



Earlston

Conservation works to a mid-18th century terraced house



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This case study is published by Historic Environment Scotland, the lead body for the country's historic environment.

This publication is a web publication and is available for free download from the Historic Environment Scotland website:

<https://www.historicenvironment.scot/refurbishment-case-studies/>

This publication should be quoted as:
Historic Environment Scotland
Refurbishment Case Study 18

ISBN 978_1_84917-208-1

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Conservation works to a mid-18th century terraced house

Amy J Kennedy

Acknowledgements

Historic Environment Scotland would like to thank the owners of this property for sharing their experience in the refurbishment.

Preface

This case study is one in a series of *Refurbishment Case Studies* published by Historic Environment Scotland (previously Historic Scotland). The series presents examples of conservation projects of mostly pre-1919 buildings which have been repaired, refurbished and adapted. Covering a wide range of building types, the series includes traditional cottages, tenements and other domestic buildings such as farmhouses, bothies, townhouses and castles, as well as non-domestic buildings including churches and libraries. Most, but not all, are of traditional construction and some have statutory listing.

The *Refurbishment Case Studies* play a part in the wider discussion on the use of traditional building materials, energy-efficiency and sustainability, and describe how traditional buildings can be improved, sometimes using novel techniques, without negatively affecting the character or technical performance of the building fabric. Improvements to energy efficiency, vapour permeability and reinstatement of internal details and finishes are some examples of work that is covered in this series. Each case study presents one building, or a related series of buildings, which have recently been upgraded. The refurbishments typically incorporate an assessment of the impact of these interventions on the buildings' performance and occupants' comfort is discussed.

This *Refurbishment Case Study* presents a conservation project carried out on a privately owned mid-18th century terraced house in Earlston in southern Scotland. The property is not listed, although it plays an important part in the town's heritage. While Historic Environment Scotland did not offer any financial assistance on this project, it is included in the series to highlight the approach taken in its repair and upgrade. Not all the interventions are always directly transferable to other projects, but can provide inspiration in the conservation and repair of traditional and historic structures.

Together, Historic Environment Scotland's *Inform Guides*, *Short Guides*, *Technical Papers* and *Refurbishment Case Studies* provide practical and technical information and discussion points for all those working on the upgrade and refurbishment of existing buildings. Themes of sustainability, adaptation and resilience all feature and are part of the evidence base that shows that older buildings are part of the solution, not the problem.

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1. Introduction

This case study describes conservation work, repair and alterations carried out to a privately owned mid-18th century terraced property in Earlston, Berwickshire. The owners of this property sought the refurbishment as a long-term project, learning as they proceeded, to repair the largely modernised house, retaining the historic form and fabric as far as possible. This project has been selected as a case study to share different approaches in the conservation and the repair of traditional and historic structures. The project demonstrates how a historic building of modest size can be sympathetically upgraded using traditional materials and techniques; improving the presentation of the property and resolving many building fabric issues. As with previous Refurbishment Case Studies, this report gives details of the work that was carried out to different building elements in turn. The success of the project may provide reassurance that much conservation work on domestic buildings is well within the grasp of most homeowners.

This case study, unlike others in the series, looks back at refurbishment work carried out some ten years previous, to investigate how the restoration is performing at the time of writing in 2016. In describing the processes and some of the lessons learnt throughout the restoration project there are some aspects that might, in hindsight, have been done differently. However, the overall use of appropriate materials and techniques has shown that changes can be made to good effect, improving the internal living spaces and the technical performance of the building fabric, whilst also retaining traditional character and appearance.

2. Background

The site

The property is located in Earlston, situated in the south-east corner of Berwickshire in the Scottish Borders. This terraced property contributes to the traditional character of Earlston's main street. On a junction with the A68, Earlston is somewhat of a connection or stopover for visitors travelling northwards to Edinburgh or southwards to Jedburgh and the English border beyond.

