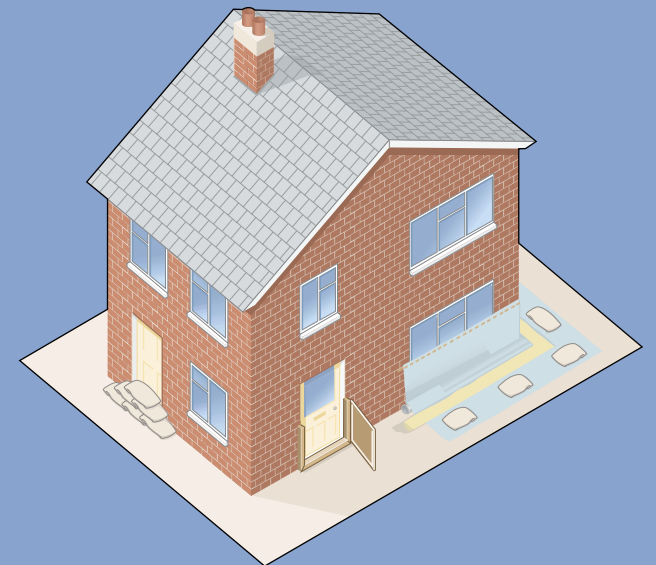


 ENVIRONMENT
AGENCY
Floodline
0845 988 1188



Damage Limitation

How to make your
home flood resistant



Two million homes are situated in flood plains in England and Wales and are at risk of flooding from rivers or the sea.

Finding out whether your home is in a flood risk area, understanding what you can do to reduce the risk and taking action to prepare in advance are the key steps in learning how to cope with flooding.

This guide gives practical advice on how to make your home more likely to withstand the effects of flooding. Measures are often simple and do not need technical knowledge.

Do remember that unless the flood passes very quickly, you are unlikely to keep floodwater out of your home completely (unless it has a water-excluding structure). If flooding is very severe it may enter through doors, windows, airbricks, vents, drains, walls and even through the ground floor.

Following the advice in this guide may save you and your family a great deal of expense and minimise the hard work and heartache of cleaning up a home after a flood.

Flooding. You can't prevent it. You can prepare for it.



Flooding possible. Be aware! Be prepared! Watch Out!



Flooding expected affecting homes, businesses and main roads. Act now!



Severe flooding expected. Imminent danger to life and property. Act now!



An all clear will be issued when flood watches or warnings are no longer in force. Flood water levels receding. Check all is safe to return. Seek advice.

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This guide has been produced by the Environment Agency working in partnership with the Construction Industry Research and Information Association (CIRIA).

While the authors believe the information contained in this guide is correct, it offers basic advice only and is not a substitute for expert or professional opinion which should be sought for any major DIY work undertaken to improve your property's flood resistance.

Here are some quick and easy things you can do to help reduce the damage of floodwater to your home and its contents.

These steps do not require pre-planning and will help if you only have a little time to prepare for a flood. If you can, it is worth making sure you have a stock of useful materials such as plywood, plastic sheeting, sandbags (unfilled), sand, nails, a hammer, shovel, bricks, blocks of wood and a saw.

Essential Services

- Turn off gas, electricity and water supplies at the mains – find out now if you don't know where they are.
 - Cookers, washing machines, dishwasher etc. connected by rigid pipes to gas and water supplies should be disconnected. This will prevent damage to the pipes if they move or float during the flood.
 - Unplug all electrical items and store upstairs or high up.
 - After flooding do not reconnect gas, electricity or water services until systems are checked by an accredited engineer.
 - Dry out appliances affected by floodwater and get a qualified electrician, CORGI registered gas engineer or plumber to inspect before use.
- Minimising Floodwater Entry and Damage**
- You can reduce the amount of water entering your property by using sandbags, plywood or metal sheeting placed on the outside of doors, window frames and airbricks. Even if you cannot create a complete seal, this will reduce the amount of floodwater entering. Remove any coverings on airbricks once the flood has passed, as ventilation is essential to dry wall cavities.
 - If you have silicone sealant to hand this will help to make doors and windows more resistant to floodwater. Open the door or window and place the sealant around the frame, then close and lock the door until the flood has passed. Do not permanently seal any airbricks, wall vents, or air intakes/vents for appliances such as boilers. These will need to be re-opened as soon as possible after the flood and permanently blocking them may be hazardous.
 - Floodwater can enter through drains, toilets and other outlets such as washing machines. The simplest way to prevent this is by putting plugs into sinks and baths and weighing them down with a sandbag or other heavy object. Outlets from washing machines and dishwashers should be disconnected. Place a sandbag in the toilet bowl and block the washing machine drain with a suitable plug (e.g. cloth or towel) to prevent backflow.
 - Floodwater can contaminate foodstuffs and chemicals such as paints, garden pesticides and household cleaning products. Similarly they may spill or leak into the floodwater causing additional cleaning-up problems. Store any materials like this in the upper part of your home, garage or garden shed.

