

Refitting your home to cope better with flooding

A guide to improving energy efficiency & resilience to extreme weather in traditional buildings

Is your home, community venue or business premises a traditional, older building?

There's a lot you can do to reduce the impact of flooding or other extreme weather.

The building materials and methods you choose when refitting after flooding, or just while doing home improvements, can make a big difference to getting your building back into use more quickly if you are flooded in the future.

This booklet is packed with practical guidance and will be useful if you're:

- ✓ Refitting your home or building after flooding
- ✓ Planning some home improvements
- ✓ Looking for information on sustainable property refurbishment
- ✓ A contractor, builder, surveyor or insurer looking into the best long-term solutions for refurbishing traditional properties that have been flooded, are in a flood-risk area or suffer from damp

While you're doing other works, it's also a great opportunity to make some improvements that will cut your energy bills.



Using this guide

The advice in this guide is mainly about older buildings, as the majority of houses in Cumbria were built before 1919, when modern methods became widely used.

Every building is unique, so this booklet gives general guidance. At the end, you'll find a list of organisations you can contact for more detailed advice.

If your building has features or fabrics that are of particular historical interest, we would recommend getting expert professional advice.

Benefits to you – why improve your building

- ✓ You can improve flood resilience and insulation at the same time, so it's cheaper and less disruptive.
- ✓ If you choose building and insulation materials that can dry out after flooding, you're less likely to have to replace them – less money, waste and stress.
- ✓ Getting rid of damp can reduce the energy you use to heat your building. It also prevents mould, rot and damage, giving you a healthier and more comfortable home.
- ✓ It's predicted that we'll see more heavy rain, floods, high winds and hot weather in the future, as our climate changes. By using less energy to heat your home, you'll cut your bills and you'll also help tackle climate change, which is causing more extreme weather events.

Getting started

First, we'll look at your building's construction and how water can get in. Then we'll give you some options to improve flood resilience and energy efficiency.

Step 1

Find out what sources of water might affect your property

What is the likelihood of a flood affecting your property?

How high might the flood water reach?

What would cause flooding at your property – a river, surface water runoff or rising groundwater?

You can find this out from the Know Your Flood Risk Campaign, the National Flood Information Service, your local council and the Environment Agency. (See Further Information section.)

If you are at risk of flooding, the measures you take to protect your property will depend on the level of risk and how high the water might reach.

Is water causing your walls or floor to be damp, particularly after regular rainfall?

Damp can penetrate your building because something isn't working properly, like a leaking gutter, or because of materials that aren't right for your building. Step 3 should help you work out where the water has come from.

Step 2

Find out if your property was built in a traditional way

It is important to understand the differences between traditional and modern buildings, so that improvements actually work and don't cause long-term problems.

Is your property traditional or modern construction?

Traditional buildings were built with stone, brick, timber and clay, using lime-based mortars and renders. These materials can absorb moisture and then allow it to evaporate away. This is usually referred to as allowing the building to 'breathe'. These buildings are quite good at controlling dampness, because moisture can evaporate away easily. Outside walls are dried out by the wind and sun. Inside, the air flow through chimneys, windows and doors helps moisture to get away.

Mortar
used to hold
building materials
like brick or stone
together

Render
layer covering
the walls of a
building (usually
outside)

You could say that traditional buildings naturally cope with flooding and rainfall because they're made from permeable, flexible materials that can deal with short-term wetting and drying. If these buildings aren't well maintained, though, or if they're repaired in a way that isn't right for them, these natural processes can stop working properly. If the building can't breathe, it can become damp, mouldy and difficult to heat.

Modern building methods came in around 1919, after the First World War. To keep moisture out, they rely on cement mortars and renders, an open 'cavity' in walls, damp-proof courses and waterproof paints. These methods work well on modern buildings if they're maintained, but they're rarely right for traditional buildings.