Historical analysis

The property forms part of the 18th century village, having been continually lived in as far back as the property deeds state to 1788, where it is described as an established property in existence at that time. 19th century alterations to the building are thought to have included; the removal of astragals and re-glazing of the original window sashes, replacement of some doors, and alteration to some fireplaces. There may also have been some alterations to room layout, including the possible subdivision of the attic floor. Unusually, the house did not undergo any significant modernisation in the 20th century, resulting in the retention of much of the 18th and 19th century fabric and fixtures. When the house came into the possession of the present owners, there was no fixed kitchen or central heating (*Fig. 1* and *Fig. 2*), and it is understood that the ground and attic floors had been largely unused for some time.



Fig. 1: Existing kitchen space located in later lean-to extension.



Fig. 2: Existing bathroom.

Spread across three floors, the property currently comprises three reception rooms and four bedrooms. Three bathrooms, two of which are located within cellars, are quite unusual features for this type of property. At the rear of the property there is a later lean-to extension, access for which is believed to be from a former stair window. Overall, the layout does not appear to have changed much over the history of the property, excluding alterations to the present kitchen.

Through visual assessment, several features of particular historic interest came to light and helped to identify and give some clues to the history of the property. At one stage, both the property in question and the neighbouring property were owned by the same family and were interconnecting. This was identified by a small set of stairs uncovered in the present dining room cupboard (*Fig. 3*).

When restoring any property, whether it be residential or not, it is useful to uncover the history of the building. This is worthwhile as it provides information on previous alterations and/or original materials, but it also provides an opportunity to document the building prior to and during the refurbishment.



Fig. 3: Former stairs adjoining terrace to neighbouring property.

3. Condition prior to the work

Through visual assessment there were no signs of cracking or movement in the exterior masonry walls; however issues were evident with the south-westerly chimney stack (*Fig. 4*). As chimneys are the most exposed element of a building, and by their nature typically hard to access, they are often neglected. Mortar joints had degraded and washed out over time, allowing water to penetrate the fabric and the establishment of vegetation. This compromised the structural integrity to a state of near collapse. Not only did this cause the chimney to be dangerous, it was admitting water to other areas of the property. Due to exposure to wind and rain, evidence of damp was found in the attic as a result (*Fig. 5*). There was also an area of rotten flooring and joists in the attic, towards the centre of the house, attributed to a roof leak which had subsequently been fixed.



Fig. 4: The west chimney prior to works; note the lack of a cope and poor pointing.



Fig. 5: Stained masonry and stone decay in the attic below chimney due to defective work above.

Defects were also noted internally; the intermediate timber floor joists appeared under-sized, resulting in movement or flexing within the floors. The barrel vaulted cellars to the rear were damp, due to being closed off with little to no ventilation and, with the addition of rainwater goods in the 19th century, water was draining from the roof into the cellars.

With regards to services; mains electricity, mains water, sewage and gas already existed on site however, through investigation, a fair degree of work appeared to be required on all services.

4. Objectives of the project

The property was purchased with a long-term plan in mind, and it was intended that the works would be carried out over the course of several years. The broad objective was to repair and upgrade the house for family living.

Balancing the period features of the house with the new works was an important part of the plan, and the owners were determined to retain as much of the history of the property as possible. They wanted the building to still feel and look the same, and have the same atmosphere, albeit with the addition of current materials and systems where applicable, by achieving a balance between the new and the old. For example; they specifically wanted underfloor heating and a modern kitchen, however, particular attention to joinery and surface finishes assisted in maintaining the period feel of the house. In restoring the house externally, the owners also intended to contribute to maintaining the heritage and architectural character of Earlston's High Street.

5. Design approach

Based on the historical analysis the owners decided to maintain the original 18th century symmetrical layout. This has a simple configuration of two rooms per floor, with cellars on the ground floor and a later lean-to extension on the first floor, which exits to the raised ground level to the rear. Built into a hill, the house can be accessed from two levels; ground floor from High Street and first floor from the back garden (access off the lane behind).

For family living requirements, the owners decided to inhabit the first floor of the property as their main living level. Both the lounge and dining room are located in the original house, with a small study located above the entrance hall. The kitchen diner is located in the later lean-to extension, accessed off a floor variation, leading out to the large back garden. The ground floor consists of two bedrooms, each with cellar bathrooms. The second floor attic space consists of two guest bedrooms, with a shower room between the bedrooms over the entrance hall.