Furniture and Household Appliances

- Move as much furniture and electrical items as you can upstairs. If you have time, roll up carpets and rugs and put them upstairs (or in a safe place).
 - Empty furniture that cannot be moved and carry the contents upstairs. See if you can raise the item above floor level using bricks or blocks – this may be particularly helpful for larger appliances such as fridge-freezers. Move furniture away from walls as this helps with drying the property later.
 - Leave internal doors in the open position and if time allows, remove them and store them upstairs. Remove cabinet drawers.
 - If items of furniture cannot be moved, weigh them down with a heavy object or stack and tie them together. If the flood is severe this will stop furniture floating around and causing damage such as broken windows.
 - If there is no time to remove curtains, hang them up over the curtain rods so that they are kept above the floodwater.
- Personal Items**
- You cannot replace sentimental items. If a flood is on the way, you may forget to move them to a safe place. So think about keeping them upstairs or somewhere high up in your property on a permanent basis.
 - Personal documents, insurance and bank details and essential contact telephone numbers should be collected and kept in polythene bags. Think about storing them NOW in a place safe from floodwater.

- Remember that sentimental items can include favourite toys or family photographs, not just valuable items like jewellery.

Outside the Home

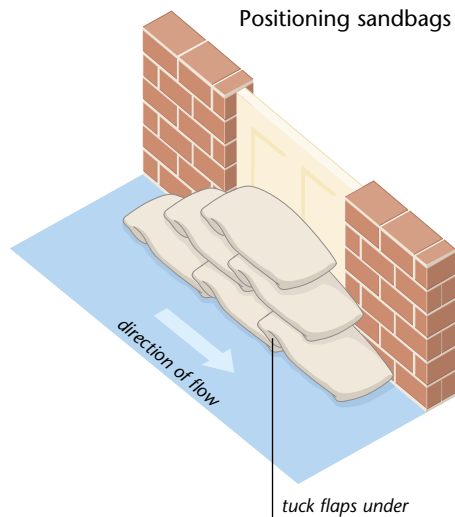
- If possible move anything kept outside and not fixed to the ground to a safer location, eg dustbins, garden chemicals, car oils which you keep in the garage or shed.
- Floodwater may get into the garage and damage your car. Move it to higher ground if safe to do so.
- Weigh down any manhole covers on the property with sandbags or a heavy object. If they lift up during a flood, the drain may be left open which will create a hazard.
- Close off the flow valves on propane tanks, oil drums or other fuel containers that supply the home through pipes and fittings.
- Work with your neighbours to make your flood protection measures more effective. This is particularly important if your home is part of a terrace or is semi-detached as water can come through adjoining walls.

Sandbags are one of the most well-known devices for keeping floodwater out of your property. Unfilled sandbags and a supply of sand can be purchased from some DIY stores and Builders Merchants, but remember that if there is a flood in your area demand may exceed supply as people rush to buy them. Some local authorities may provide sandbags in an emergency, but again there may be limits to availability.

If you have not purchased sandbags and sand in advance, you can use alternatives such as pillow cases or refuse sacks and fill them with garden soil. Remember that they can get heavy quickly, so do not overfill, or fill them too far away from where you want to position them.