Here in Cumbria, our typical buildings are traditional rubble-filled solid stone walls (e.g. limestone, slate, sandstone), or traditional solid brick walls and cavity walls. If your home is made with bricks, you can often tell from the brick pattern whether it's a solid wall or a wall with a cavity in it, as shown below.



typical solid brick wall



typical cavity wall

Step 3

Ways to improve resilience and energy efficiency

In this step, we'll look at the main things that help your building cope with flooding and hold its heat. When you're thinking about the best options for your building, you'll also need to weigh up a few other things:

- where water might come in from and the flood risk in your area (which we looked at in Step 1)
- the way your building was constructed (as we saw in Step 2)
- the way you live in your building
- the amount of disruption that is acceptable
- your budget

Damp

Water in the fabric of a building is referred to as damp. Damp makes buildings feel colder. This is because heat transfers through water much faster than through dry materials. Damp may also damage plaster and stonework, make timber decay and create unhealthy conditions for people using the building, because of mould & rot.

Penetrating damp – This is where rainwater gets into the building fabric above ground, through roofs, walls, chimneys and openings such as windows & doors.

Condensation – Moisture in the air from cooking, washing and people breathing (we breathe out a litre of water each day!) turns into a liquid when it touches a cold surface. The cold surface could be:

- the inside of an external wall
- within the wall itself
- the roof or floor

Plaster layer covering the walls of a building (usually inside)

The actions you can take to get rid of damp in traditional buildings will also help to dry out flood water and make the building more energy efficient. That's why it makes sense to consider them together.

Building fabric the walls, roof, floors & any materials used to construct a building

If the water can evaporate (which it will do through lime plaster, lime mortar or stone) the building can dry out. If it's trapped (as will happen with gypsum plaster, cement render or cement pointing on the outside of a wall) it can't get out and the wall stays wet. Sometimes builders, insurers and householders suggest using modern solutions for waterproofing walls, but these can harm old buildings, because they stop them from breathing like they should.

Ventilation & draughts

Ventilation is necessary in older buildings to help remove moisture and prevent condensation. However, too much ventilation can lead to a draughty and uncomfortable home. Sources of draughts can be easy places for floodwater and rainwater to get in.

- Draught proof your windows and door frames (see CAfS Draughtproofing Guide for detailed advice).
- Make sure any vents into the floor space are kept clear. Use removable covers that can be put in place to keep out flood water when needed.

Keeping your building in good order can stop water getting in.

- Fix any roof slates or tiles that come away.
- Clear gutters and downspouts regularly, and make sure you remove leaves in autumn.
- Replace any broken and leaking gutters and downspouts so that rain doesn't splash down walls.
- If your guttering often can't cope with the amount of water coming into it, you might need to change to larger guttering.
- Get the junctions of roofs, chimneys and lead flashing inspected regularly (by professionals with suitable access equipment) and carry out repairs promptly.
- Repair damaged lime pointing and render (if you have any).
- Replace cement-based pointing and render with lime mortars and renders. Hairline cracks in render will let water get in but not evaporate away, because cement products trap water.
- Make sure the ground level outside is at least 150mm below the floor level inside your building, or below a slate, brick or other damp-proof course if there is one. Dig the ground away by hand to reduce the risk of damage by machinery.



More things you can do

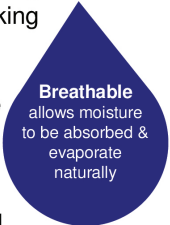
While you're doing other works, think about raising electrical sockets and the consumer unit above the height that flood water might reach.

You could also position the main parts of a heating system (like the boiler or manifold) upstairs or well above ground level.

No-one wants to lose treasured personal belongings, and items are often damaged beyond repair during flooding. Sometimes, though, household items are thrown away and replaced when they could be reused once they're washed and dried. Reducing waste will save you money. It also saves the energy that's used to make and transport new items, so you'll be helping to tackle climate change, one of the causes of extreme weather.

