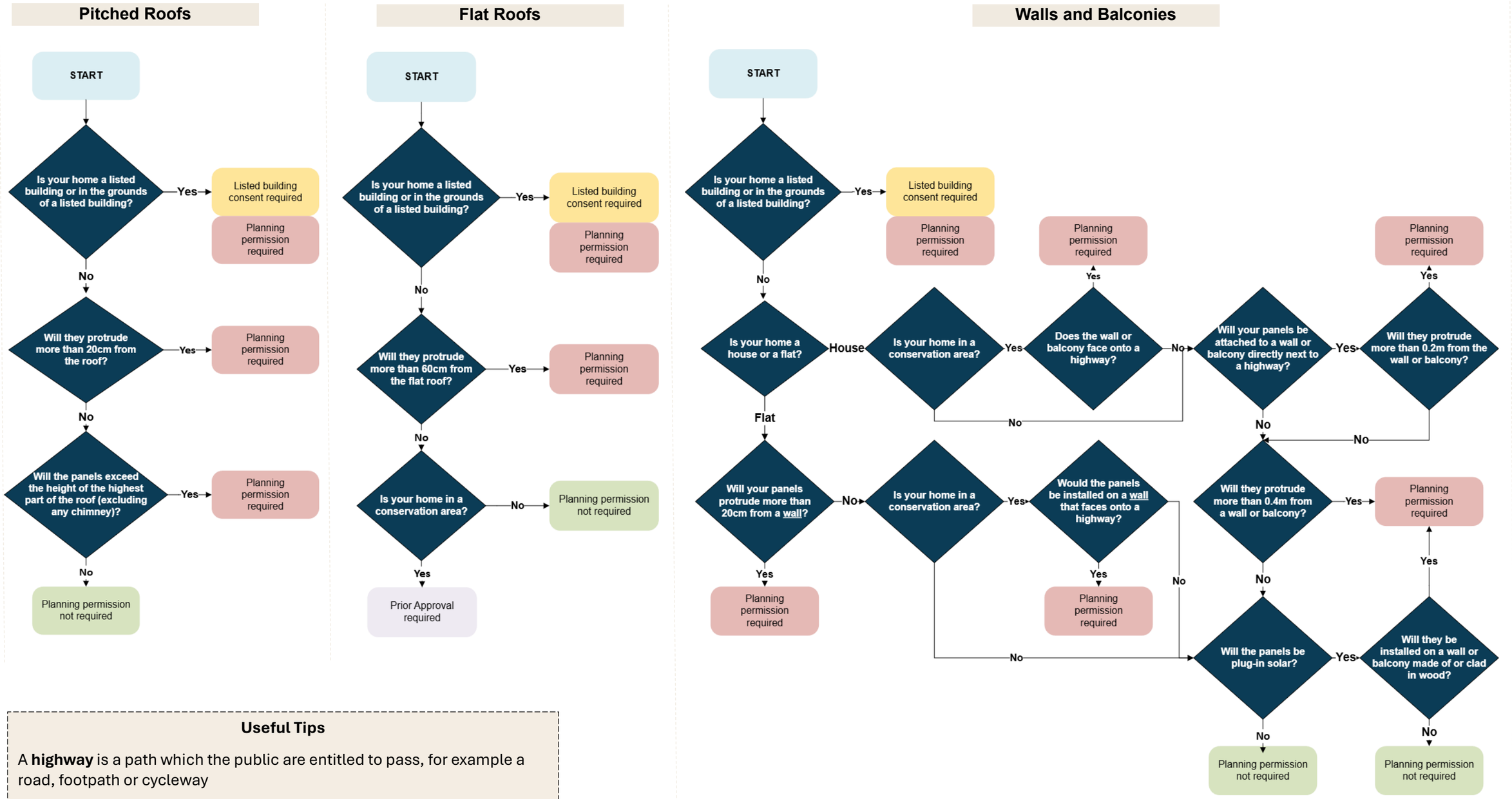
What does it mean when it says I may need 'Prior Approval'?

In a small number of cases, the Government require you to apply to the Council for 'prior approval' before you can carry out your works. This is not the same as needing planning permission and is only focused on a single issue, the impact on the conservation area. The two cases where this is required are:

- Where you are proposing to put solar panels on a flat roof in a conservation area; or
- Where you are proposing to put standalone solar panels in a garden located in a conservation area and the panels would be closer to the highway than your home or within 5m of the boundary.

The outcomes of the Prior Approval process can be that you can proceed without planning permission, or the Council may not allow you to proceed with your specific proposal if they are concerned about its impact on the character of the Conservation Area. Following the advice in the following sections can help maximise your chances of success but you will usually also need to justify why you have chosen this location over potentially less sensitive locations. You can find further information and apply for Prior Approval on the Planning Portal.

Flowchart: Do I need planning permission for roof, wall or balcony-mounted solar panels?

