



Historic England

# Technical Conservation Guidance and Research



February 2024



# Summary

This brochure lists our technical conservation guidance, research reports and Technical Tuesday webinars on all aspects of the repair and maintenance of the historic built environment.

All our advice and reports are free to download from the relevant sections on our website, [HistoricEngland.org.uk](https://HistoricEngland.org.uk). If you are viewing this brochure online, each publication can be opened by clicking on the listed titles, or the link at the foot of the page will take you to the relevant section of the website.

For more information about our technical advice and research, contact [NationalSpecialistServices@HistoricEngland.org.uk](mailto:NationalSpecialistServices@HistoricEngland.org.uk)



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# Keep up to date

## Technical Conservation News

If you would like to receive news about our latest technical conservation advice and events, please join our newsletter mailing list.

To sign up, send an email to the address below with your request:

[NationalSpecialistServices@HistoricEngland.org.uk](mailto:NationalSpecialistServices@HistoricEngland.org.uk)

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## Social media



Follow us on X (formerly Twitter): [@HistoricEngland](https://twitter.com/HistoricEngland) and [@HeritageAdvice](https://twitter.com/HeritageAdvice)



See our updates on [LinkedIn](https://www.linkedin.com/company/historic-england)



# Technical Tuesday webinars

Our Technical Tuesday webinars explore a range of technical conservation topics and take place throughout the year. See the [Technical Tuesdays webpage](#) for details of forthcoming webinars.

Recordings and transcripts of previous webinars are available to view [online](#).

Historic England is an IHBC-recognised CPD provider, and individual webinars may count towards IHBC members' CPD requirements.

Webinar topics include:

- Building materials: lime and earth mortars, fibrous plasters, stone, concrete, metals
- Building works: dealing with graffiti, bats
- Dealing with damp in old buildings
- Building services: installation, lighting
- Climate change adaptation
- Fire and lightning protection
- Flooding
- Projects and programmes
- Retrofit and energy efficiency
- Roofing
- Survey, assessment, inspection, and investigation for historic sites
- Windows including glass and glazing
- War memorials



# Retrofit and Energy Efficiency in Historic Buildings

Improving the energy efficiency of historic buildings can be done sympathetically and without compromising their character. Our guidance explains how to go about it, and includes information on draughtproofing, insulation and installing heat pumps, photovoltaics and other renewable energy systems.

We advocate a whole house approach to energy efficiency. Our guidance explains how to plan energy efficiency improvements in older buildings and how to comply with regulations.

This suite of guidance includes:

- Our whole house approach to improving energy efficiency
- Advice on statutory requirements
- Guidance on installing energy efficiency measures
- Guidance on climate change impacts

## Technical guidance

### Whole house approach

- [How to improve energy efficiency](#)

### Climate change impacts

- [Summertime overheating](#)

### Statutory requirements

- [Building Regulations, Approved Documents and historic buildings](#)
- [Energy Performance Certificates guidance](#)
- [Energy Performance Certificates: case studies](#)

# Retrofit and Energy Efficiency in Historic Buildings

Our guidance provides advice on the principles, risks, materials and methods for making changes to buildings to improve energy efficiency.

## Technical guidance

### Roofs

- Insulating flat roofs
- Insulating pitched roofs at ceiling level
- Insulating pitched roofs at rafter level
- Insulating thatched roofs
- Open fires, chimneys and flues

### Floors

- Insulating solid ground floors
- Insulation of suspended timber floors

### Walls

- Early cavity walls
- Insulating solid walls
- Insulating timber-framed walls



Insulation in timber-framed wall

### Windows

- Insulating dormer windows
- Modifying historic windows as part of retrofitting energy-saving measures
- Secondary glazing for windows

# Retrofit and Energy Efficiency in Historic Buildings

Our webinars explore assessing energy performance and summertime overheating in historic buildings, and the whole house approach to retrofit.

