Traditional Windows

Guidance on their repair, upgrading and replacement

City Design Group

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Contents

Prepared by City Design Group, Planning Division, Place Directorate, Bristol City Council

Preface

Windows are an integral part of a building's design; they have the potential to add to its overall beauty, historic significance, and make an important contribution to the character of a local area.

A traditional window is the original created for the building, or a replica of the original, in construction and material. The timber sliding sash is the most common form of traditional window in Bristol, although there are examples of steel and timber casements, and leaded lights.

A decline in the perceived value of traditional windows, coupled with the introduction of cheaper plastic alternatives, has meant that many of Bristol's buildings, streets and neighbourhoods have suffered their wholesale loss. Addressing energy efficiency has further contributed to the loss of traditionally-constructed windows.

In more recent years, however, the perceived value of traditional windows is increasing. There is a growing awareness of the environmental impact of uPVC and the negative impact plastic windows can have on property prices and the character and appearance of neighbourhoods. Technical studies have also provided data to prove the thermal efficiency of an upgraded traditional window, which will have at least double the life span of plastic.

This document aims to highlight the value of traditional windows in Bristol, and a good-practice approach to their upgrading and sensitive replacement.

When is planning or listed building consent required?

- Replacing any of the windows on a listed building will require listed building consent
- Introducing secondary glazing in a listed building will also require listed building consent
- Changing the windows on a flat on any building in a conservation area will require planning permission
- Like-for-like repairs does not usually require permission

Find out if your property is listed or in a conservation area on the web resource Know Your Place (www.bristol.gov.uk/knowyourplace)

'Traditional windows and their glazing make a hugely important contribution to the value and significance of historic areas. They are an integral part of the design of older buildings and can be important artefacts in their own right'.

Historic England guidance: Traditional Windows September 2014

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1 Traditional 8-over-8 Georgian sash window, Somerset Street (Kingsdown Conservation Area.

The value of traditional windows

Summary

There is a gradual revival of interest in preserving or reintroducing traditional windows in period properties and using timber windows in new-buildings.

Many of Bristol's oldest townhouses retain their original timber sash windows, including original Crown glass, period fittings and high-quality seasoned timber. A replacement window, even if it is an exact replica of the original, will result in the loss of this important historic fabric.

Window replacement can easily destroy the character of a traditional building. Traditional windows can be very durable: many original Georgian and Victorian windows are still in place, whereas modern windows tend to have much shorter life-spans (typically 20 years or less).

There are no 'one size fits all' solutions to traditional buildings and there is increasing evidence to highlight the benefits and risks of various technical solutions.

An upgraded traditional window can enhance the look and value of a home with added energy performance. Repair and restoration of traditional timber windows should always be the first option.

'Across the country, the most significant threat to the character of conservation areas comes from the simple loss of historic building details such as traditional windows and doors…'

(English Heritage 2012)

1 3
2 4

1 Alfred Place, Kingsdown Conservation Area

2 Alfred Hill (east) - traditional late Victorian 1-over-1 timber sashes, with single glazed original plate glass.

3 Plastic windows

4 Traditional timber vs uPVC

1 1 Traditional Georgian 6-over-6 sliding sash windows, Lower Park Row

2 2 Late Victorian

Traditional sash windows

The sliding box sash window has played an important role in Bristol's architectural heritage, spanning over 300 years and reflecting distinctive periods of building design and manufacturing skill.

Sliding sash windows appeared in Britain from the late 17th century. The earliest sash windows had many small panes and heavy glazing bars. Cast iron or lead weights, hung on cords running over pulley wheels hidden in the hollowed out frame, were used to counterbalance the sashes.

During the 18th century, the classic Georgian style of two rows of three panes in each sash evolved (six-over-six), and the thickness of the glazing bars was reduced to give an elegance typical of the era. The 'box sash' replaced the hollowed solid frames.

After the window tax was abolished in 1845, windows with larger panes of glass became more common. Large windows with only one large pane per sash were a symbol of wealth in Victorian houses. Sash 'horns' increased the strength of sashes with larger panes and fewer glazing bars.

From the early 20th century, changes in architectural styles and the introduction of mass-produced wooden and steel casement windows reduced the popularity of the traditional timber sash window.