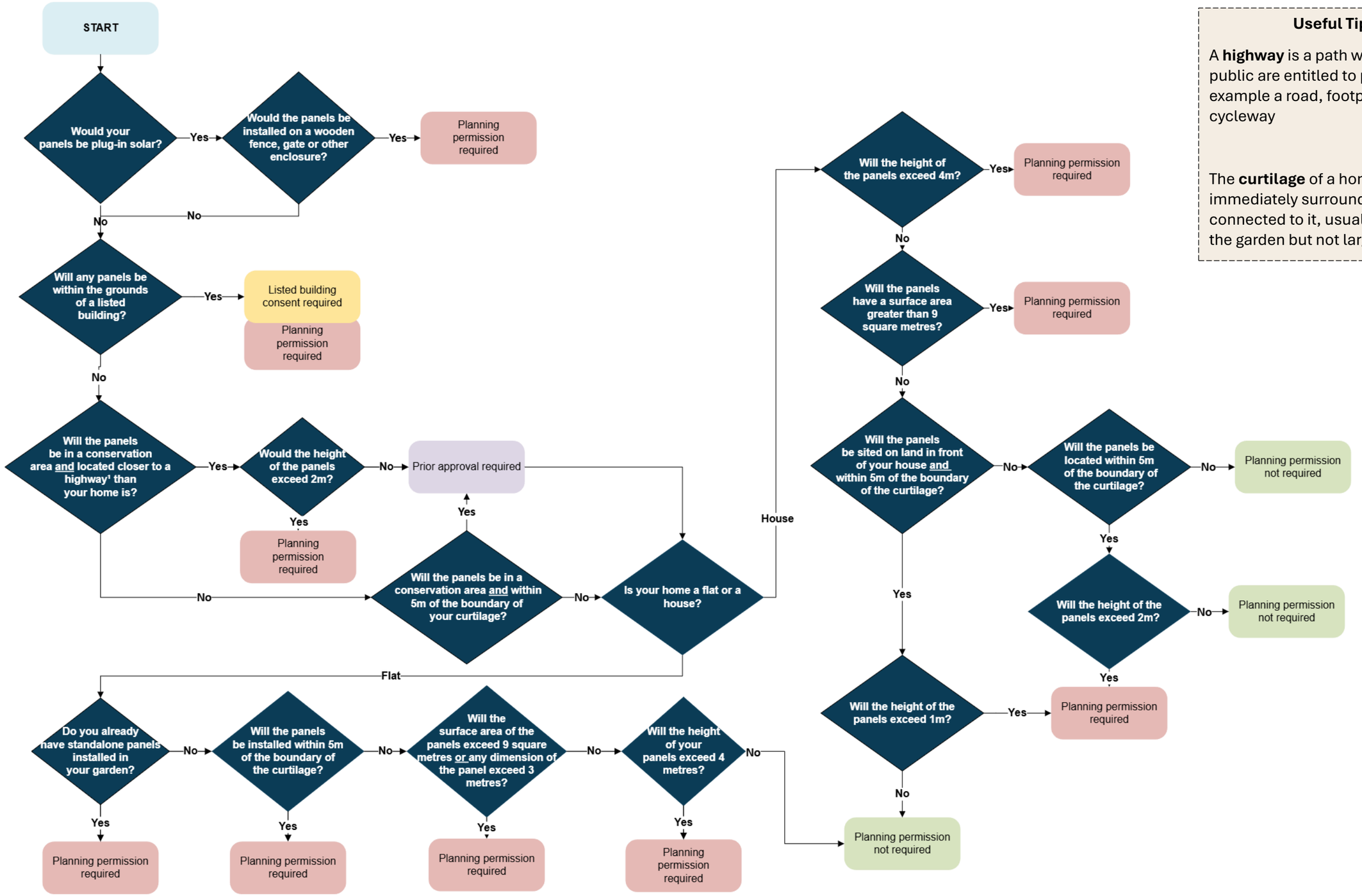


Useful Tips

A **highway** is a path which the public are entitled to pass, for example a road, footpath or cycleway

If you are planning to install panels in a number of places in your home, you will need to follow each applicable flowchart to understand where permission is required. In some cases, this may mean you need permission for some of your panels, but not others.

Flowchart: Do I need planning permission for standalone solar panels in my garden?



Useful Tips

A **highway** is a path which the public are entitled to pass, for example a road, footpath or cycleway

The **curtilage** of a home is the land immediately surrounding it and connected to it, usually including the garden but not large grounds

3.4.4 Best Practice Design Principles for Solar Panels

The performance of solar panels depends greatly on their orientation and pitch. The Council aims to support panels sited to maximise performance. However, it is important that your design also minimises the visual impact on the surrounding area wherever possible.

Shading can reduce the performance of solar panels. Even partial shading of one panel can affect the output of an entire array, so chimneys, dormer windows, parapets, and nearby trees should be carefully considered at design stage. Preliminary shading analysis or simple sunlight diagrams can help confirm the suitability of the preferred roof area before detailed design begins. However, you should always site panels to avoid shading, rather than, for example, removing trees to reduce shading. Doing so can undermine the environmental benefits of installing the solar panels in the first place.

As much as possible, make sure your panels integrate with your home's architectural style, particularly where your home is in a conservation area or the panels would be visible from the street. As a general principle, panels should always be arranged neatly within the roof space, aligned with existing ridgelines and eaves, and kept clear of decorative features. Where feasible, in-roof sunken panels, integrated flush with the roof covering, can provide a more discreet finish than on-roof systems.

The visual impact of any panels will be greatest when positioned on roof slopes or walls visible from public spaces, including the street. Wherever possible, you should prioritise roof slopes or walls that are less visible from public spaces. The best location will usually be rear-facing roofs. However, we recognise that in certain cases this may not be practical, especially if there is only one suitable roof location or because generation capacity will be significantly undermined.

Where your solar project requires permission, you may be asked to demonstrate why you have chosen the location you have, particularly if you have chosen a more visible roof slope or wall. Where the location has been chosen because of its exposure to sunlight to maximise efficiency, it can be helpful to provide supporting evidence about how alternative locations would affect the capacity of the panels. This should include the expected reduction in capacity if the panels were located on an alternative roof slopes or walls that are less visible from public viewpoints.

If your home has a larger garden, ground-mounted arrays or installations on garages and outbuildings may also be appropriate, provided they are carefully sited and screened to protect neighbouring amenity and views.

Whether your project requires permission or not, there are a number of principles that can be applied to limit the visual impact of panels, as set out in the checklist below. Illustrated examples are provided at Figure 16.

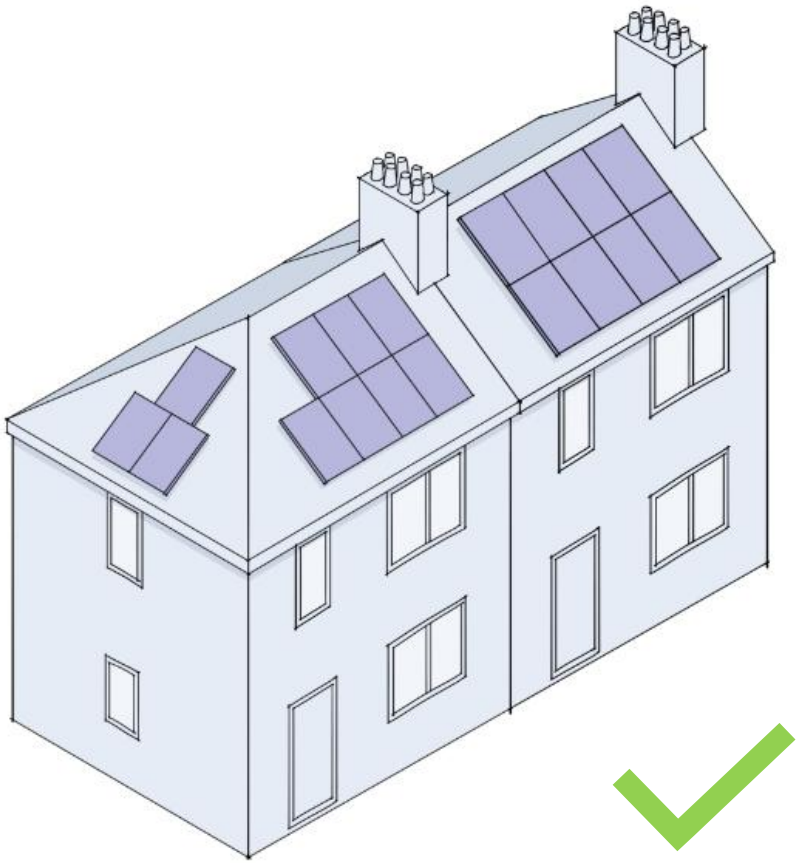
☑ Evenly space panels across a roof slope and do not place them in an irregular pattern