## Webinars

### Whole house approach

- Whole house approach to retrofit
- Retrofit fundamentals

### Assessing performance

- Energy assessment: Theory versus reality
- Thermal imaging
- Lessons learnt from Building Performance Evaluation of retrofit projects: Session 1, overview
- Lessons learnt from Building Performance Evaluation of retrofit projects: Session 2, moisture risk assessment and analysis

### Climate change impacts

- Assessing future summertime overheating risk in historic buildings: Part 1
- Assessing future summertime overheating risk in historic buildings: Part 2
- Retrofit and flooding



Regeneration of Victorian terraced housing in Toxteth, Liverpool

- How climate change is increasing lightning and how to protect our built heritage

### Statutory requirements

- Achieving an EPC B rating and the implications for traditional buildings
- Energy Performance Certificates in the private rental sector case studies
- Updates to the Building Regulations Approved Documents Part F and Part L



# Retrofit and Energy Efficiency in Historic Buildings

Research underpinning our technical guidance on retrofit and energy efficiency.

## Research reports

### Performance and whole house approach

- Correlating maintenance, energy efficiency and fuel poverty for traditional buildings in the UK
- Energy efficiency and historic buildings: Assessing the thermal and hygrothermal performance of two refurbished dwellings
- EPCs and the whole house approach: A scoping study
- Reducing energy use in traditional dwellings: Analysis of four solid wall houses in Reading
- A retrofit of a Victorian terrace house in New Bolsover: A whole house thermal performance assessment
- The SPAB Performance Survey 2011-2017
- The sustainable use of energy in traditional dwellings: Using legislation and policy to guide decision-making

### Roofs

- A study of the roof environment in four domestic buildings



Timber sash windows, The Engine House, Swindon

### Walls

- External wall insulation in traditional buildings
- Research into the thermal performance of traditional brick walls

### Windows

- The Engine House, Swindon, Wiltshire: Thermal performance of energy efficiency improvements to timber windows
- Improving the thermal performance of traditional windows: Metal-framed windows
- Research into the thermal performance of traditional windows: Timber sash windows

# Low and Zero Carbon Technologies

Our guidance on low and zero carbon energy sources for historic buildings, and installation and maintenance considerations.

## Technical guidance

- Daylight harvesting and historic buildings
- Energy efficiency and historic buildings: Solar electric (Photovoltaics)
- Installing heat pumps in historic buildings
- Low and zero carbon technologies
- Heat pumps in historic buildings: Air source heat pump case studies - Small scale buildings



Photovoltaic cells installed in the glass roof above King's Cross Station, London

## Webinars

- Counting carbon
- Embodied carbon: The case against demolition
- Low-carbon heat sources
- Net Zero and the decarbonisation of National Grid distribution network
- Saving energy through daylight harvesting
- The use of heat pumps in historic buildings
- The Decarbonisation of heating
- What is embodied carbon, how it is relevant to existing buildings and what the UK needs to do about reducing it
- The use of air source heat pumps in non-domestic historic buildings
- The Demonstration of Energy Efficiency Potential (DEEP) project findings
- Case study of Shrewsbury Flaxmill Maltings ground source heat pump project
- Hydroelectric power in historic landscapes

# Building Services Engineering

Our advice on installing and maintaining building services such as lighting and heating.

## Technical guidance

- [External lighting of historic buildings](#)
- [Heating historic buildings](#)
- [Installing electrical energy storage systems and batteries in historic buildings](#)
- [Internal lighting in historic buildings](#)
- [Maintaining building services](#)



The elegant internal lighting at Saltaire United Reformed Church, Saltaire, West Yorkshire

## Webinars

- [Emergency lighting and exit signage](#)
- [External lighting](#)
- [The Future of Heating conference](#)
- [Inspection and maintenance](#)
- [Installation of building services](#)
- [Internal lighting](#)
- [Principles and decision making](#)

# Emergency Planning and Fire Advice

Our guidance on emergency planning, fire prevention and protection.