1 1 Early 19th century 'plate glass'

Glass

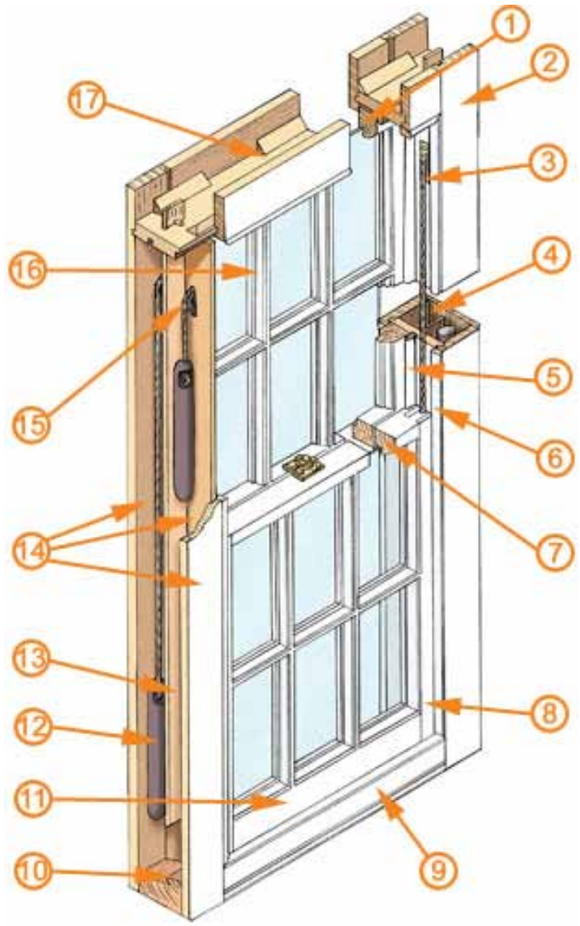
The earliest glass type is called Broadsheet glass – made through splitting and flattening a blown cylinder. This produced the slightly opaque glass used in leaded lights in churches and other very early buildings.

In the early 18th century, Crown glass was most commonly used in windows - a sphere of moulten glass is opened and spun it into a circular sheet. Crown glass can contain tiny air bubbles and characteristic concentric ripples. The size of panes cut from crown glass was quite limited, so windows were multi-paned – as in the early sash windows seen in Georgian townhouses across Bristol.

In the 19th century, glass making advanced and much larger single panes of Plate glass were produced – a sheet of glass cast on a flat surface, then ground and polished by hand.

During the 20th century, new mass-production techniques developed leading to cheaper ways to produce quality glass with a consistent appearance. Most glazing today is made using a 'float process', which gives a highly polished, perfectly flat and highly reflective surface.

Anatomy of a window



1 Top Rail - the top horizontal framing member of a sash

2 Box Frame - sometimes called a ‘jamb’

3 Sash Cord - runs over the pulley wheel and holds the weights

4 Weight Pocket - the weights hang in the pockets created by the timber linings on each side. Insulation can be retrofitted in the pockets

5 Parting Bead - a long, narrow vertical seal that fits in the Box Frame

6 Staff Bead - a moulded piece of timber made of four sections and nailed around the Box Frame to aid airtightness and hold the bottom sash in place

7 Meeting Rails - the horizontal framing members which meet the two sashes together in the middle

8 Stile - vertical side framing member of a sash, there is one on each side

9 Apron - a decorative panel or cladding beneath the window

10 Cill - a horizontal board fitted internally at the base of the sashes, shaped so that water runs away

11 Bottom Rail - the bottom horizontal framing member of a sash

12 Weight - a pair of lead weights hung on the Sash Cord counterbalance each sliding sash

13 Wag Tail - a strip of timber inside the Box Frame that separates the Weights

14 Timber Linings - the sections that form the casings of the Box Frame

15 Pulley Wheel - the Sash Cord passes over it to counterbalance the Weight

16 Glazing Bar - a vertical horizontal framing member that divides the panes within the Stiles and Rails. Each is cut to form a groove to hold the single-pane glazing

17 Soffit Lining - glued triangular blocks in the window’s head to provide strength.

An approach to improving thermal performance of traditional windows

Are the existing windows original?

Yes

Was the property built before 1850?

Yes

The windows will be an important aspect of the special interest of the building.

Seek specialist advice

No

Are the window frames timber?

No

This means the windows are likely to be Crittall metal frames.
Crittall make replacement double glazed units, but consider appropriate secondary glazing after repair and draught proofing measures

Yes

Repair/maintenance and draught proofing before considering appropriate secondary glazing

No

In some instances factory made timber double glazing might be appropriate

Seek specialist advice

No

Challenging perceptions

There is a misconception that timber windows are high maintenance and ineffective at keeping wind and damp out and heat in. The rise in energy bills has prompted many homeowners to replace timber windows with plastic double-glazed alternatives.

Cost

Comparing wholesale window replacement, uPVC windows are almost always the cheaper option in the short term. However, thermally upgrading and repairing an existing traditional window will be significantly cheaper.

A traditional window will add value to a property, especially a period property, making them a great investment for the future. uPVC can decrease the value of a period property.

uPVC windows typically have a 10-year warranty; they cannot be easily repaired after a few years most will be obsolete and require a complete replacement.

Maintenance

A misconception is that plastic windows are the low-risk, low-maintenance option – in reality, uPVC windows are unserviceable and irreparable.