☑ Position panels to retain even distances to roof margins (ridges, eaves, party walls) and/or wall margins

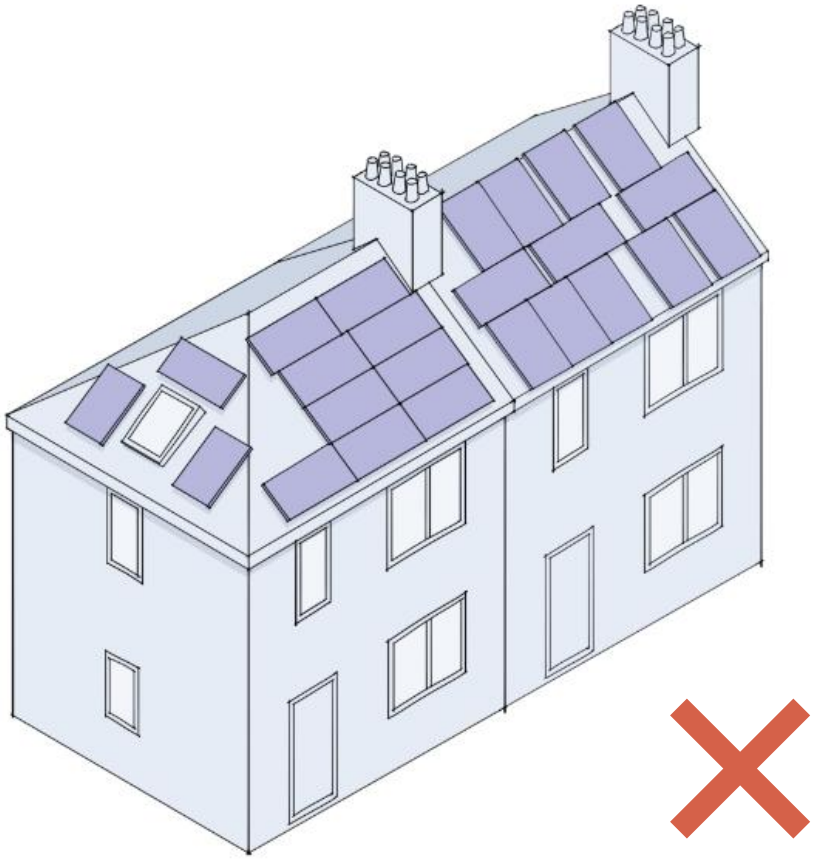
☑ Place the panels, where possible, behind parapets or roof features such as chimneys, where these features do not cause shading issues

☑ Locate cabling to minimise visibility and use colours that are in keeping with the colour of the building's exterior

Figure 16: Minimising Visual Impact of Solar Panels



- Panels are evenly spaced with consistent and even gaps between panels and roof features
- Panels are arranged in a regular pattern and closely aligned with one another
- Panels are mostly symmetrical and consistently oriented



- Panels are unevenly spaced with inconsistent and harsh gaps between panels and roof features
- Panels are in an irregular pattern with notable gaps
- Panels overlap roof edges
- Panels are mostly asymmetrical with inconsistent orientation

3.4.5 Specific Advice for Solar Panels in Conservation Areas and Listed Buildings

Conservation Areas

When your home is in a conservation area, preference should be given to siting panels on roof slopes that are not visible from public spaces, including the street. Usually this will mean rear-facing roof slopes but some homes will have roof designs that allow for less visible placements in other locations, including butterfly roofs or flat roofs.

Placing panels behind existing parapets can be a useful way of limiting visibility, provided this does not lead to excessive shading. Similarly, some homes in conservation areas have outbuildings, such as detached garages, which can support panels in less visible locations. Where visibility from public spaces is unavoidable, such as on corner plots, or because this is necessary to optimise energy generation, planning applications will need to demonstrate how the visual impact of the panels has been minimised. In conservation areas, following the checklist in the previous section is even more important.

It is particularly important to align any panels carefully with existing ridgelines, pitches and the pattern of windows to help avoid an incoherent or cluttered appearance. Installations should avoid damaging or obscuring architectural features including chimneys, cornices, dormers, decorative gables or parapet details that contribute to a building's historic significance.

Solar panel type can also help to minimise visual impact. Where the existing roof is not itself of historic significance, or does not use traditional or original materials, solar tiles or sunken tray solar panels may, if appropriately sized and coloured, blend more seamlessly into the surrounding area. However, these are less likely to be appropriate if the roof is of historic significance or uses original materials, in which case the reversibility of rail or plug-in solar may be preferrable.

Wherever possible, the fixings and brackets used to install solar panels should be reversible, causing no permanent damage to traditional materials such as slate, tile or lead. Cabling should follow existing routes and be concealed where possible.

Listed Buildings

For many listed buildings, it will usually be possible to identify locations where solar panels can be installed without harming the significance of the listed building. For example, it may be possible to site ground-mounted solar in a way that is discreet and does not have a harmful impact on the importance or setting of the wider building.

Where the panels are to be mounted to the listed building itself, it is important to prioritise roof slopes that are less prominent and avoid installations that have a physical impact on the building. Given the age of many listed buildings, it is important to ensure that any roof slope can structurally bear the weight of solar panels and that the panels can be easily removed at the end of their operational life, without causing permanent damage to the building. For this reason, rail-mounted or plug-in solar panels may be preferrable, as they avoid the need to remove historic fabric from the building and can usually be reversed at end of life. Solar panels that require the removal of fabric from the building are likely to only be appropriate where the fabric being removed is of limited historic significance, because, for example, it has already been replaced with a modern material.

