Property Flood Resilience (PFR) Booklet

Flood barrier / Lakeside Flood Solutions

INTRODUCTION

Property Flood Resilience (PFR) is the term used to describe the ways in which a property can be protected from flood damage. The two main strategies used are 'resistance' and 'resilience'.

Flood Resistance

A flood **'resistance'** approach aims to prevent water entry or reduce the amount of floodwater that enters a property and it requires the purchase and installation of home flood defence products. These products can be permanent or temporary. Permanent products are fitted, left in place, and remain 'always ready' to work 24/7, with no action needed to activate them in the event of a flood. Temporary measures are usually stored away and then put in place when flooding is expected.

Government guidelines suggest 600mm (2ft) as a safe height to resist water entry, but many buildings in flood risk areas are protected to around 900mm (3ft). Beyond this height, it is advised that floodwater should be allowed to overtop barriers and enter a property to prevent structural damage.

A successful resistance strategy ensures that every water entry point on the property is protected. If a single point is missed or a flood defence product fails, the property will begin to take on floodwater which compromises all other protection measures and results in a failed package of works.

Flood Resilience

A flood **'resilience'** approach aims to reduce the damage caused by floodwater when it enters a property, resulting in quick and easy cleaning, drying, recovery and reoccupation of the property. This could potentially eliminate the need for an insurance claim. Resilient measures usually involve changes to the fabric of the building so no action is needed to activate them in the event of a flood. Undertaking a resilience approach directly after your home has flooded presents an opportunity to reinstate the property with water resilient materials and design.

Things to Consider

Understand your Flood Risk

Flooding can occur from rivers, ordinary watercourses, surface water, groundwater, sewers, and reservoirs. Understanding your flood risk and where floodwater may affect your property from is important for identifying the most appropriate strategy for protecting your home.

Professional Advice

Whilst not mandatory, a property flood resilience survey by an experienced professional would be advised if you are unsure about how to proceed in protecting your property. There will be a charge for a thorough survey and report, which help you make informed choices when choosing resilience strategies.

Property Type

If your property is a listed building, or is located within a conservation area, certain products such as PVC flood doors, or exterior works such as re-pointing or rendering may have additional requirements or not be permitted.

Kitemarked Products

The BSI (British Standards Institute) Kitemark for Flood Protection products is **BS 851188**, meaning the products have been independently tested under specific flood conditions. Any flood protection products used by you or a contractor should be Kitemarked where possible.