## Technical guidance

### Emergency planning

- [Arson risk reduction](#)
- [Emergency planning advice](#)
- [Emergency information](#)
- [Lightning protection](#)
- [Reference documents on saving paintings, books etc](#)
- [Responding to an emergency](#)

### Fire advice

- [Arson risk reduction](#)
- [Designing, installing and maintaining a fire detection and protection system](#)
- [Fire alarms for historic buildings](#)
- [Fire fighting in thatched buildings](#)
- [Fire resistance of historic timber panel doors](#)
- [Fire safety advice](#)
- [Fire safety for traditional church buildings](#)



The old fire alarm panel at the Waterloo Mills, Bradford

- [Fire safety: Hot work and historic buildings](#)

## Research reports

- [Fire in thatched properties with wood-burning stoves](#)

## Webinars

- [Fire alarm systems in historic buildings: Installation and design](#)
- [Fire in thatched buildings](#)
- [Lightning protection](#)
- [How climate change is increasing lightning and how to protect our built heritage](#)

# Flooding

Our advice on dealing with floods, minimising damage and cost-efficient precautions.

## Technical guidance

- [Flooding and historic buildings](#)

## Research reports

- [An analysis of drying data from a medieval hall after flooding](#)
- [A preliminary study of flood remediation in Hebden Bridge and Appleby](#)
- [The health risks from contaminated flood water in the United Kingdom](#)



The River Sever overflowing its banks at Worcester

## Webinars

- [Flooding Part 1: Preparation resistance and resilience](#)
- [Flooding Part 2: Salvage recovery and restoration](#)
- [Retrofit and flooding](#)

# Care, Maintenance and Repair

Advice on how to maintain and repair historic buildings, including the types of materials and treatment methods to use.

## Technical guidance

- [Building works and bats](#)
- [Bird deterrents](#)
- [Cleaning and disinfecting historic surfaces](#)
- [Removing and preventing graffiti](#)
- [Maintenance and repair of traditional farm buildings](#)
- [Repointing brick and stone walls](#)

## Roofing

- [Church roof replacement using terne-coated stainless steel](#)
- [Conservation of traditional thatch](#)

## Insuring historic buildings, and managing vacant buildings

- [Insuring historic buildings and other heritage assets](#)
- [Vacant historic buildings: Guidelines on managing risks](#)



Grffiti on Holy Rood Church, The Lawn, Old Town, Swindon

## Research reports

- [Traditional thatching materials: Issues affecting a sustainable future](#)

# Care, Maintenance and Repair

Advice on how to maintain and repair historic buildings, including the types of materials and treatment methods to use.

## Webinars

### Building works: graffiti, bats

- [Building works and bats](#)
- [Graffiti on historic buildings](#)

### Roofing

- [Conservation of traditional thatch](#)
- [Terne-coated stainless steel: Its use as a replacement material after lead theft from church roofs](#)



Re-thatching a cottage

### Damp in historic buildings

- [A common-sense approach to damp: The basics](#)
- [A common-sense approach to damp: The buildings](#)
- [Damp, masonry decay and sustainability conference](#)
- [Damp: Survey and inspection](#)
- [Damp, timber decay and sustainability conference](#)

# Care, Maintenance and Repair

Advice on how to maintain and repair historic buildings, including the types of materials and treatment methods to use.

## Technical guidance

### Decorative features

- [Historic fibrous plaster in the UK](#)
- [Wall paintings: Anticipating and responding to their discovery](#)

### Glass and glazing

- [Stained glass windows: Managing environmental deterioration](#)
- [Traditional windows: Their care, repair and upgrading](#)

### Stone

- [Coade stone](#)
- [Nanolime: A practical guide to its use for consolidating weathered limestone](#)
- [Purbeck Marble: Conservation and repair](#)
- [Sourcing stone for historic building repair](#)



Low level decay on a Purbeck Marble column at Lincoln Cathedral



# Care, Maintenance and Repair

Advice on how to maintain and repair historic buildings, including the types of materials and treatment methods to use.

## Webinars

### Building materials: mortars, fibrous plasters and decoration

- Concealed decoration
- Earthen mortars and plasters
- Earthen mortars case studies
- Fibrous plaster
- Mortar analysis
- Mortars for conservation: History and materials

### Building materials: stone, concrete, metals

- Conservation of architectural metalwork: Introduction
- Conservation of architectural metalwork: Iron gates and railings
- Conservation of reinforced concrete
- Purbeck Marble: Conservation and repair
- SPAB Fellows: Experiences of building materials



Concrete sound mirrors in Dungeness, Kent

- SBAB Scholars: Repairs and materials
- SPAB Scholars: Traditional building materials and availability
- SPAB's William Morris Craft Fellowship: The repair and conservation of timber framed buildings

### Windows: glass and glazing

- Dealing with environmental deterioration of stained glass
- Glazing and the environment
- Traditional windows: Care, repair and improving energy efficiency

# Care, Maintenance and Repair

Research on a range of topics relating to the conservation of historic buildings and structures.