Whilst many listed buildings will be suitable for some type of solar installation, there will be some listed buildings that, because of their particular importance, design or materials, are not suitable for solar panels. If you are looking to install solar panels to a listed building, you are encouraged to read Historic England's guidance and appoint a specialist who will be able to work with you and the Council to design a solar panel proposal that is sympathetic to the listed building.

The Council encourages applicants to seek early free pre-application advice for any solar proposals in heritage contexts.

4 The Planning Process

Whilst many home retrofit projects do not require permission, this section explains how the process works when projects do.

This includes:

- General advice on how to make a successful application for planning permission or listed building consent
- What information should be submitted to ensure applications for planning permission or listed building consent meet the Council's requirements and will be decided quickly
- Information on our free pre-application advice service
- Information on when to apply for a Lawful Development Certificate

If you need to understand what the different planning terms mean, refer to Appendix 4: Glossary.

4.1. Overview of the Planning Process

Pre-Application Advice

The Council offers a pre-application advice service where planning officers can review and offer feedback on your proposal before you make a formal application. This service is not mandatory, and for less complicated projects it may be possible to discuss and agree any changes needed to your plans during the course of your planning application. However, there are circumstances in which the Council would strongly encourage you to seek pre-application advice.

These include:

- Where your home is listed or in a conservation area
- Where your retrofit project is particularly complex or involves substantial building works
- Where you or your planning agent has identified that it may be difficult to meet the Council's requirements because of the particular circumstances of your home

Requesting pre-application advice can help you test ideas to understand what is most likely to be supported by the Council. This is particularly helpful where there are sensitive heritage or design issues to consider. Pre-application advice can also help you identify which documents you may need to prepare and submit to make a valid planning application (also known as complying with validation requirements).

If you are requesting pre-application advice, it will usually not be necessary to have prepared all of the documents that you will need to submit as part of any future planning application, but it can be helpful to submit drawings and as many documents as you have ready.

Don't forget! The Council has made pre-application advice relating specifically to promoting sustainable development free of charge. For pre-applications relating to further aspects of design and conservation, check the Council's webpage for the most up to date charges.

Making an Application

Where planning permission and/or listed building consent is required, you will need to submit an application to the Council. These applications will need to include various documents, including architectural drawings showing what you want permission for and sometimes technical assessments such as heritage assessments.

The result of a planning application can be that planning permission is granted, or planning permission is refused.

The documents that you need to submit as part of your planning application will depend on the types of work proposed.

The reason the Council asks for this information to be provided is to make sure it has all the information it needs to make a quick and accurate assessment of whether your plans are acceptable. When it receives a planning application, it checks each required document and only marks the application as valid when all requirements are met. Making a full and valid application can help ensure your application is dealt with quickly.

Section 4.3 provides further detail on the documents that need to be submitted with any planning application or application for listed building consent.

After Permission is Granted

When planning permission is granted, it is important that you stick to what was approved. If you build something different to what was approved, you may need to re-apply for permission or could, in some circumstances, be at risk of enforcement action.

Planning permissions will also usually be subject to conditions. Conditions set out additional requirements for how you need to carry out your works. They will often include a time limit on how long you have to start (usually 3 years) and may require you to carry out your project in a certain way (e.g. only using certain materials). Using a qualified planning agent to prepare and submit your planning application is important for maximising your chances of success, but they can also help you understand and comply with any conditions.

Figure 17: Overview of Planning Process for Home Retrofit



4.2 National, Regional and Local Planning Policies

When a planning application is made, it will be assessed against relevant planning policies which set out the standards that applications need to meet in order to be approved.

These policies are generally very positive towards the principle of carrying out retrofit, although other considerations will be relevant in certain circumstances. Wider considerations relevant to a retrofit planning application might include:

- Any impacts upon the character or appearance of your home, particularly if your home is listed or in a conservation area
- Any impacts upon the character or appearance of your wider neighbourhood, particularly if your home is listed or in a conservation area
- The need to avoid or mitigate any negative impacts upon your neighbours (for example, resulting from overlooking, noise, vibrations or glare)

Section 3: Retrofit Measures includes good practice design principles for four main types of retrofit project which can be applied whether your specific proposal requires planning permission or not. Where your project requires planning permission, applying these design principles is likely to give your application the best chance of being approved.

Where your proposal requires planning permission, understanding the policies that will be used to assess whether permission should be granted is helpful. The planning policies that will usually be most relevant to retrofit projects are summarised below and available in the full by accessing the documents linked.

National Planning Policy Framework (NPPF, 2026)
The NPPF sets out the Government's overarching planning policies for England. The NPPF emphasises the importance of development supporting the transition to net zero by 2050 (Section 5) and promotes measures which improve energy efficiency, support renewable energy and incorporate adaptive design that responds to climate impacts. Where relevant, the NPPF also supports conserving heritage assets in a manner appropriate to their significance (Section 20) whilst recognising that changes to heritage assets that enable energy efficiency and low carbon heating generate public benefits.

The London Plan (2021)
The London Plan includes planning policies which apply across the whole of London. It supports minimising greenhouse gas emissions (Policy SI2), emphasises design measures which avoid overheating (Policy SI4) and promotes conservation-led regeneration and sensitive energy upgrades (Policy HC1).

Richmond Local Plan (2024–2049)
The Richmond Local Plan is supportive of developments which help to tackle the climate emergency including the retrofitting of existing buildings through low carbon measures (Policy 3), which minimise greenhouse gas emissions and promote energy efficiency (Policy 4), which incorporate sustainable construction methods (Policy 6) and which adopt a circular economy approach (Policy 7).

In relation to local character and design of buildings, the Richmond Local Plan also requires developments to be of a high architectural design quality and enhance the local environment and local character (Policy 28) and to conserve and positively contribute to the historic environment of the Borough including in relation to designated heritage assets, such as conservation areas and listed buildings, (Policy 29) and non-designated heritage assets (Policy 30).

The Local Plan also expects developments to protect the amenity and living conditions of all homes and areas as a whole, including by ensuring alterations to homes are not visually intrusive or overbearing and do not harm the enjoyment of buildings or gardens due to increases in noise or other disturbance (Policy 46).

Together, these policies establish a positive framework through which retrofit projects can contribute to a low-carbon, resilient, and high-quality built environment.