6. Consents for alterations

Planning permission and building warrant consents are often required when making alterations to an existing building. In projects where the property is listed, an additional consent, *Listed Building Consent*, (LBC) may be required. If you are planning to make internal or external alterations which may affect the character of the building, contact your local planning authority's development management team who will tell you whether they consider the works require listed building consent. In this case, as the building was unlisted this was not required, although planning permission and a building warrant were required for some of the works to the house.

It is important to establish communication as early as possible with the local planning authority. In some cases this can be done through an appointed professional agent, such as an architect. In this case, the owner made contact with the local authority, Scottish Borders Council, direct to make the necessary applications prior to work commencing. A service fee is also required for each of these applications; for planning permission this is based on the area of works, and for building warrant a percentage of the value of work requiring warrant application.

As warrant consents also require a completion certificate, necessary for insurance purposes and solicitors when/if the property goes up for sale, the owners maintained a continuous dialogue with the local authority throughout. They ensured the building standards officer was in agreement with all alterations undertaken on site, prior to granting the necessary completion certificate.

Planning permission was required for; *Proposal for alteration to dwellinghouse and installation of window*, and a Building Warrant was required for; *Alterations to bathrooms and installation of velux windows*, with an amendment to *Alter existing room to provide usable height and natural light*. Conditions can also be fixed as part of the permission and approval, which must be adhered to.

The main alteration during the refurbishment, in respect of planning permission and warrant approval, lay within the kitchen. This centred on the glazing improvements, to be discussed with the other improvements later in section 7.1. A brief explanation of the layout for this area is as follows (with corresponding images); entering the kitchen through the doorway from the rear elevation, assumed to be the old stair window (*Fig. 6*), leads into a spacious area with raised ceiling, previously flanked with two lean-to extensions. Works raising the roof of the west lean-to created a large flat roof with a large lantern light (*Fig. 7*). This now forms part of the kitchen to the property (*Fig. 8*), with the dining table placed in the original central section (*Fig. 9*), featuring above it a solitary original timber beam. The east lean-to was reinstated and this is now employed as the larder for the kitchen.



Fig. 6: Previous works creating a door opening from former stair window, allowing access to the later lean-to extension.



Fig. 7: Former lean-to roof, raised, thus creating extra space - now the current kitchen with large lantern light.



Fig. 8: New kitchen located in previous westerly lean-to.



Fig. 9: Dining area located in section of raised ceiling space - adjacent to new kitchen.

7. Repair and improvement works

7.1 External alterations and improvement works

Prior to undertaking improvement works to any building, the structure has to be made wind and watertight, and in a good state of structural repair. In this case the property had some significant defects which needed addressed. Due to the defective chimney stack, there was evidence of damp on the interior side of the west gable and many of the joists around the affected area were rotten at the ends. It is important to address the causes of damp and water ingress at the commencement of any project - with this in mind, the chimney and roof work was the main focus of activity for the external works during this project.

Chimney

As previously stated, chimneys are generally the most exposed element of a building, and by their nature are typically hard to access. This often leads to their neglect, as was the case in Earlston. The westerly chimney stack was in such poor condition that, having been exposed to long periods of saturation and penetrating damp, the majority of the lime mortar joints had progressively washed out over time, resulting in a weakened structure. With only degraded and friable mortar remaining, the chimney was in a state of structural deformation, nearing collapse. Consequently, the chimney was taken down and rebuilt from ridge height.

Previously built using sandstone, the existing stone was in too poor a condition to be reused. Reclaimed colliery brick was used with a clay flue liner, in keeping with many other rebuilt chimneys in Earlston (*Fig. 10*).



Fig. 10: New chimney stack built used reclaimed colliery brick.

Roof repairs

Welsh slate was originally used for the roof, but this was in poor condition. Many of the slates were coming to the end of their life, and their fastenings were beginning to corrode (this process is often described as *nail sickness*). As a result, the slates were removed along with rotten sarking boards. The structural roof timbers were exposed and inspected.