## Research reports

- [A comparative evaluation of methods to monitor moisture in historic porous masonry materials](#)
- [Conserving stained glass using environmental protective glazing](#)
- [Does wall plaster retard the drying of walls after flooding?](#)
- [Measuring moisture content in historic building materials](#)
- [Rain noise: Acoustic tests on terne-coated stainless-steel roofing](#)
- [A study of the roof environment in four domestic buildings](#)
- [The variability in resistance moisture meter readings obtained from medieval roofs](#)
- [Ventilation and conservation](#)



Stained glass windows in a church

## Books

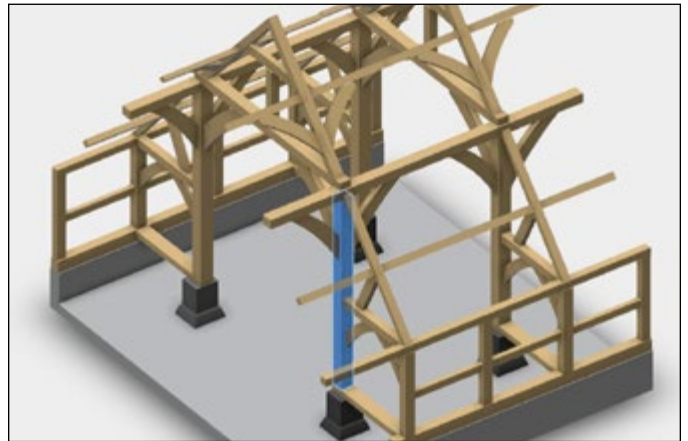
- [Timber decay in buildings and its treatment](#)
- [Practical Building Conservation volumes - see pages 23-24 of this brochure](#)

# Geospatial Survey

Our guidance on Building Information Modelling and specialist survey techniques for heritage projects.

## Technical guidance

- [BIM for Heritage: Developing a historic Building Information Model](#)
- [BIM for Heritage: Developing the Asset Information Model](#)
- [Geospatial survey specifications for cultural heritage](#)
- [Multi-light imaging](#)
- [Photogrammetric applications for cultural heritage](#)
- [Sketchfab: Our collection of 3D models](#)
- [Traversing the past: The total station theodolite in archaeological landscape survey](#)
- [3D laser scanning for heritage](#)



A BIM model of the Great Barn, Harmondsworth

## Research reports

- [A trial of different geospatial techniques to improve the legibility of the engraving on the stone from Fishpool Valley](#)
- [Examining Structure-from-Motion photogrammetry of artefacts from Rievaulx Abbey](#)

## Case studies

- [A survey of the historic carvings at Carlisle Castle, Cumbria, using Structure-from-Motion photogrammetry and terrestrial laser scans](#)
- [Church of St Edward and the Market Place, Leek, Staffordshire: Geospatial survey of standing medieval cross](#)

## Webinars

- [BIM for heritage](#)
- [Drones for remote inspection](#)
- [Geospatial survey](#)
- [Laser scanning for remote inspection](#)
- [Reality capture for remote inspection](#)



# Building Stones Database for England

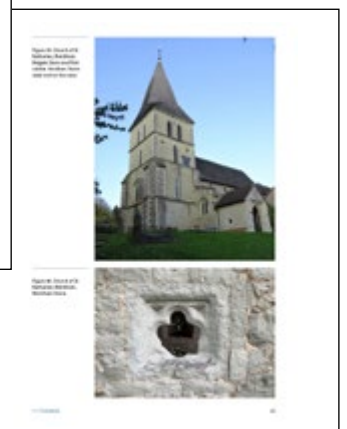
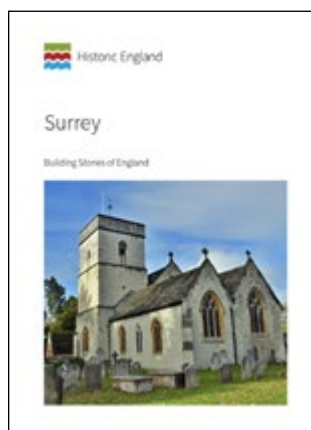
England’s rich architectural heritage owes much to the great variety of stones used in buildings and other structures. The building stones commonly reflect the local geology, imparting local distinctiveness to historic towns, villages and rural landscapes.