Excerpts from **Policy 3 (Tackling the Climate Emergency):**

A. Climate change is now the greatest challenge facing our society. ***The Council will promote zero carbon development, with the aim that all buildings and infrastructure projects in the borough will be net-zero carbon by 2043****, at the latest.*

B. This will be achieved by requiring all development to…

11. ***promote retrofitting of existing buildings****, through low-carbon measures;*

4.3 General Advice for Making a Successful Application

All Applications

To ensure the application process runs efficiently, the Council recommends that you appoint a suitably qualified person, usually a planning agent or architect, to prepare and submit your application for you. They will have experience of preparing similar applications and are more likely to submit the right information first time.

The Council's Local Validation Checklist sets out the information that you will need to submit as part of different types of application. As set out in the checklist, there is certain information likely to be required as part of all applications involving retrofit works, including:

- A completed Planning Application Form, which can be found on the Planning Portal Website
- A completed Ownership Certificate, following the guidance set out on the Government website.
- Location and block plans showing the application site (e.g. your home) in its local context
- Floor and elevation plans showing your home, as existing and proposed, clearly showing the works you are proposing

There is also some information only required from certain applications, such as:

- **Applications involving roof-mounted solar panels** must provide plans showing the roof, as existing and proposed, showing the position of the solar panels and their alignment, and cross-sectional roof plans showing the thickness of the solar panels, their positioning against the roof and the mounting method.

- **Applications involving external roof insulation** must provide plans showing the roof, as existing and proposed, as well as cross-sectional roof plans showing the thickness of the proposed insulation.
- **Applications involving external wall insulation** must provide cross-sectional plans showing the thickness of external wall insulation.
- **Applications involving air-source heat pumps that meets the Microgeneration Certification Scheme's MCS 020a planning standard** must provide a copy of the manufacturer's specification sheet, and a certificate of MCS compliance or installer declaration confirming compliance with MCS 020 a) noise limits and siting criteria.
- **Applications involving air-source heat pumps that do not meet the Microgeneration Certification Scheme's MCS 02a planning standard** must provide a Noise Impact Assessment or Acoustic Design Statement to demonstrate that noise impacts are acceptable and meet relevant planning policy standards. These should be prepared by specialist acoustic surveyors.

Applications Affecting Conservation Areas or Listed Buildings

General Advice

The Council recognises that a balance will always need to be struck between achieving the environmental goals of retrofit and the need to conserve the significance of heritage buildings and settings, such as listed buildings and conservation areas.

In most cases, substantial retrofit improvements can be made in heritage settings, but they may require slightly more careful design.

The default approach in heritage settings is usually based on minimum intervention, maximum reversibility, and compatibility with original materials. In practical terms, this means prioritising retrofit measures that:

- ☑ Are compatible with the building,
- ☑ Do not damage or unnecessarily change historically significant parts of buildings,
- ☑ Use installation methods that can be reversed and are non-invasive, and
- ☑ Use materials that match or are compatible with those used in the original building.

Section 3: Retrofit Measures provides detailed guidance on how to approach insulation, glazing and windows, heat pumps and solar panels in heritage settings. Where you require permission, applying this detailed guidance should maximise your chances of designing your retrofit improvements to meet the Council's requirements. This section also provides links to further technical guidance which you may find useful, including Historic England's own detailed guidance. Further general good practice tips are set out below.

Where permission is required for more substantial measures, including internal or external wall insulation and visible pumps or panels, it can be helpful to show how :

- The measures have been designed to avoid harm to heritage significance
- Moisture and ventilation issues have been fully considered, along with the structural behaviour of traditional materials
- Any visual and acoustic impact has been minimised.

Where it is possible to balance retrofit and heritage goals, the Council will expect original features such as sash windows, decorative brickwork and timber framing to be retained. Opportunities to repair and enhance these features should always be explored before you consider their replacement. Where replacement is unavoidable, new features should closely match the original proportions, profiles and materials, or be supported by a clear justification.

For low-carbon energy opportunities, such as solar PV and heat pumps, priority should be given to locations that minimise visual impact. Rear-facing gardens are usually the best place to start.

As specified above, early pre-application engagement is strongly recommended for more substantial retrofit projects on listed buildings or in conservation areas. This service is free for sustainability projects and can help ensure your application stands the best chance of being successful.

Information Required

Retrofit applications in conservation areas and listed buildings will need to include a **Heritage Statement** prepared by a specialist.

The role of Heritage Statements is to identify the significance of the heritage asset affected and how proposed works will impact on this significance. These apply to conservation areas and listed buildings. They help ensure that an informed judgement can be made on whether the works should be granted permission. The level of detail in a Heritage Statement will vary depending on the range of works you are proposing, and the importance of any heritage assets being impacted. As a general rule, Heritage Statements do not need to be any more detailed than necessary to understand the potential impact of the proposal on the significance of the heritage asset.

We encourage you to work with a planning agent or architect as they can prepare the Heritage Statement for you, or contract with a specialist to do so. The Council is unlikely to accept Heritage Statements prepared by a person not qualified to assess impact. You can check whether your proposal is likely to affect the significance of any heritage assets, such as conservation areas or listed buildings, using the 'Heritage Asset' category on the Council's online mapping tool.

Heritage Statements should usually include:

1. Details of all heritage assets affected by your project (e.g. conservations areas or listed buildings);
2. A summary of the significance or 'special interest' of any conservation areas or listed buildings that your property falls within;
3. A summary of your proposed retrofit works;
4. A statement regarding how your works will impact on the significance of the conservation area or listed building;
5. Justification of the impact of the proposal, including details of how the proposal has been designed to avoid/minimise harm to the special interest of the conservation area or listed building, and any heritage benefits which may outweigh the harm caused (mitigation).

Heritage Statements for more complex retrofit projects should take into account any relevant Conservation Area Appraisals, as well as Village Planning Guidance SPDs.

Applications for Listed Building Consent

There is also certain information required only for applications for Listed Building Consent. This includes:

- A Design and Access Statement explaining why the design of a proposed works is suitable including the reasons why certain design choices have been made. They should also include an analysis of the application site (i.e. your home and the surrounding area), any constraints and wider surrounding context. They should explain how the surrounding context (e.g. the character or materials) has influenced the design.
- A Schedule of Works by room or part of your home
- Detailed internal plans showing any new doors, windows, panelling, fireplaces, plaster mouldings, and other decorative features proposed
- Any applications proposing any structural alterations and repairs to Listed Buildings must include a Structural Impact Assessment relating to the proposed works prepared by a qualified professional. This should include structural engineering information explaining the proposed means of support and any loss of historic fabric, particularly in relation to proposed or altered basements.