Improvement works to the roof commenced with checks and minor repairs to the rafters, supplementing the timbers as necessary where affected by the roof leak. New sarking boards were laid and fixed, then covered with a vapour-open roofing membrane to manage vapour dispersal and to ensure the roof remains watertight during extreme weather. This 'roofing paper' was selected to be able to maintain the building's breathability, without the need for roof vents or additional ridge/eave ventilation, as affecting this can cause lasting issues with damp and resulting impairments.



Fig. 11: Re-dressed, reinstated Welsh slate on the back pitch of the terrace, with replacement lead flashing.

Slates were then fastened with copper nails, which are more durable than ferrous metal or galvanised nails. Approximately 50% of the existing roof slate was redressed and reinstated on the back pitch (*Fig. 11*), while the remainder was replaced with reclaimed Scots slate on the front pitch. These were laid in the traditional manner with diminishing courses, utilising random lengths and widths, and overlapping each course with both headlap and sidelap. This arrangement is fundamental to the proper functioning of a slate roof to achieve weather tightness. In hindsight, the use of Scots slate was an indulgence of the owners and is now thought not to be in keeping with other properties in Earlston, due to different coursing and grading and where Welsh slate was the dominant slate used.

Replacement lead flashing was installed along the roof ridge (*Fig. 11*) and at the junction of the skew cope and the slates, replacing similar old lead flashing. These are important junctions which can be a point of weakness, particularly in terms of water penetration, which if uncovered or laid incorrectly can result in internal dampness.

Walls

Due to the nature of the property, being a mid-terrace, it does not suffer greatly with levels of wind driven rain, having only two external walls. Dampness did however occur in the gable wall due to chimney defects, allowing water to be drawn in and become trapped. This issue was addressed through the re-building and repair of the chimney and the gable dried out. Correct detailing around the chimney allowed for the protection of the gable, whilst time and applied heat from the wood burning stove below subsequently helped dry out the wet gable.

External render

Lime render finished with lime wash is often used as a protective layer on traditional masonry. Traditional lime harling reduces the incidence of hairline cracking, which can occur with cement render, while the open pore structure allows water vapour dispersal and prevents the build-up of moisture in a masonry wall. This is the most appropriate material when re-rendering any traditional structure. However, the Earlston property had been rendered in a modern cement based render, probably applied around the 1960's. As there were no obvious issues of damp it was decided to leave it in place (*Fig. 12*) but paint it with a mineral paint. Mineral paint bonds well with cement based substrates and allows a degree of vapour movement. The lighter colour much improves the aesthetics of the façade and it appears to be lasting well since application (*Fig. 13*).



Fig. 12: Existing modern cement render.



Fig. 13: Traditional mineral paint used on the principal façade.

Rainwater goods

Lack of maintenance, including regular inspection and cleaning, as well as damage, led to the requirement for all existing rainwater goods to be replaced. They were replaced with new cast iron rhones and downpipes, appropriate for a property of this type. Care was taken to ensure that the rhones were set at a shallow angle to provide a run which allows the water to drain away into the downpipes effectively. Consideration was given to making sure that the rainwater goods were of sufficient size to handle the more intense rainfall experienced in recent years and expected in the future. This is evermore critical in the planning and specification for new builds and refurbishments in Scotland due to the adverse effects of climate change.

Windows, rooflights and external doors

During the refurbishment, all of the existing single-glazed timber-frame sash and case windows were retained. These windows appeared to be original, showing a characteristic moulding pattern on the sashes. At some stage the astragals had been removed; stumps were still evident on the sashes, indicating they originally had six panes per sash (*Fig. 14*).

In retaining these windows, although undoubtedly having an effect on the thermal performance of the property, the owners maintained the (albeit modified) character and appearance of the terrace, without large cost implications.

New double-glazed conservation rooflights with a central astragal were installed, replacing the existing cast-iron ones, which were corroded (*Fig. 15*). New timber double-glazed windows and a large timber lantern were installed in the lean-to kitchen and although not sash and case, these are in keeping with later works to the rear of the property.