In our [Building Stone GIS map](#), developed with the British Geological Survey and local experts, you can search for:

- a building stone type in an area
- details on individual mapped buildings or stone sources
- potential sources of building stone sources within a given proximity of a stone building or area
- buildings or stone sources in individual mineral planning authority area.

In addition to the GIS map, new editions of the illustrated county guides were published in 2023 along with companion spreadsheets that provided:

- more examples of buildings. Information is included on building type, date, architectural style, building stone source, and listed/scheduled status
- a list of known (active and ceased) building stone sources such as quarries, mines, pits and delphs
- additional information on building stones including lithology, grain size, sedimentary structures, key identification features, and notes on failure/weathering, and use.



# Improving Accessibility to Historic Buildings and Landscapes

Our guidelines on improving access to historic buildings and landscapes for people with disabilities explain how to make a range of positive changes to historic places, while at the same time working within the wider principles of conservation.

## Technical guidance

- [Easy access to historic buildings](#)
- [Easy access to historic landscapes](#)

## Case studies

- [Black Barn case study: Delivering public engagement, skills and training](#)
- [Bounds Wall Ushaw case study: Delivering public engagement, skills and training](#)
- [Delivering public engagement, skills and training: Harmondsworth Barn case study](#)



The entrance of The Treasury, London

# War Memorials

Our advice and case studies on conserving, protecting and maintaining these important monuments.

## Technical guidance

- Conservation and management of war memorial landscapes
- Conservation, repair and management of war memorials
- Conserving war memorials: Cleaning
- Conserving war memorials: Inscriptions
- Conserving war memorials: Structural problems and repairs



RAF war memorial plinth, Catterick

## Case studies

- Cleaning
- Conservation of mortar-filled inscriptions
- Deterioration of metal fixings
- Differential movement of foundations
- The replacement of missing bronze elements
- The surface treatment of bronze statuary - 1
- The surface treatment of bronze statuary - 2

# War Memorials

Historic England's case studies look at specific conservation challenges of memorials.

## Webinars

- [Conserving war memorials: Part 1 - Introduction](#)
- [Conserving war memorials: Part 2 - Materials and cleaning](#)



War memorial cross, The King's School, Canterbury

## Videos

Watch our videos on how to treat and repair stone war memorials:

### Conserving inscriptions

- [Condition and legibility](#)
- [Gilding](#)
- [Inpainting](#)
- [Recutting](#)
- [Replacement](#)

### Cleaning

- [Reasons for cleaning](#)
- [Biocides](#)
- [Chemical cleaning](#)
- [Water washing](#)

# Parks, Gardens, Landscape Management and Wildlife

Our online guidance covers a range of topics from public green spaces to trees and hedges, lakes and water features, wildlife and habitats, and managing the landscape management of archaeological monuments and other sites.

## Technical guidance

- [Looking after monuments and sites](#)
- [Looking after parks, gardens and landscapes](#)
- [Wildlife and habitats](#)



Campbell Park, Milton Keynes

## Case studies

- [Capability Brown landscapes](#)
- [Humphry Repton landscapes](#)

- [Hardy plants and planting for Repton and late Georgian gardens \(1780-1820\)](#)
- [Lancelot ‘Capability’ Brown: A research impact review prepared for English Heritage by the Landscape Group, University of East Anglia](#)

## Research reports

### Capability Brown and Humphry Repton

- [Capability Brown’s drawings: A reference catalogue of drawings by Brown or his office \(c1740s-1783\), including architectural drawings and landscape scenes](#)
- [Capability Brown’s plans reference catalogue for researchers](#)

### Urban green spaces

- [Commons, heaths and greens in Greater London](#)
- [History of public park funding and management \(1820-2010\)](#)
- [National review of research priorities for urban parks, designed landscapes and open spaces](#)



# Parks, Gardens, Landscape Management and Wildlife

Our online guidance covers a range of topics from public green spaces to trees and hedges, lakes and water features, wildlife and habitats, and managing the landscape management of archaeological monuments and other sites.

