

INFORM

INFORMATION FOR HISTORIC BUILDING OWNERS

**Growing
Old
Gracefully**



HISTORIC SCOTLAND
ALBA AOSMHOR

Introduction

This INFORM guide explains some of the aesthetic issues surrounding historic masonry to encourage reflection on why we expect historic buildings and structures to look a certain way and to raise awareness about how cleaning may adversely affect the aesthetics and durability of the structure. For the purposes of this guide, stone is the main form of masonry discussed, however, much of the information is also relevant to brick masonry. This guide does not provide technical conservation or cleaning advice, which can be found elsewhere (see *Further Reading and Contacts* at the end of the guide).

Perceptions of masonry over time

Stone and brick are durable building materials, but they are subject to deterioration, and their appearance inevitably changes over time. In the past, the effects of ageing exhibited by historic masonry buildings were perceived in different ways. Whilst renewal and restoration were extensively undertaken by the Victorians, resulting in widespread destruction of historic medieval fabric, the romantic revival of the late 19th century celebrated the ‘patina of age’. The patina of ancient masonry, formed by centuries of interaction with the environment, became valued for its unique appearance, providing buildings with a sense of history and connection with their surroundings. In the more recent past,



Fig 1 The aged appearance of older buildings adds to the quality of the built environment.



Fig 2 Different approaches and cleaning methods can disrupt the visual integrity and aesthetics of an historic streetscape.

masonry cleaning was again made popular, often generated by a desire to remove pollutant deposits and restore a building to 'how it originally looked', which in reality is an impossible task. We now know that such patination layers on stone derive from the combined effects of mineralogical changes, the formation of biological growth, and soiling. This can have a stabilising effect on the underlying building materials, as well as being aesthetically pleasing in many cases.

Aesthetics

The visual appeal, or aesthetics, of a building are influenced both by personal tastes and shared attitudes about what is considered appropriate and beautiful. Such attitudes are culturally driven, and may change over time. The aesthetic appreciation of any building or streetscape is extremely subjective, and evidence of ageing observed on a building may generate varied and extreme opinions. Nevertheless, it is a well-established conservation principle that the fabric of a building, and its authenticity, are of paramount importance to its cultural significance. The process of ageing leaves an imprint of the passage of time, which is irreplaceable and inimitable. This patina is considered to be of high value to the overall significance of historic buildings, and should be conserved wherever possible (Fig 1).

Expectations of how buildings should appear

Just as a very new building with an extremely dirty appearance would not be appreciated, an excessively cleaned very old building would also look artificial and out of place. This is particularly true when several historic buildings are next to each other and have not been maintained uniformly (Fig 2).

Achieving a very clean surface on a historic building presents many ethical and technical challenges and may not be realistically achievable. The degree of ageing displayed by buildings that may be considered acceptable by many is often determined largely by the age of the building, as well as the materials used

in its construction. New buildings with smooth lines constructed with glass or other highly polished or consistently coloured surfaces are expected to appear "as new" for as long as possible. However, aging processes begin almost immediately, and such a fresh appearance cannot be maintained forever (Fig 3).

What is the ageing process for historic masonry?

Ageing is a natural process of material loss, addition and modification that occurs over time.

- **Loss:** Surface material is eroded away, edges and sharp features are less well-defined
- **Addition:** The deposition of airborne particles and biocolonisation (the growth of organisms) on masonry
- **Modification:** In stone, mineralogical changes occur at the surface due to wetting and drying cycles, as well as the interaction of biological growths with the stone surface.

Original building material displaying decades or even centuries of accumulated ageing alterations preserves the true history of a place. The combination of these processes may lead to the development of a patina that forms a protective layer over the interior of the building stone or brick. In some cases, if removed, material behind such a surface layer may be more vulnerable to damage, and the re-establishment of a stable patination layer may take many years (Fig 4).



Fig 3 New buildings will quickly exhibit soiling and a fresh appearance cannot be maintained forever.

What is “soiling”?

Soiling is a process that may include the deposition of airborne particles on the surface of a building, as well as biocolonisation by various organisms such as algae, bacteria, fungi and lichens. Over time, soiling patterns may vary as particulate sources change; for example diesel pollution is more common today whereas soot was most common in the past. Environmental conditions may also change and support different types of biological growths on buildings, or climatic changes may alter natural wetting and drying processes, also affecting soiling patterns (Fig 5).

The aesthetics of soiled historic buildings

- Historic buildings are expected to display some signs of ageing, including some soiling
- Patterns arising from natural soiling may be considered appealing as they add depth and richness to the natural variation of stone
- In some cases, soiling can accentuate architectural details or add depth and contrast to a façade
- Soiling may contribute to visual uniformity over a façade, streetscape or district
- Soiling can help to even out the appearance of defects that accumulate over time
- Some types of biocolonisation, particularly lichen growth, are a commonly accepted sign of age, and as well as being beautiful may be protected in their own right.