Traditional timber and metal windows can almost always be repaired, even when in quite poor condition and normally at significantly less cost than complete replacement.

Depending on exposure conditions, timber windows will likely need a fresh coat of paint after the first 10 years, then at seven year intervals. This will bring them back to their original condition and will ensure they last a lifetime and beyond.

A survey of estate agents carried out by English Heritage revealed that

- Unsympathetic replacement windows and doors, particularly plastic/uPVC, is the single biggest threat to property values in conservation areas
- 82% feel that original features tend to add financial value to properties and 78% think they help a property sell more quickly

- Wooden windows have a warranty of 30 years. uPVC windows have a warranty of 10 years
- uPVC windows discolour and lose their finish over time, they cannot be repainted or easily repaired
- Plastic windows tend to require wholesale replacement within 20 years
- Modern factory-finished timber windows are as equally low maintenance as plastic

Appearance

uPVC windows are clearly distinguishable from timber, particularly in neighbourhoods where many intact traditional buildings survive. A ‘sash appearance’ plastic window, with applied glazing bars and sash horns will have a fundamentally different opening and construction method compared with timber.

Timber windows are much stronger than uPVC windows and therefore can be used for larger openings, especially side hung windows. This also gives more flexibility to the style of the windows.

An advantage of wooden windows is that the finished colour can be changed to suit the internal decoration. Unfortunately, this is not an option with plastic windows.

Repairing windows is the best way of maintaining the visual character and architectural significance of a building’s elevation and can add to its value.

Sustainability

Timber is undoubtedly the most environmentally sustainable choice of window material. Wood is a natural insulator and carbon neutral, it has far better insulation properties than uPVC.

Gas-filled double glazed windows are usually filled with inert gasses (Argon, Xenon etc) which carry a very high embodied energy due to the energy-intense processes needed to extract them from the air.

The frames of new windows also add to embodied energy. This makes retaining existing windows a more sustainable option than replacement.

- The production and disposal of uPVC windows leads to the release of highly poisonous chemicals which threaten the environment and human health
- uPVC production involves no less than six of the fifteen most hazardous chemicals listed by European governments for priority elimination
- For every timber window fitted instead of a uPVC window it saves around 160kgs of carbon dioxide

(Greenpeace)

uPVC in Conservation Areas and Listed Buildings

The visual character of Bristol’s Conservation Areas is under threat from unsympathetic replacement windows. Permitted development rights limit the control of replacement windows.

Where control does exist e.g in Listed Buildings and alterations that require planning permission. The use of uPVC will be resisted.

The negative environmental and visual impact of uPVC does not convincingly outweigh its benefits.

Thermal efficiency

It is possible to improve energy efficiency in traditional buildings without compromising their historic or architectural character. The key lies in balancing the character of a traditional building and area, retention of original fabric, energy conservation and an overall reduction in CO2 consumption.

The thermal efficiency of traditional buildings can be greatly improved without replacing windows that contribute to their significance. It is better to consider energy conservation that addresses the thermal efficiency of a building as a whole rather than focusing entirely on windows. However, the efficiency of windows can be improved through simple thermal upgrading options such as draught-proofing or secondary glazing, and are usually available at much less cost compared to complete replacement.

Modern maintenance and repair methods for traditional timber windows are now so sophisticated that many problems historically associated with them are no longer valid.

- Secondary glazing system with low-e glazing = 63% reduction in heat loss compared with single glazing
- Secondary glazing and insulated shutters = up to 77% reduction in heat loss compared with single glazing
- Secondary glazing and shutters = up to 75% reduction in heat loss compared with single glazing
- Secondary glazing and curtains = up to 66% reduction in heat loss compared with single glazing
- High performance secondary glazing also results in improved air-tightness

Draught-proofing

Draught-proofing is usually the first option to consider for improving the thermal performance of windows in an older building. As windows are often a major source of air infiltration, draught-proofing is one of the best ways of improving comfort and reducing energy use, with little or no change to a building's appearance at minimal cost.

Draught proofing for sash windows has improved significantly over the last 10 years, with the development of discrete hidden systems that can be fitted to a sash window. A woven brush pile with a polypropylene backing and a central seal to stop dust is fitted into new timber staff and parting beads. This offers the following benefits:

- Significantly reduces the amount of heat lost, improving thermal efficiency, cutting heating bills and lowering carbon emissions
- Insulates against outside noise
- Stops rattling
- Ensures smooth sliding windows
- Keeps the visual appearance of traditional sashes

If fitted correctly, an upgraded system will eliminate draughts and rattles, and give the top and bottom sash a smooth opening and closing movement.

Professional draught-proofing reduces air leakage by 86%. The addition of secondary glazing will further reduce air leakage.