Fig. 14: Stumps of removed astragals showing the original 6 over 6 glazing arrangement.

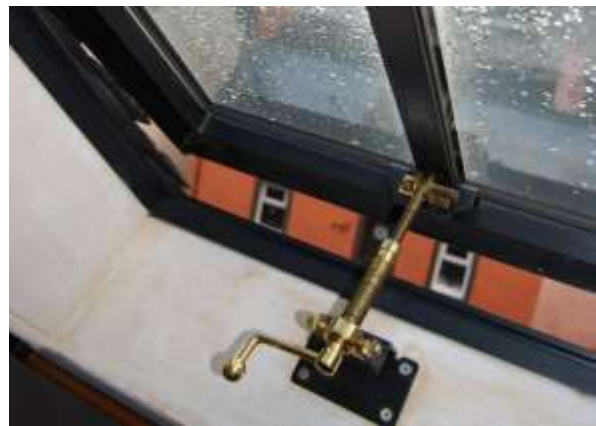


Fig. 15: Newly installed double-glazing conservation rooflights were installed.



At the time of the refurbishment the external front door was in good condition. From the style, it was probably a late 19th century door with raised mouldings in the panels. As water was penetrating underneath the door, a new wooden threshold or sill was fitted to prevent driving rain and draughts breaching the door casing (*Fig. 16*). Now, some ten years later, the condition of the door is deteriorating. Consideration will need to be given whether to remove and replace the affected panel of the door or replace the entire door like-for-like.

Fig. 16: External front door with wooden threshold to prevent driving wind and rain ingress at the periphery.

7.2 Internal alterations and improvement works

Floors

Internal alterations and improvements commenced with work to the intermediate floors. Initial observation highlighted that the floor joists appeared undersized (*Fig. 17*), resulting in movement and deflection within the floors. The floor boards were lifted, and the existing joists were braced with additional new timbers. During this work, packed heather was found between the joists (*Fig. 18*); presumably installed as a form of sound insulation or deafening. This was nonetheless removed due to reservations about its fire risk.



Fig. 17: Undersized timber floor joists resulting in movement across the floors.



Fig. 18: Dried packed heather (grey colour) revealed in the floor zone.

Floor boards were reinstated where possible (*Fig. 19*) and where new ones were required these were cut to match the existing boards by a local sawmill (*Fig. 20*).



Fig. 19: Existing timber floor boards were re-laid.



Fig. 20: New floor boards made by local sawmill, maintaining the width of the original boards.

Hearths and flues

When the property was purchased there were six existing hearths, one in each room of the original Georgian house. These were all retained, and some were kept in use. On the ground floor, a 1930's period tiled chimneypiece was removed, and a large 'inglenook' type hearth was opened up. It is likely that this hearth would have once been the heart of the house and probably fitted with a cast iron range. A wood-burning stove has been installed in this space (*Fig. 21*).

A second wood-burning stove was installed in the lounge on the first floor. Previously this had a 1930's tiled fireplace with a gas fire. This was removed and the hearth reinstated back to its original appearance, installing a reclaimed cast iron hob grate. However, it was found that the flue failed to draw well, hence replacement with the wood-burning stove (*Fig. 22*).



Fig. 21: Large inglenook revealed behind a 1930/40s fireplace. **Fig. 22:** Wood burning stove located in the lounge.

Although the other hearths are not used, such as in the attic bedrooms (*Fig. 23 and Fig. 24*); these existing chimney hearths with their 18th century fittings and stone surrounds were retained as features.



Fig. 23: Attic bedroom with original hob grate.

Fig. 24: Late 19th century inset in bedroom fireplace, retained as a feature.

Plasterworks

Most of the internal lime plaster was retained in the refurbishment, whilst areas in poor condition were repaired. Some areas were 'plastered on the hard', meaning that the plaster was applied directly onto the masonry. Areas in need of repair were largely found in the master bedroom (Fig. 25 and Fig. 26), the attics, and one of the cellars. The masonry in the other cellar was left un-plastered. Vapour-open lime plaster was used, as it allows a degree of air and moisture movement, which is compatible with traditional masonry walls.