Whilst not mandatory, it can be helpful to include photographs of your home which help the Council to assess the suitability, and any impacts, of what you are proposing in its context.

4.4 Lawful Development Certificates

If you believe your retrofit project does not require planning permission but want to be sure, you can apply to the Council for a Lawful Development Certificate (LDC).

This is not the same as applying for planning permission and is subject to a lower fee. The purpose of an LDC is to confirm that the development you plan to carry out would be “lawful”; in other words you do not require planning permission to carry out the works lawfully.

Lawful Development Certificates are entirely optional but can provide additional comfort and certainty when you believe your project falls within permitted development criteria. In some cases, it may also be helpful when you come to sell your home, to confirm to the future owner that the works you have carried out did not require planning permission. However, they are not an alternative to planning permission or listed building consent, and if you believe that permission is required, you should apply for this instead, or seek pre-application advice where appropriate.

As with the other types of application listed above, you can apply for a Lawful Development Certificate using the Planning Portal.

To ensure the Council has enough information to consider your application, you will usually need to provide accurate plans showing the works you are proposing. This includes:

- Location and Block Plans
- Existing and Proposed Elevation Plans
- Existing and Proposed Floor Plans
- Existing and Proposed Roof Plans (if your works affect the roof)

Further guidance on plans is provided in the Local Validation Checklist.

Appendix 1: Typical Retrofit Opportunities by House Type

The table below provides an overview of the general characteristics and typical retrofit opportunities for different periods of homes present across Richmond. Whilst this table can be used to help to better understand your home, it is important to note that the period or architectural design of your home is only one factor in identifying the right retrofit approach, and there can be significant differences between homes built at similar times. Similarly, many older homes will have been altered significantly since they were built. This is why it is always important to work with a qualified person, such as a Retrofit Co-ordinator, to ensure your retrofit strategy is designed around your actual home. It also important to note that the right retrofit strategy for your home will also depend on whether your home is listed or in a conservation area. Homes in conservation areas and listed buildings will often be older building types, but this is not always the case. Following the detailed advice in this guide on how to approach retrofit for listed buildings and conservation areas should always be prioritised over the indicative information in this table.

Building Type	Example	Characteristics	Typical Retrofit Opportunities
Georgian (1714–1830)		Georgian homes in Richmond are noted for their symmetrical designs, sash windows, brick or stucco exteriors, and shallow slate roofs often concealed by parapets. Common features include solid brick walls, timber or stone floors and hipped or gabled roofs.	✓ Low cost, low effort measures – see Smarter Homes Handbook ✓ Prioritise repairing and draughtproofing historic windows and building fabric ✓ Secondary glazing ✓ Internal insulation, including roof and floor ✓ Heat pumps and solar panels may be suitable if discreetly sited and avoid damage to historic fabric
Victorian (1837–1901)		Victorian homes form a large proportion of Richmond's housing, ranging from compact terraces to ornate villas. Features include sash and bay windows, decorative brickwork, steep slate roofs and timber or tiled flooring. Early examples have solid brick walls, while later ones may contain partial cavity construction	✓ Low cost, low effort measures – see Smarter Homes Handbook ✓ Repairing and draughtproofing historic windows ✓ Secondary glazing ✓ Internal insulation, including roof, floor or internal wall ✓ Upgrading windows, subject to following the detailed advice on historic windows set out in this guide ✓ External insulation to rear walls may be appropriate in some cases ✓ Heat pumps and solar panels likely to be suitable, if discreetly located and avoid damage to historic fabric
Edwardian (1901–1914)		Edwardian homes are typically wider, lighter, and airier than Victorian ones, often with brick or mock-tudor cladding and timber exteriors, sash or casement windows, decorative tilework, and generous roof spaces. Many have early cavity walls, though some remain solid.	✓ Low cost, low effort measures – see Smarter Homes Handbook ✓ Repairing and draughtproofing historic windows ✓ Secondary glazing ✓ Internal insulation, including roof, floor, or internal/cavity wall ✓ Upgrading windows, subject to following the detailed advice on historic windows set out in this guide ✓ External insulation to rear walls may be appropriate in some cases ✓ Heat pumps and solar panels likely to be suitable, if discreetly located and avoid damage to historic fabric
Interwar (1918–1939)		Typically, semi-detached or terraced homes with brick or rendered exteriors, bay and casement windows, wide plots, and hipped or gabled roofs. Cavity brick walls and timber floors are common, and larger gardens and roof areas provide opportunities for retrofit.	✓ Low cost, low effort measures – see Smarter Homes Handbook ✓ Repairing and draughtproofing windows ✓ Secondary glazing ✓ Internal insulation, including loft, floor or cavity wall ✓ Upgrading windows, subject to following the detail advice on historic windows set out in this guide ✓ External insulation ✓ Heat pumps and solar panels
Post-War (1945–1970s)		Suburban estates and low-rise flats, usually built from cavity brick or blockwork, with concrete floors, are typically plain and allow for visible retrofits. Windows are typically simple with large panes, constructed from metal or early examples of uPVC.	✓ Low cost, low effort measures – see Smarter Homes Handbook ✓ Repairing and draughtproofing windows ✓ Secondary glazing ✓ Internal insulation, including loft and cavity wall ✓ Upgrading windows, subject to advice on historic windows set out in this guide ✓ External insulation ✓ Heat pumps and solar panels
Modern (1980s–present)		A variety of infill, apartments, and custom homes, typically using timber-frame or advanced cavity systems with enhanced insulation. Commonly use uPVC windows.	✓ Low cost, low effort measures – see Smarter Homes Handbook ✓ Repairing and draughtproofing windows ✓ Secondary glazing ✓ Internal insulation, including loft and cavity wall ✓ Upgrading windows ✓ External insulation ✓ Heat pumps and solar panels

Appendix 2: Guidance on Insulating Listed Buildings

External Wall Insulation (EWI)

As set out across this guide, substantial carbon, cost and heat loss savings and comfort improvements can be delivered through a package of measures without including wall insulation and therefore given complexities and potential incompatibility with listed buildings, homeowners should think very carefully about whether the time and cost of designing wall insulation is worthwhile.

In most cases, it is unlikely that consent will be granted for adding EWI to a listed building.