## Historic significance

- [Golf courses as designed landscapes of historic interest](#)
- [List of registered cemeteries](#)
- [A delicious retreat: The marine villa and its setting in England, c. 1760 to c. 1840. A contextual study](#)



Detail of ivy on a wall

## Landscape management

- [Devon cobbled churchyard paths: Evaluating their significance, survival and adaptation](#)
- [Ivy on walls](#)
- [Mapping pests and diseases in historic parks and gardens](#)
- [Soft capping on ruined masonry walls](#)

# Practical Building Conservation books

This series of books offers a comprehensive and practical reference resource for professionals involved in repairing historic buildings.

Published by [Routledge](https://www.routledge.com) on our behalf, the books are available to purchase from their website.



## Conservation Basics (2013)

The history and evolution of building conservation in England, and current best practice for planning conservation projects



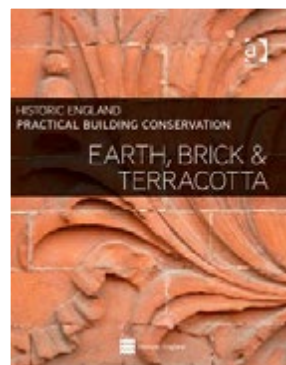
## Concrete (2013)

The history of concrete, and best-practice conservation



## Building Environment (2014)

What the building environment is, how it works, why it fails, and how problems can best be remediated



## Earth, Brick and Terracotta (2015)

The history and conservation of fired and unfired clay materials, including earth, brick, terracotta, and tiles

# Practical Building Conservation books



## Glass and Glazing (2012)

The history, deterioration and conservation of glass used in windows, roofing and walling



## Roofing (2013)

The history and conservation of traditional roof coverings, including thatch, slates, tiles, shingles, lead and other metals



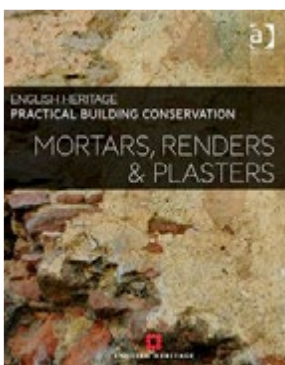
## Metals (2012)

The history and conservation of ferrous and non-ferrous architectural metalwork, including railings, fittings, and statuary



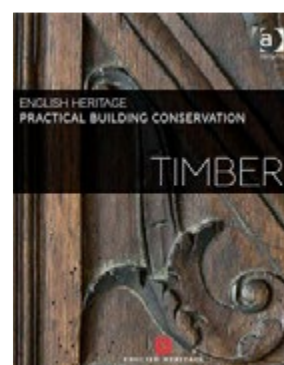
## Stone (2012)

The history and conservation of architectural stonework, including carved decoration, and ruins



## Mortars, Renders and Plasters (2012)

The history and conservation of mortars, including the design and preparation of new mortars for repair and construction



## Timber (2012)

The history and conservation of timber in historic buildings, from timber frames through to joinery and fixings



# Historic England

Historic England is the public body that helps people care for, enjoy and celebrate England's spectacular historic environment.

All our guidance is available online to view or download for free. You can also buy printed versions of our guidance publications.

[HistoricEngland.org.uk](https://HistoricEngland.org.uk)

If you have any questions about this brochure, email:

[NationalSpecialistServices@HistoricEngland.org.uk](mailto:NationalSpecialistServices@HistoricEngland.org.uk)

Historic England's Technical Tuesday webinars and recordings:

[HistoricEngland.org.uk/services-skills/training-skills/training/webinars](https://HistoricEngland.org.uk/services-skills/training-skills/training/webinars)

To sign up to our Technical Conservation newsletter, email:

[NationalSpecialistServices@HistoricEngland.org.uk](mailto:NationalSpecialistServices@HistoricEngland.org.uk)

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