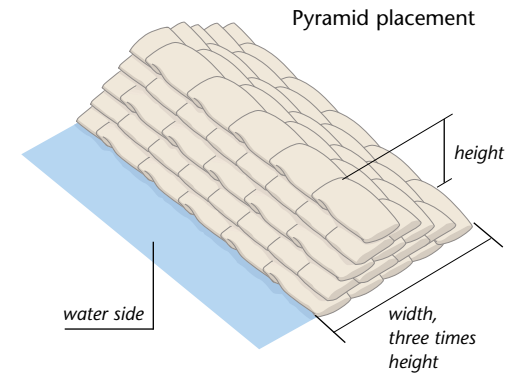
How to Fill and Position Sandbags

- Unless you have access to a sandbag filling machine, this is a two person job: one to hold the bag open and one to fill.
- Sand is abrasive – both people should wear protective gloves.
- Do not fill bags more than half full.
- It is not necessary to tie the end of the bag.
- Remove any debris from the area where the bags are to be placed.
- Place the half filled bags lengthways and parallel to the direction of the water flow. Tuck the opened end under the filled half of the bag and position it pointing into the water flow.
- Place bags in layers. Like a brick wall, make sure that in the next layer each bag overlaps the one below by half.
- Stamp bags firmly into place to eliminate gaps and create a tight seal.



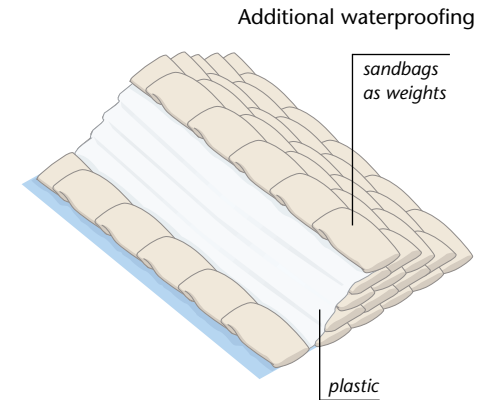
Pyramid Placement Method

If you need to create sandbag protection that is more than three layers high you will need to build in a pyramid style. For the structure to be stable, you should build the 'sandbag wall' three times as wide as you need it to be high. It will also be more effective if you alternate the layers lengthways and crosswise. Stamp each bag in place and tuck the loose end firmly under the filled portion of the bag.



Additional Waterproofing

Lay plastic sheeting across the side of the 'sandbag wall' that will face the floodwater. Weigh down with additional sandbags.



Remember!

Sandbags are popular but they have disadvantages:

- During an emergency sufficient quantities may be difficult to obtain
- They are time-consuming and require two people to fill
- They can be difficult to handle, particularly for the elderly or infirm
- When they come into contact with floodwater they tend to retain contaminants such as sewage
- Sacking material is biodegradable, and will disintegrate if left in place for long periods of time

Flood boards can avoid some of these drawbacks

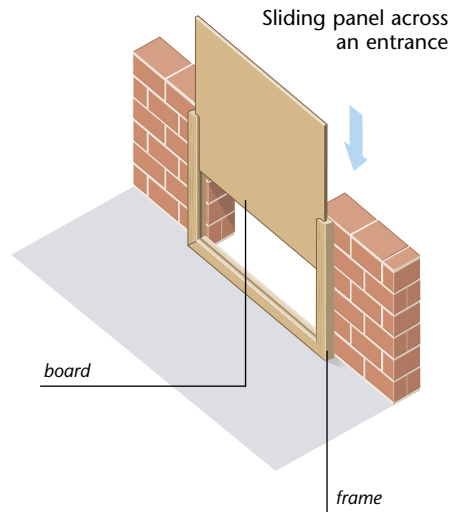
How to Make and Use Flood Boards

The most basic method is to construct a strong wooden or metal barrier that is secured flat against the wall or frame surrounding a door or window. The pressure of floodwater itself will help seal the barrier. This can be enhanced by adding suitable material to make a seal between the wall and the board, for example a blanket or silicone type sealing compound.