Fig. 25: Master bedroom works to re-plaster on the hard.



Fig. 26: Master bedroom works to re-plaster on the hard.

Joinery and ironmongery

The vast majority of internal details, fixtures, features and finishes were retained, including internal finishes and ironmongery. The timber window shutters were retained and refurbished (Fig. 27), helping in the thermal performance of the property as well as privacy and security. The shutters were generally in good condition, and only required modest repairs. Dado rails were also restored where extant (Fig. 28), maintaining the character of the original design. Internal timber panelled doors were retained, and required minimum repair (Fig. 29). Plain boarded doors were also re-used (Fig. 30). Due to their condition and damage from earlier electrical work, the skirting boards were replaced.



Fig. 27: Existing timber window shutters restored.



Fig. 28: Existing timber dado rails restored.



Fig. 29: Existing panelled doors restored.



Fig. 30: Existing plain boarded doors restored.

The owners were keen to retain all existing ironmongery. There was a nice range of 18th and 19th century fittings, including door handles, door closers, latches and blind pulleys, all of which were cleaned and reused (*Fig. 31*).



Fig. 31: Existing ironmongery cleaned and reused.

Redecoration

The owners chose to decorate most internal walls with lime paint. Clay paint was used in the former cellars, now bathrooms. Not only do these paints provide shading and depth of colour, offering subtly changing hues in different light conditions; the material is breathable, allowing moisture to disperse freely, and are safe to use as they do not release *Volatile Organic Compounds* (VOC's).

Although mainly associated with external work, limewashes have been used as interior coatings for centuries, with colour from natural pigments. The lime paint was applied directly onto lime plaster, giving a textured finish as seen in the lounge and dining room (*Fig. 32*). Stronger colours were used in these principal rooms, similar to how it would have been historically. Clay paint is very good at buffering humidity and was therefore suitable for use in the bathrooms, applied directly onto the plaster in the west cellar and exposed masonry in the east cellar. This paint is applied in the same way as conventional paints; the light colour was chosen to maximise the light in these enclosed spaces.



Fig. 32: Decoration works including: lime paint in the sitting room and clay paint in the cellar bathrooms.

Existing wallpaper was found behind the timber window shutters in the lounge. This was kept as an interesting decoration feature which helps to tell the history of the property (*Fig. 33*).



Fig. 33: Existing wallpaper retained behind sitting room timber window shutter.

Thermal improvements

While much of the work in the project concerned alterations and reinstatement, the owners were keen to incorporate as many energy saving measures as possible. Although they were aware they had to tread a careful balance between working with the existing historic fabric and what thermal improvements could be achieved. In retaining the original windows in an unimproved condition there was clearly going to be heat loss. However, to reduce this loss, the owners use the refurbished shutters effectively; regularly closing them to retain heat.

With the walls being plastered on hard, and wanting to retain this original feature, there was not a great deal of scope with altering the external walls in terms of thermal improvement, such as with the application of wall insulation. Conventional loft insulation was used in the roof space.

8. Services

Heating

The building had previously been heated by open fires, one in each room, and a single gas fire had been installed in the 20th century. The new owners installed a wet underfloor heating system on each of the floors, which allows for an even distribution of heat and a consistent temperature throughout. Electric heated towel rails were installed for background warmth in each of the bathrooms (*Fig. 34*).



Fig. 34: Electric heating towel rails installed in the bathrooms for additional heat

Underfloor heating was the owners preferred form of heating system. Lifting the timber floor boards provided the opportunity to lay the pipes. This approach mitigates any potentially damaging effect on the building fabric by eliminating the requirement for wall mounted radiator units. It also affords marginal extra space when considering room layout in respect of furnishings and so forth. When gaining feedback the owners believe this type of heating has worked well for the property and their own daily requirements.

Wiring

Due to the age of the wiring, this was replaced throughout. A new consumer unit (meter and fuse box) with an inbuilt *Residual Current Detector* (RCD) breaker was fitted.