If you’re doing work to refurbish the walls, floor or roof of a property, then you’ll also need to improve the insulation in the walls, to comply with new Building Regulations. There are some exemptions and special considerations for traditional ‘breathable’ buildings, but the guidelines say you should ‘improve energy efficiency as far as is reasonably practicable’, taking into account the guidance given by Historic England (formerly English Heritage).

Older masonry houses were often constructed with thick external walls. This type of construction can store warmth when the building is heated. The heat is then slowly released as the building cools down. In hotter weather, the thick walls keep these buildings cool, so they don’t overheat like some modern buildings do. In hot weather, keep the windows closed during the day to keep cooler air in, and then open them at night to ventilate the building.



Some types of insulation can cause condensation and damp in traditional properties. You should choose insulation that’s breathable. If you’re in a flood-risk area, you should use insulation that can dry out well. Sometimes, it might be best to install a ventilated dry-lining system inside the building.

It may not be possible to refurbish the inside and outside of a property to the ideal level – for example, if it’s in a terrace, access is limited or simply due to budget. It is better to allow a wall to breathe in one direction than not at all.

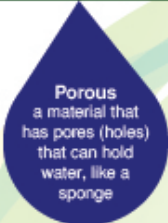
If the materials or insulation you choose can’t deal with getting wet, you may have to think of them as ‘sacrificial’, as you’d need to dispose of them if water gets in. It’s a good idea to fit sheets or batts horizontally. That way, you only have to remove the lower sheets if water comes in at floor level.

Some types of insulation cope better with getting wet than others. The important thing is that they can dry out and continue to keep your building insulated after flood water has subsided.

| Type of insulation | Pros | Cons |
|--|---|--|
| Loose fill (like Rockwool, sheep’s wool and wood fibre) | Breathable and porous. | <ul style="list-style-type: none">• Will absorb and retain water. Will probably have to be removed if wet.• Likely to slump in cavity walls, leaving pockets uninsulated. |
| Semi-rigid batt type insulation (like sheep’s wool & wood fibre) | Breathable and porous. | <ul style="list-style-type: none">• Will absorb and retain water.• Dries slowly and may have to be removed if wet. |
| Insulating lime plaster and lime render | <ul style="list-style-type: none">• Porous, but will dry out and can be kept.• Will retain insulating properties.• Breathable. | Rapid drying and/or dehumidification may cause damage. |
| Closed-cell insulation (like Kingspan, Celotex, Isotherm) | <ul style="list-style-type: none">• Non-porous, so absorbs little water.• Will dry out and can be retained.• Will retain insulating properties e.g. if in cavity. | Not breathable. |
| Spray-on roof foams | Non-porous, so absorbs little water. | <ul style="list-style-type: none">• Not breathable, so more risk of roof timber decay.• Prevents proper inspection.• Harder to re-use slates or tiles. |

Building materials

Water affects materials in different ways. The most important thing, when it comes to helping your building cope with flooding, is how well the materials can deal with getting wet and drying out. Here are the pros and cons of some common building materials:

| Type of material | Pros | Cons |
|-----------------------------------|---|--|
| Concrete | Very resistant to water damage. | Not breathable. |
| Stone | <ul style="list-style-type: none"> Resistant to short-term water damage. Porous and breathable (depending on type of stone). | Long-term water penetration and saturation can cause serious damage, due to freezing and thawing or salt crystallisation. |
| Brick | <ul style="list-style-type: none"> Resistant to short-term water damage. Porous and breathable (except 'blue' engineering bricks often used as a damp-proof course). | Long-term water penetration and saturation can cause serious damage, due to freezing and thawing or salt crystallisation. |
| Timber (wood) |  <ul style="list-style-type: none"> Can cope with short-term wetting. Should be dried out steadily (not too fast), as soon as possible. Old items of joinery removed during work should be carefully repaired and reinstated, not automatically replaced. Doors can be removed and allowed to dry out. Plain-edged timber boards on suspended floors will dry out. You might need to lift some boards to avoid buckling due to expansion. | <ul style="list-style-type: none"> Can suffer from rot if allowed to remain wet. Tongue-and-groove floorboards are likely to be damaged due to expansion and buckling of floor. |
| Cement render | Dense material, retains little water. | <ul style="list-style-type: none"> Dries slowly. Not breathable (prevents wall 'breathing'). Traps moisture. |
| Cement or gypsum plaster | Dense material, retains little water. | <ul style="list-style-type: none"> Dries slowly. Not breathable. Tends to crumble or disintegrate when wet. Must be removed to allow wall to dry out. |
| Plasterboard | If boards are fitted horizontally, you won't need to remove as many if you're flooded. | <ul style="list-style-type: none"> Porous and tends to crumble or disintegrate when wet. Not breathable. If backed with foam insulation will absorb moisture and will not dry out, so will have to be disposed of and replaced. |
| Lime plaster | <ul style="list-style-type: none"> Resists water damage. Porous and breathable. Can retain large amounts of water but will often dry out quickly. Can be retained if allowed to dry out. | |
| Lime render | | |
| Limecrete | <ul style="list-style-type: none"> Drying too quickly (e.g. heating or dehumidifiers) may cause damage. | |
| Water-resistant coatings | | <ul style="list-style-type: none"> Not breathable (generally). Can cause walls to fail if flood water is over 60cm deep, due to high pressures exerted on the wall. Difficult to remove once applied. |
| Ceramic floor tiles, slates, etc. | <ul style="list-style-type: none"> Resists water damage, particularly if you use waterproof grout. Dries quickly and easily cleaned. | <ul style="list-style-type: none"> Can trap water. You must allow drying in one direction. |
| Carpet | | <ul style="list-style-type: none"> Not water resistant. Rubber-backed carpets can also cause damp on solid floors. |
| Decorating | Limewash and soft distemper are breathable types of paint. | <ul style="list-style-type: none"> Wallpaper is not water resistant and not breathable. Vinyl paints are not breathable and will blister on a wet wall. |

Step

4

Before you start work, get any permissions you might need

You may need permission before carrying out any permanent changes to your property if it is listed or in a conservation area. Check with the planning authority before you do any improvements. That includes fitting brackets for removable flood gates, and installing or removing external insulation or render.

You'll also need to make sure the work complies with Building Regulations (see Insulation above). Get some advice from your district council's building inspector or an independent approved inspector.

More information

Here are some websites and publications that will give you more detailed guidance.

National Flood Information Service www.gov.uk/check-flood-risk (Includes Environment Agency services)

Society for the Protection of Ancient Buildings (SPAB) View their factsheet on Floods and Old Buildings at: www.spab.org.uk/advice/technical-qas. Choose Q&A 31

Historic England Download the booklet Flooding and Historic Buildings at: www.historicengland.org.uk/advice/technical-advice/flooding-and-historic-buildings
Their booklet Energy Efficiency and Historic Buildings looks at how Part L of the Building Regulations applies to historic and traditionally constructed buildings. Download it at: www.historicengland.org.uk/advice/technical-advice/energy-efficiency-and-historic-buildings

Construction Industry Research and Information Association (CIRIA)
Download their guidance on flood resilience from their dedicated flood website: www.ciria.com/flooding/advice_sheets.html

Historic Environment Scotland To download their booklet INFORM: Flood Damage to Traditional Buildings, go to www.historicenvironment.scot and click on Archives and Research, then Publications. Search 'flood'.

Know Your Flood Risk Campaign Download guides, including Homeowners Guide to Flood Resilience, at: www.knowyourfloodrisk.co.uk/flood-advice-guidance

National Flood Forum www.nationalfloodforum.org.uk

Building Regulations To see the regulations on energy efficiency in buildings, visit: www.gov.uk/government/publications/conservation-of-fuel-and-power-approved-document-l

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Cumbria Action for Sustainability
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