The priority for insulating a listed building should therefore be floors and lofts, with internal wall insulation in a minority of cases. This is because the external appearance and materials of listed buildings are nearly always a vital part of their special interest. In many cases, listed buildings are cherished for the relationship between architectural features such as eaves, windows, doors, and walls, and their use of historic materials. These features and materials are usually directly covered, or even lost entirely, when EWI is added.

There may be some limited exceptions where previous alterations have already compromised the special interest of the exterior of the building and/or where the building is already finished in an inappropriate or modern render. Historic England is particularly concerned that external wall insulation on listed buildings risks harm because of a lack of ventilation, cold bridging and condensation.

In exceptional circumstances where EWI is being considered for a listed building, specialist advice should be sought.

Loft Insulation

In listed buildings with open lofts, it will usually be acceptable to add insulating material over and between existing ceiling joists. Any insulating material added should be permeable and removable. As a result, spray foam and non-permeable products like mineral wool should not be used in a Listed Building. Consideration should also be given to ventilation of the loft space to avoid condensation.

Adding insulation to roof spaces within listed buildings, including between or below rafters, will often be acceptable as long as this does not result in masking or damaging significant parts of the existing roof structure or plasterwork. Adding insulation above rafters is more sensitive but may be possible where the historic character of the roof is not harmed. Make sure you consider ventilation of the roof to avoid condensation, in line with British Standard 5250.

You can find Historic England's detailed guidance at:
Insulating Roofs in Historic Buildings by Historic England

Floor Insulation

In listed buildings with floor voids, it will usually be acceptable to add insulating material within the floor void provided that the addition of the insulating material does not materially change the floor levels and the existing historic floor material can be retained without damage after the insulation is installed.

In listed buildings where a timber ground floor is suspended over bare earth, gaps between floorboards can be a significant source of heat loss and uncontrolled ventilation. It will usually be acceptable to add insulating material under the floor unless the underfloor layer or

finishes are of particular historic significance and would be damaged by the works. This is a particular risk with older floors given the need to take up most of the floorboards to install the insulation.

In listed buildings with solid floors, the amount of heat loss through the floor and into the ground is often lower and the effectiveness of adding insulation can therefore be more marginal. In some cases, it may not be appropriate to install insulation because it risks damaging historic floor surfaces or other archaeological remains just under the existing floor or might damage shallow foundations.

Any insulating material added under floors should be permeable and removable. Always consider ventilation to avoid trapping moisture.

You can read Historic England's detailed guidance at:
Insulating Floors in Historic Buildings by Historic England

Internal Wall Insulation (IWI)

The special interest of many listed buildings often relates not only to their external design but to their internal features, including fixtures, fittings and finishes. The installation of IWI therefore needs careful consideration, particularly where it risks damaging or removing valuable internal features such as historic plasterwork, joinery, cornices, wall panelling or chimneys.

IWI can also be a poor fit for some listed buildings because of their method of construction. This is because it can be hard to ensure appropriate ventilation or avoid thermal bridging, meaning insulation can be less effective or contribute to moisture retention and mould.

IWI is likely to be more acceptable where a listed building has internal features that do not contribute to its special interest or where the features that contributed to its special interest have already been lost.

In all cases, IWI installed to a listed building must:

- be compatible with the existing wall construction
- be appropriate for the building's location, exposure and vulnerability
- not lead to moisture accumulation, condensation or mould
- not hinder the drying process
- not undermine climate resilience or increase summertime cooling demand

You can read Historic England's detailed guidance at:
Insulating Walls in Historic Buildings by Historic England

Cavity Wall Insulation

Whilst many listed buildings were not built with cavities, some present opportunities to add insulation between internal and external walls.

With modern listed buildings with cavities, installing cavity wall insulation will usually be acceptable given it is not visible and is unlikely to harm the significance of the listed building, although thorough inspection by a professional should still be carried out before any application is made. Cavity wall insulation should however be permeable and therefore spray foams should not be used.

Older listed buildings may have spaces between inner walls and outer protective surfaces that are suitable for insulation. This includes some timber-framed or weatherboarded homes. It may be appropriate to replace the material used to infill the spaces in timber-framed buildings where this has already been replaced with a modern material. With weatherboarded homes, as long as an air gap can be maintained, it may be possible to add insulation between the weatherboarding and internal plaster. Particular care should also be given to managing moisture and fire risk.

You can find Historic England's detailed guidance at:
Insulating Walls in Historic Buildings by Historic England

Appendix 3: Other Resources

Resource / Organisation	Focus / Support Provided	Website / Link
Richmond Council: Climate and Nature	Find out information about the Council's climate commitments, including its Climate and Nature Strategy and Action Plan	https://www.richmond.gov.uk/news/press_office/campaigns_and_events/climate_emergency
Richmond Council: Planning Advice and Free Pre-App Service	Free pre-application advice and policy guidance	https://www.richmond.gov.uk/services/planning
Richmond Council: Online Planning Map	Find out if your property is a listed building, in a Conservation Area or covered by an Article 4 Direction	https://mapping.richmond.gov.uk/map/Aurora.svc/run?script=%5CAurora%5Cpublic_Art4_Retrofit_Permitted_Dev_LBR.AuroraScript%24
Richmond Council: Smarter Homes Hub and Handbook	The Council's dedicated portal for retrofit guidance, funding links, and case studies	www.richmond.gov.uk/smarterhomes
Boiler Upgrade Scheme	Information on the Government's grant scheme for boiler replacements (heat pumps)	https://www.gov.uk/apply-boiler-upgrade-scheme
Energy Saving Trust	Trusted independent advice on home energy efficiency and renewables	www.energysavingtrust.org.uk
Greater London Authority (GLA)	London Plan policies, energy and retrofit funding programmes	www.london.gov.uk
Historic England Guidance	Detailed Historic England guidance on retrofitting historic buildings	https://historicengland.org.uk/advice/technical-advice/retrofit-and-energy-efficiency-in-historic-buildings/
LETI (London Energy Transformation Initiative)	Best-practice guidance on net-zero design and embodied carbon	www.leti.london
Microgeneration Certification Scheme (MCS)	Information on the industry certification for renewable energy installations	www.mcscertified.com
Passivhaus EnerPhit Guidance	A detailed standard for retrofitting buildings	https://www.passivhaustrust.org.uk/UserFiles/File/2014/Guidance/EnerPHit pres Oct 2011.pdf.
Publicly Available Specification (PAS 2035)	Information on the British Standard for carrying out retrofit projects and co-ordinators	https://retrofitacademy.org/wp-content/uploads/2025/12/PAS2035_2023.pdf
RICS (Royal Institution of Chartered Surveyors)	Methodology for Whole-Life Carbon Assessment	www.rics.org
TrustMark	Government-endorsed quality scheme for tradespeople	www.trustmark.org.uk