Drainage and sewage

There was an existing connection to the main drainage and sewage, and works were required to these during the refurbishment. The original drains ran through the cellars; an unsightly feature and a possible cause of dampness. These drains were re-diverted allowing full use of the cellars. The sewage connections were also upgraded, removing an open drain and completing works up to the point of the boundary with their neighbours.

9. Summary

This case study demonstrates a sympathetic approach to the repair and upgrade of a traditional building. The house has been repaired and has been back in habitation for 10 years. The owner, in undertaking this work, learned a lot about the appropriate use of traditional techniques, and the benefits of using technically compatible materials, such as lime plaster, lime paint and clay paint. This has resulted in a warm, dry building enjoyed by the family. Many of the approaches used in this project can be applied to other traditionally constructed properties in Scotland and elsewhere.

10. References and further reading

Historic Scotland (2008) *Short Guide: Sash and Case Windows: A Short Guide for Homeowners*. Edinburgh: Historic Scotland.

Historic Scotland (2013) *Short Guide 1: Fabric Improvements for Energy Efficiency in Traditional Buildings*. Edinburgh: Historic Scotland.

Historic Scotland (2014) *Short Guide 9: Maintaining Your Home: A Guide for Homeowners*. Edinburgh: Historic Scotland.

Historic Scotland (2007) *Inform: Damp: Causes and Solutions*. Edinburgh: Historic Scotland.

Historic Scotland (2013) *Inform: Domestic Chimneys and Flues*. Edinburgh: Historic Scotland.

Historic Scotland (2007) *Inform: Interior Paint: A Guide to Internal Paint Finishes*. Edinburgh: Historic Scotland.

Historic Scotland (2008) *Inform: Timber Floors*. Edinburgh: Historic Scotland.

Other useful information regarding conservation repair and maintenance can be found in our various other publications including *INFORM Guides*, *Short Guides*, *Technical Papers* and *Research Reports* along with other *Refurbishment Case Studies* available from our website; <https://www.historicenvironment.scot/conservation/search-for-conservation-publications/>

Further reading

Refurbishment Case Studies

This series details practical applications concerning the conservation, repair and upgrade of traditional structures. The Refurbishment Case Studies seek to show good practice in building conservation; some describe projects supported by Historic Environment Scotland, and some are entirely privately resourced projects. The results of some of this work are part of the evidence base that informs our technical guidance. At the time of publication of this Refurbishment Case Study there are 20 case studies covering measures such as repairs to masonry, upgrades to windows, walls and roof spaces in a range of traditional building types such as tenements, cottages and public buildings.

All the Refurbishment Case Studies are free to download and available from the HES website <https://www.historicenvironment.scot/refurbishment-case-studies/>

Technical Papers

Our Technical Papers series disseminate the results of research carried out or commissioned by Historic Environment Scotland, mostly related to improving energy efficiency in traditional buildings. At the time of publication of this Refurbishment Case Study the series has 23 titles covering topics such as thermal performance of traditional windows, U-values and traditional buildings, keeping warm in a cool house, and slim-profile double-glazing.

All the Technical Papers are free to download and available from the HES website <https://www.historicenvironment.scot/technical-papers/>

INFORM Guides

Our INFORM Guides series provides an overview of a range of topics relating to traditional skills and materials, building defects and the conservation and repair of traditional buildings. At the time of publication of this Refurbishment Case Study the series has over 50 titles covering topics such as: ventilation in traditional houses, maintaining sash and case windows, domestic chimneys and flues, damp causes and solutions improving energy efficiency in traditional buildings, and biological growth on masonry.

All the INFORM Guides are free to download and available from the HES website <https://www.historicenvironment.scot/inform-guides/>

Short Guides

Our Short Guides are aimed at practitioners and professionals, but may also be of interest to contractors, home owners and students. The series provides advice on a range of topics relation to traditional buildings and skills.

All the Short Guides are free to download and available from the HES website <https://www.historicenvironment.scot/short-guides/>