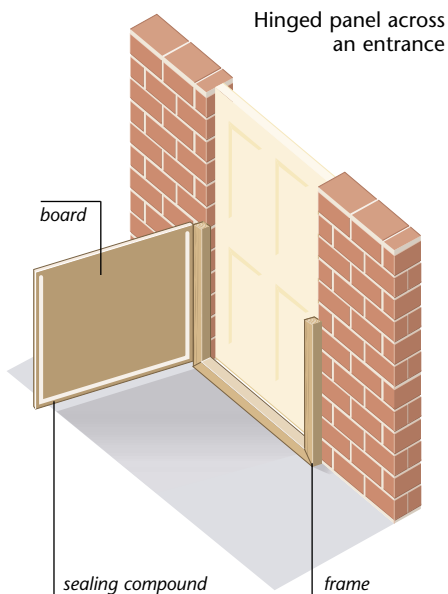
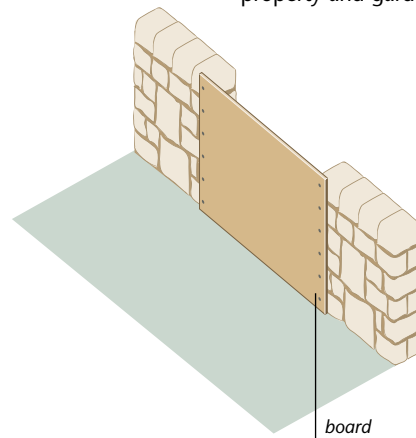
The efficiency of makeshift flood boards will depend on the strength of the walls and the durability of the fixings used to secure the wooden or metal panels.

Purpose-made flood boards for doors, windows and air bricks will be more successful than sandbags for minimising floodwater entering a property. They are available commercially, but can be easily made by someone with DIY knowledge. In either case the product or materials will need to be purchased and installed in advance of a flood.

Most commonly, this type of flood board will comprise a frame and board or panel. Retaining fixtures may need to be a permanent feature of the property, but the frame and gate can be removed and stored when not in use. If a flood is imminent, most can be installed in a matter of minutes.

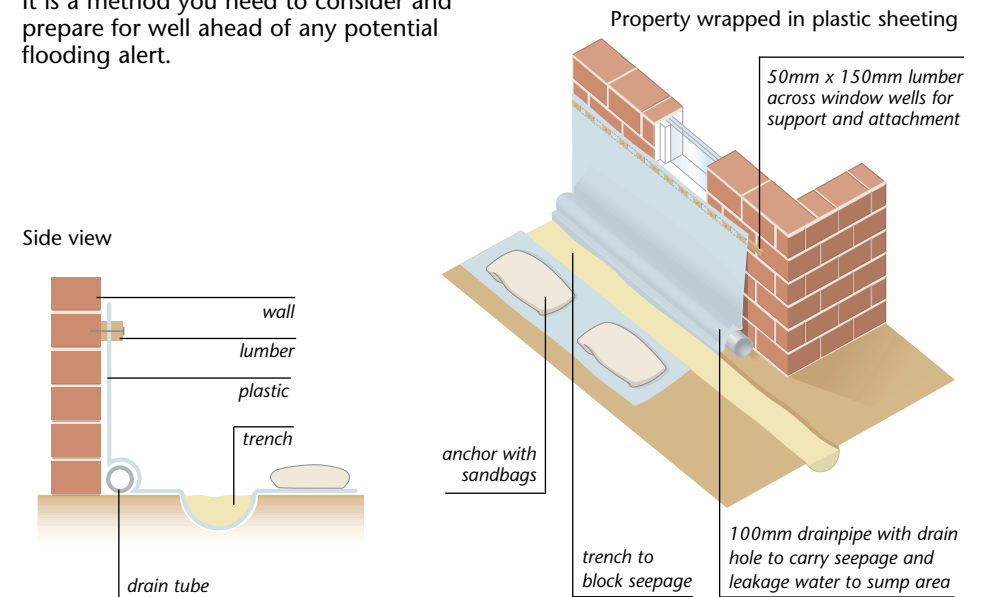


Using boards to prevent floodwater entry to property and gardens



This is an advanced method of reducing the effects of floodwater by enclosing the bottom 600-900mm of a property in plastic sheeting.