(Paul Baker 'Performance of traditional windows and practice improvements')

Secondary glazing

Secondary glazing is a fully independent window system installed to the room side of existing windows. The original windows remain in position and in their original unaltered form.

Secondary glazing is the most effective option to preserve existing traditional windows; it is also the most effective overall option at improving thermal performance, air tightness and noise reduction. Where traditional timber windows survive, secondary glazing should be considered the preferred option.

To achieve a higher acoustic performance, a minimum gap of 10mm should be achieved between the primary window glazing and the secondary glazing. The optimum desirable gap for thermal efficiency is 18mm. The installation method will depend upon the depth of the primary window reveal. If the reveal is insufficient, then the window will require boxing out to the required depth

Recent research has shown heat losses by conduction and radiation through a window as a whole can be reduced by over 60% by using secondary glazing with a low emissivity (low-E) hard coating facing the outside.

Account should also be taken of the environmental conditions inside the building before designing the installation. If secondary glazing is the preferred solution then the outer windows are best left without draught-proofing so that there is a degree of ventilation to the air space between the outer windows and the secondary glazing to prevent the build up of condensation.

Resources: Energy Efficiency an Historic Buildings: Secondary glazing for windows (English Heritage)

Secondary glazing systems can vary significantly in appearance, design and thermal efficiency. The appropriateness of the system will depend on the specific building, the need for access and ventilation.

- Lift out units: These units are used where the primary window is fixed of where the window is rarely opened for ventilation or access. They are also useful for windows of unusual shapes.
- Hinged units: These are generally used with a casement (hinged primary window). This type of system is frequently used where the whole window is to be covered to avoid any sight lines on the secondary unit and where regular ventilation is required.
- Vertical sliders: These are normally used on vertical sliding sashes with the meeting rails aligning with the primary window meeting rail
- Removable: A lightweight and easy to remove system is a magnetic secondary glazing system. This can be a cost effective solution with minimal intervention in original fabric. Not suitable in rooms that require regular ventilation
- Integrated: Typically glazed with uv-proof plexiglas attached by magnetic strips, this is when secondary glazing is fitted directly to the existing sash or casement so the window opens as usual. This also achieves an air gap closer to the optimum 18mm

Double glazing

The best thermal performance will be achieved with vacuum double glazing, however, the typical thickness of this type of double glazing will rarely be appropriate in traditional buildings.

Slim-profile double glazing is typically 8.2 to 16mm thick and has been promoted as a solution for upgrading windows designed for single glazing. However, the thermal performance of slim-profile double glazing, balanced against the harm and loss of fabric in an original window limits its success.

Slim profile double glazing is expensive to install and less energy efficient than retention of single glazing with added secondary glazing. It also only offers marginal improvement in appearance in relation to spacer depth and usually involves either complete renewal or inappropriate adaptation, and potentially loss of glass with unique surface character, reflectivity and transparency.

The thermal performance of slim profile double glazing varies according to window type. It is less energy efficient in a multi- pane window compared with a larger pane. Slim profile double glazing performs better when fitted into Victorian ‘1-over-1’ windows. The loss of original fabric, is also reduced.

Gas-filled double glazed windows are usually filled with inert gasses (Argon, Xenon etc) which carry a very high embodied energy due to the energy-intense processes needed to extract them from the air.

- Balanced against the loss of fabric and the limited thermal benefits, slim profile double glazing is not appropriate in multi-pane windows and will be resisted in Listed Buildings with typical Georgian sashes.
- Slim profile double glazing may be acceptable in later Victorian buildings although secondary glazing should be the preferred solution.
- Where a property is sub-divided into flats, introducing double glazing to just one dwelling or on one storey can affect the appearance of the building as a whole.

Replacement windows

In some historic or listed buildings, it may be necessary to exactly replicate the original windows using single (putty) glazing, matched mouldings and historic glass.

For an unlisted building, where traditional windows are unsalvagable, or unsympathetic windows require replacement a factory-made, energy efficient, high performance timber window is the best alternative. uPVC should never be considered.

If well designed and well made, replacement wooden windows can combine authenticity with high performance: energy-efficiency, security, acoustic performance and low maintenance, but they are not replicas of historic windows.

Document review

This guidance has been reviewed and agreed by officers at Historic England Southwest Regional Office and members of the Bristol Conservation Advisory Panel (CAP). Their comments have informed the production of the document.

Research and further reading

http://www.historic-scotland.gov.uk/technicalpaper20.pdf

https://content.historicengland.org.uk/images-books/publications/thermal-performance-traditional-windows/thermal-performance-traditional-windows.pdf/

http://www.historic-scotland.gov.uk/paul-baker-performance-of-traditional-windows-and-practice-improvements.pdf

Paul Baker ‘Performance of traditional windows and practice improvements’

Energy Efficiency an Historic Buildings: Secondary glazing for windows (English Heritage)

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