Appendix 4: Glossary

Term	Definition
Air Source Heat Pump (ASHP)	A system that extracts heat from the air outside and transfers it for use inside a home.
Article 4 Direction	Legal directions used by local councils to remove certain Permitted Development rights from homes. Article 4 Directions are made when councils feel they need to have more control in managing development in a particular area, often a conservation area, usually because they feel there is a risk that changes that are harmful to the area could otherwise be carried out without planning permission. Depending on which Permitted Development rights are removed, householders whose home is subject to an Article 4 direction may have to apply for planning permission for works which would normally not need permission. You can check if your property is in an area covered by an Article 4 Direction here.
Building Regulations	A set of technical regulations separate to the need for planning permission or listed building consent. They require any building works to achieve relevant technical and safety standards during installation and usually throughout the lifetime of the building's use. All works to a home must comply with current Building Regulations, particularly those relating to energy efficiency, ventilation, and moisture control. Using a trusted registered installer is vital to ensure any building works are carried out in compliance with the Building Regulations. More information can be found on the Government website. Whilst Building Regulations should always be handled by a qualified designer and contractor, key parts likely to be more relevant to a home retrofit project include: • **Part L:** Conservation of Fuel and Power • **Part F:** Ventilation • **Part O:** Overheating
Circular Economy	Design and construction approach that maximises material reuse, repair, and recycling to minimise waste.
Coefficient of Performance (COP)	Ratio of heat output to electrical input for heating systems.
Conservation Areas	Areas of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance'. Richmond has around 80 conservation areas. They can be searched using our interactive map. When considering planning applications in conservation areas, the Council will have particular regard to avoiding development which would harm the architectural or historic character or appearance of the area.
Curtilage	The land immediately surrounding a home and connected to it, usually including the garden but not large grounds

Term	Definition
Embodied Carbon	Greenhouse gas emissions associated with the construction of buildings in terms of the materials they are built from, including production, transport, installation, and end-of-life disposal.
Fabric	The physical structure of a building, including the materials it is built from
Fabric First Approach	An approach to retrofit which prioritises improvements to the fabric of a building (e.g. its structure and materials), such as insulation, airtightness, and windows, before adding renewable technologies. Taking a fabric first approach is associated with better retrofit outputs as it helps to ensure that the benefits of renewable technologies, such as heat pumps and solar panels, are not wasted because a home loses excessive amounts of heat and energy through its fabric.
Ground Source Heat Pump	A system that extracts heat from underground soil or boreholes to supply heating and hot water to a home.
Highway	A path which the public are entitled to pass, for example a road, footpath or cycleway.
Heritage Asset	A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. It includes but is not limited to designated heritage assets (such as listed buildings, conservation areas and World Heritage Sites) and non-designated heritage assets identified by the local planning authority (note: in Richmond, these non-designated heritage assets include Buildings of Townscape Merit).
Heritage Statement	A document assessing the significance of a heritage asset and the impact of proposed works. A Heritage Statement may be required as part of a planning application affecting a conservation area or listed building.
Listed Building	Buildings of special architectural or historic interest with legal protection. The record of each listed building, also known as the list entry, is hosted on the National Heritage List for England which is a publicly available, searchable database of entries containing information on England's protected heritage. Each entry provides a description of the building/structure, and some include a summary of significance. The level of detail in these entries does not always reflect the importance of the listed building as some of the earliest entries are very short. Works to a listed building, whether internal or external, and often to other buildings within the curtilage (grounds) of a listed building, will nearly always require a form of permission called listed building consent. Around 1% of homes in Richmond are listed.
Listed Building Consent	A form of permission granted by the Council to alter, extend or demolish a listed building and relates to external and internal works even if the interior is not referenced in the list entry. The requirement to obtain listed building consent is in addition to the requirement to obtain planning permission. Due to the particular historic importance of listed buildings, it is a criminal offence to carry out work which needs listed building consent without obtaining it beforehand.
Neighbouring amenity	Refers to the quality of living conditions and environmental well-being experienced by the occupants of nearby properties, including matters such as adequate privacy, sunlight and normal enjoyment of their property
Operational Carbon	Greenhouse gas emissions associated with the use of buildings on a day-to-day basis, including the energy used to heat, cool, and power a building during its lifespan.

Term	Definition
Planning Permission	Permission given by the local planning authority (the Council) to allow someone to build or make changes to a building. Its primary purpose is to ensure that any proposed building works meet the planning policies in place for that local area which includes considering the impact of proposed changes on neighbouring properties and the surrounding area, and an assessment against design and safety standards.
Permitted Development	An automatic planning permission given by the Government to most householders. Permitted development gives householders the automatic right to improve and extend their homes without the need to apply for planning permission as long as they keep within certain limits and criteria. Councils can remove PD rights from certain houses using an Article 4 Direction (see separate definition). Householder permitted development rights are set out in the Town and Country Planning (General Permitted Development) (England) Order 2015 ("the Order") as amended and are updated regularly. • Part 1 of Schedule 2 to the Order sets out the permitted development rights around enlargements, improvements, alterations and other additions that can be made to a house without the need for an application for planning permission, including windows and external insulation. • Part 14 of Schedule 2 sets out permitted development rights around renewable energy, including heat pumps and solar panels.
Photovoltaic (PV) System	Technology that converts sunlight into electricity via semiconductor cells.
Secondary Glazing	Internal glazing system installed behind existing windows to improve insulation and soundproofing.
Significance	The value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting.
Special Interest	A building's special interest are the characteristics it has which make it important to preserve (usually in the context of being listed). This can include architectural features which are particularly good examples of building types or techniques, or its association with nationally important people or events. More information on the criteria used to assess buildings for listing is available on the Government website.
U-Value	Measure of heat transfer through a building element; lower values indicate better insulation.
Whole House Approach	An approach to retrofit which involves looking at how a house works as an interconnected system and understanding how changes in one part of a home may affect another part of a home. It is associated with positive retrofit outcomes as it helps to ensure that changes to a home complement each other and avoid unintended consequences, such as improvements to airtightness leading to mould and condensation.