The process requires some DIY ability, plenty of suitable materials and enough time to construct the wrapping prior to the property being affected by flooding. It is a method you need to consider and prepare for well ahead of any potential flooding alert.



Hazard!

Do remember that in cases of very severe flooding (where the floodwater is more than one metre deep) keeping water out of your property can do more harm than good. Unless your building is specifically designed to withstand such stresses, the hydrostatic pressures involved with deep water can cause long-term structural damage and undermine the foundations of a property. Therefore you should not aim to prevent water from entering your property through any windows, doors, airbricks etc. more than one metre above the level of the ground surrounding the property.

Also consider the type of soil on which your property is built. If it is porous (eg chalk) and a water table lies immediately below the ground, it is very likely that in times of flooding water will rise up directly into your property through the ground floor. In these circumstances it is better to spend your time removing possessions to a safe place, rather than wrapping your home.

If you are planning extensive home improvements, either as DIY projects or using builders, think about some of the measures or steps you can include that will improve the resistance of your home to flood damage.

In doing so, it may be helpful to find out the worst depth of flooding that your area or property has experienced in the last 100 years. This will give you a guide as to what sort of modifications may be appropriate for your property.

Suggestions for making your home flood resistant:

Walls, windows and floorings

- Consider having extended concrete footings and a waterproof membrane laid in the foundations.
- Walls will be more water resistant if they have closed-cell cavity insulation at ground floor level and raised damp proof course.
- Apply waterproof sealant on exterior walls and use water-resistant paint for internal ground floor decoration.
- Check walls for cracks and seal them.
- Gypsum-based plaster materials have no resilience to flooding. If you are re-plastering your home opt for more resistant, waterproof material.
- Paint skirting boards both sides before fitting to improve the seal.
- Tile and seal the ground floor of your property.
- Solid flooring is much more resistant to flood damage than floor boards

- Choose rugs rather than fitted carpets on the ground floor. They can be rolled and stored, as opposed to fitted carpets that are difficult to move and will be completely ruined by floodwater.
- If you are replacing windows, choose frames made from man-made materials that will not be damaged by floodwater.

Kitchens

- Laminated chipboard or MDF kitchens are nearly always destroyed by floodwater. They cannot be dried out and are impossible to disinfect.
- Although they may be more of an investment, solid wood or plastic kitchens are far more resilient to flooding. Alternatively, opt for free standing kitchen furniture that can be moved or raised on bricks if necessary. Fit easily removable doors.

Drains, sewers and air bricks

- Buy air bricks with removable covers. Often forgotten, floodwater will get into your property through air bricks if they are not sealed. Always remove or open the cover after flooding to assist in drying out the property.
- Floodwater can back up in drains and enter your property through sinks, washing machines and toilets. It may contain sewage. To avoid this, install anti-backflow valves to drains and sewers.

Other measures

- If you are rewiring the ground floor of your house raise all wiring, switches, socket outlets, service panels and meters to a height of at least 900mm above ground floor level.
- Boilers, hot water cylinders, air-conditioning units and any other heating and ventilation main components should be situated on the first floor, or in the loft.

The Environment Agency is responsible for warning the public about flooding from rivers and the sea in England and Wales. We build and maintain flood defences in low-lying areas to reduce the risk to homes and businesses. Other responsibilities include pollution prevention, water resource management and waste regulation.

Our National Flood Warning Centre provides a focus for best practice in flood forecasting, warning and public advice and operates the 24-hour flood information service.

Floodline 0845 988 1188

More copies of this guide and a companion booklet 'After A Flood – How to Restore Your Home' are available from Floodline.

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For 40 years CIRIA - the Construction Industry Research and Information Association - has managed collaborative research and produced information aimed at providing best practice solutions to industry problems.

CIRIA stimulates the exchange of experience across industry and its clients. It has a reputation for practical, high quality information. Through networking and the dissemination of publications and newsletters, CIRIA seeks to improve the performance of all concerned with construction and the environment.

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The ABI (Association of British Insurers) and BRE (Building Research Establishment) also supported research into flood resistant techniques contained in this guide.



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