Fig 5 An historic masonry building displaying variable soiling.

Distinguishing between damaging and ageing effects

The natural visual effects of ageing, including soiling, can enhance the appearance of an historic building (Fig 6). However, in some situations where excessive, it can indicate that damage is occurring (Fig 7). Intense biological growth or salt efflorescence on masonry commonly indicates a maintenance problem, whilst not necessarily being a problem in itself. Many such instances will be resolved following repair of, for example, damaged or blocked drainage features, or by re-pointing (Fig 8).



Fig 4 Damage to a stable surface patina can expose weaker masonry underneath that is prone to decay.



Fig 6 Different surface finishes on stone masonry attract differing degrees of soiling which adds depth and richness to the building.



Fig 7 Intense soiling and biological growth on masonry is typically directly associated with maintenance issues.

Excessive use of de-icing salts can cause unsightly stains as well as considerable damage to historic masonry. Salts are absorbed into masonry and are very difficult to wash away, damaging the material by re-crystallising with fluctuations in moisture. Conservation treatment may be required to remove accumulated salts, and in extreme cases stone replacement may be necessary (Fig 9).

If soiling or biocolonisation is found to be damaging or to conceal other sources of damage to a building, their removal may be justified on preservation grounds as part of a conservation treatment plan. See the Further Reading and Contacts section at the end of this guide to seek specialist conservation advice.



Fig 9 Soiling from biological growth and salt accumulation due to water penetration.



Fig 10 Build-up of biological growth on steps is considered undesirable from a safety viewpoint.

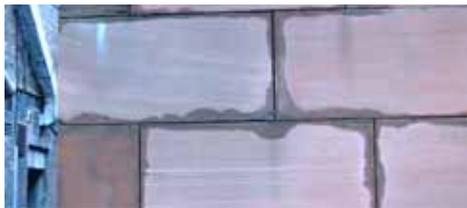


Fig 8 Water penetration to masonry caused by lack of maintenance and loss of mortar.

Why clean buildings?

There are a number of reasons for considering a cleaning treatment to remove undesirable deposits from a building or structure, which may include:

- Safety reasons
 - Remove slippery algal or moss growths on paving stones (Fig 10)
 - Remove wasp or bird nests from inappropriate locations
- Conservation reasons
 - As part of a conservation programme to inspect for and address damage
 - Remove damaging agents such as salts, bird droppings or tree seedlings
 - Remove soiling where it is causing damage
 - Remove graffiti where it negatively impacts the visual character of the building or structure (Fig 11)

Possible hazards of cleaning

Cleaning historic masonry buildings (where they are listed or in a conservation area) may not be permitted, except when the soiling is causing or amounting to a building defect or for safety reasons. This is because any cleaning process involves a degree of risk to the integrity of the building stone, and results are often unpredictable both in terms of colouration and texture (Fig 12). Where cleaning is permitted, it must be carefully specified and controlled, as many methods are unsuitable for historic building fabric. Damage can occur during and after the cleaning process. Sometimes natural weathering processes may accelerate directly after cleaning, and in other cases, damaging consequences

may only become evident long after the cleaning event. Repeated cleaning poses additional problems, as areas cleaned in the past may not respond to another round of cleaning as anticipated.

The overall appearance of a façade may not be uniform after cleaning, as some stains may originate from minerals within the stone that have migrated to the surface and cannot be removed completely. Such stains may have been hidden by soiling and become conspicuous after cleaning, or may be generated by the cleaning process itself. Also, adjacent buildings cleaned at various times may always show differences in appearance (Fig 13).

When stone repair and replacement is deemed necessary, key consideration should be given to the material properties of the stone and the aesthetics of the replacement. It is important to choose a stone that firstly has similar physical and compositional properties such as porosity and mineral content, and is visually compatible with the existing masonry

(though this should be a secondary consideration). If stone is selected carefully, it may blend in with the aesthetics of the aged building and there will be no need for cleaning (Fig 14 & 15).

Additionally, cleaning a masonry building where stone repairs have been made in the past may have unforeseen results. For example, repairs made to match soiled masonry can, after cleaning, appear unsightly as colours may not match and remedial work may be required (Fig 16).



Fig 10 Build-up of biological growth on steps is considered undesirable from a safety viewpoint.



Fig 11 The presence of unwanted graffiti may justify stone cleaning.



Fig 12 Surface damage, bleaching and iron staining to stone masonry caused by inappropriate and aggressive stone cleaning.



Fig 13 The cleaning of a facade (left side of image) is often considered desirable yet does not necessarily dramatically improve the aesthetics of a building.



Fig 14 Careful selection of replacement stone can ensure the new stone is visually in keeping with the original appearance of a façade.



Fig 15 Poor repairs and inappropriate cleaning can severely reduce the visual appeal of a building.



Fig 16 This window pediment was repaired using a dark coloured sandstone to match the soiled building façade, prior to cleaning which has then lightened the adjacent masonry.



Fig 17 Severely damaged stone façade following inappropriate cleaning, resulting in a loss of the external patination layer, discolouration from oxidation and increased deterioration.



Fig 18 Original soiled (left) and cleaned (right) sandstone masonry showing loss of the original smooth surface, resulting in a roughened texture which may be prone to resoiling and decay.

Aged masonry surfaces can develop stable patinas, which help protect the stone from weathering and decay. Stone cleaning may remove the surface patina resulting in a changed texture with increased surface area, leaving the stone more susceptible to soiling and decay (Fig 17, 18). Originally smooth finishes may become roughened or show an undulating surface, whilst textured stones may experience the opposite, losing detail and appearing flat (Fig 19). Brick masonry when cleaned may lose its vitrified surface (fire skin), leaving the material vulnerable to moisture penetration and consequent decay.



Fig 19 Original soiled (top) and mechanically cleaned (disked) (bottom) rock-faced masonry showing destruction of the original sharp masonry finish to the cleaned stone.

It is unrealistic to expect a building to maintain a freshly cleaned appearance. Biological growth is known to quickly re-establish and may even be intensified on newly cleaned buildings. Additionally, new soiling cycles may exhibit different patterns and colours as the stone surface has been altered by cleaning (Fig 20).



Fig 20 Recently cleaned sandstone building showing relatively rapid recolonisation and biological soiling.

Conclusion

Historic masonry should be appreciated for its age value and natural patina, which is created from a combination of erosion, soiling, biocolonisation, mineral changes, and other process related to aging. This adds a sense of history and endurance through time to older structures, and may enhance the appearance and even protect masonry surfaces from

decay. Thus, cleaning should be considered with the utmost care as it removes a structure's unique appearance and may harm the masonry and make it more susceptible to damage in the future. It is therefore important to distinguish between those features that are damaging or lead to unsafe masonry and those that are harmless and add character.

Further Reading and Contacts

Biological Growths on Sandstone Buildings: Control & Treatment, Technical Advice Note (TAN) 10 (1997) (available from the Historic Scotland Technical Conservation website <http://conservation.historic-scotland.gov.uk/>)

The Consequences of Past Stone Cleaning Intervention on Future Policy and Research, Historic Scotland Research Report (2003) (available for purchase at <http://conservation.historic-scotland.gov.uk/>)

Investigations in to the Control of Biofilm Damage with Relevance to Built Heritage (BIODAM), Historic Scotland Research Report (2006) (available for purchase at <http://conservation.historic-scotland.gov.uk/>)

Maintenance and Repair of Cleaned Stone Buildings, TAN 25 (2003) (Available from the Historic Scotland Technical Conservation website <http://conservation.historic-scotland.gov.uk/>)

Stonecleaning- A Guide for Practitioners, Historic Scotland (1994) (available for purchase at <http://conservation.historic-scotland.gov.uk/>)

Stonecleaning of Granite Buildings, TAN 9 (1997) (available from the Historic Scotland Technical Conservation website <http://conservation.historic-scotland.gov.uk/>)

Stonemasonry Material and Skills, TAN 31 (2007) (available for purchase at <http://conservation.historic-scotland.gov.uk/>)

The Treatment of Graffiti on Historic Surfaces, TAN 18 (1999) (available for purchase at <http://conservation.historic-scotland.gov.uk/>)

Historic Scotland INFORM Guides

- Biological Growth on Masonry – Identification & Understanding
- Bird Control on Buildings
- Cleaning Sandstone – Risks and Consequences
- Damp- Causes and Solutions
- Exterior Masonry Steps
- Graffiti and its Safe Removal
- Indent Repairs to Sandstone Ashlar Masonry
- Masonry Decay – Dealing with Erosion of Sandstone
- Repairing Brickwork
- Repointing Ashlar Masonry
- Repointing Rubble Stonework

Principal Author: Dr Julie A. Eklund



Principal authors: Dr Julie A Eklund and Katherine Hummelt

Published by Historic Scotland, February 2013

Historic Scotland, Longmore House, Salisbury Place, Edinburgh EH9 1SH

Tel: 0131 668 8600 www.historic-scotland.gov.uk email: hs.conservationgroup@scotland.gsi.gov.uk

While every care has been taken on the preparation of this guide, Historic Scotland can not be held responsible for any errors or omissions.