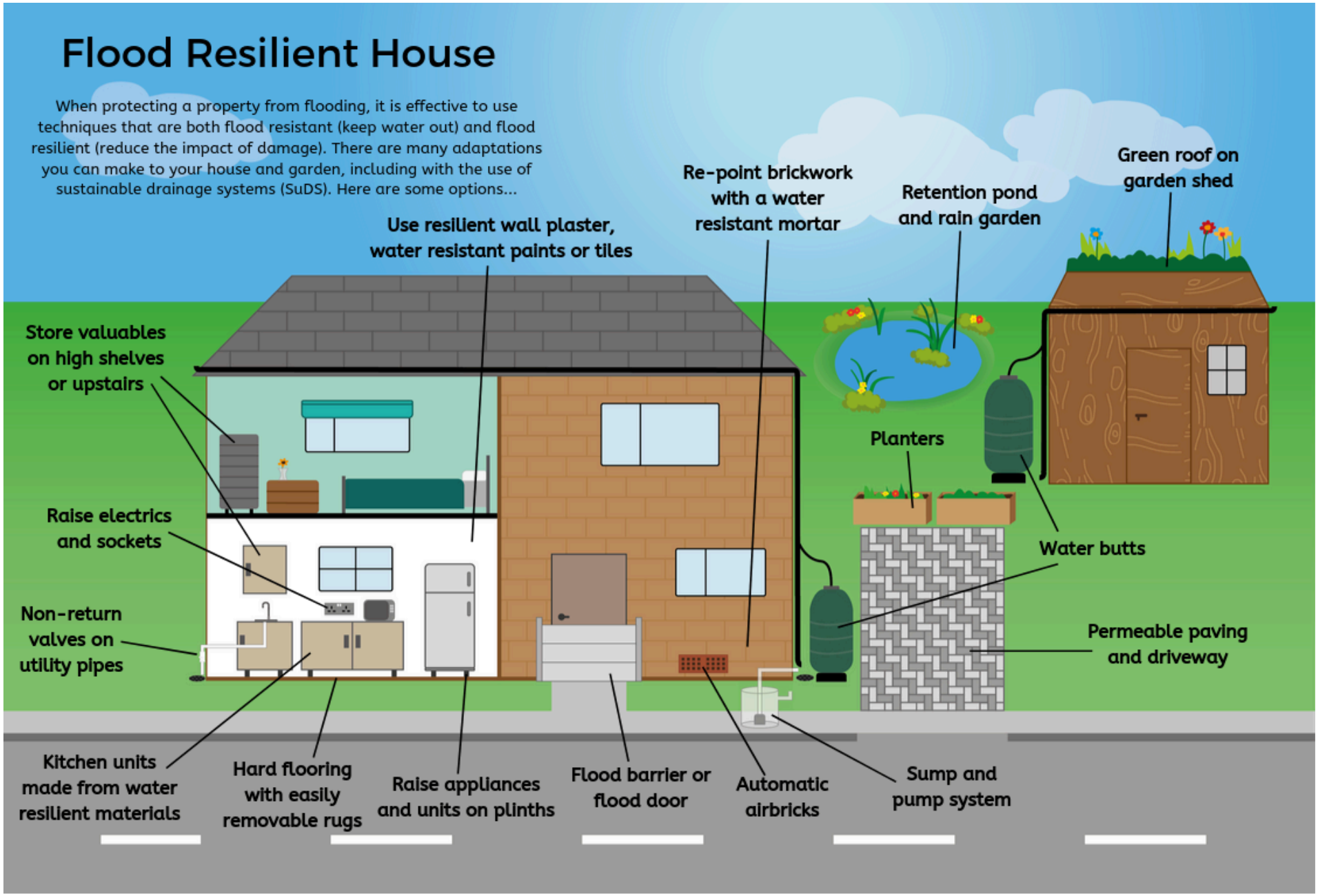
Mark of trust / BSI group

Maintenance

Many PFR products require maintenance and cleaning to ensure they continue to work. You can check with the manufacturers product information as some installers may offer maintenance services. Annual servicing may be required in order to maintain the warranty and guarantee of certain products.

It is recommended that you make a regular maintenance schedule which includes testing products, such as with ‘wet runs’ for pumps.

This graphic highlights some of the PFR measures you can add to your property to increase it's flood resilience and resistance. The following pages give information on many of these measures and more, to help you to decide the right options for your property.



Flood doors & windows

Flood doors are available in a wide range of sizes, designs, colours and finishes, including uPVC, composite, hardwood as well as steel and security doors for commercial premises. Appearance wise, flood doors can look the same as standard, ordinary non-flood doors. When closed and the locking system engaged, a watertight seal is created between the door and its frame.

Flood windows work in much the same way and can be used to replace basement windows or where floodwaters can reach significant depths and the height of ground floor windows fall within the property's safe standard of protection.

Image: The Flood Hub

Considerations:

- Offer round the clock protection.
- Can restrict entry and exit in the event of a flood.
- Good option for elderly or disabled residents or those who may be away from the property for extended periods of time.
- Requires annual servicing and maintenance to maintain the doors warranty and ensure it works as intended during a flood.

Est. Costs: Starting at around £1,800 (Incl. VAT) for a single uPVC Flood Door including installation. French doors, composite, hardwood, and bespoke designs will cost more.

Flood barriers

Flood barriers can be fitted to external doorway entrances and windows, garages, garden gateways and driveway entrances. Most work by having panels slotted into channels which remain permanently installed on the doorway. The channels can be installed on the face of the entrance or within the doorway reveals.

Barriers come in a range of materials including aluminium and uPVC. When not in use, colour-matched channel covers can be used to hide the channels and protect rubber seals.

Some barriers are designed to be installed within the doorway reveal on inwards opening doors and without the need for channels, and they expand to create a seal with the floor and masonry.

Flood barrier / Lakeside Flood Solutions

Considerations:

- Maintenance required of rubber seals which may perish over time and need replacing.
- Barriers boards need to be stored correctly to avoid damage to rubber seals.
- Property owners need to be physically able to carry out installation when a flood is expected.
- Barriers can close off access to and from the property on doors that open outwards.

Est. Costs: £500 - £800 for a single doorway aluminium barrier, wider barriers at an increased cost.

Automatic air bricks

Automatic (self-closing) air bricks are designed to replace traditional air bricks, allowing air flow under normal conditions and self-closing when they come in to contact with floodwater. The cartridges contain floating balls which rise with floodwater to create a watertight seal, preventing water from entering the wall cavity and flooding the property. Two units can be stacked to replace a double air brick. They are available in different colours to match brick work and masonry.

Considerations:

- Offer round the clock protection.
- Require maintenance and cleaning.

Est. Costs: £60 (Incl. VAT) for a single unit, and around £90 including installation.

Image: The Flood Hub

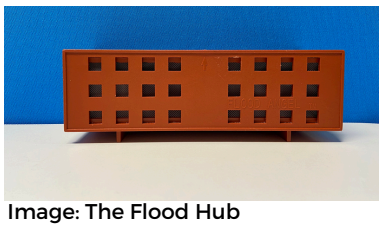


Image: The Flood Hub

Air brick covers

A lower cost option to automatic air bricks are air brick covers which can be placed on top of existing traditional air bricks when flooding is expected. Most work by pre-installing a frame around the air brick which the cover is clipped onto.

Self-adhesive patches can also be applied. Kits are available which include air brick patches and patches that are designed to help seal around pipes or other small apertures in an emergency.

Considerations:

- Affordable solution for air bricks or small holes.
- Relatively easy to install but must be installed correctly.
- Must be installed when flooding is expected and removed once floodwater has receded.
- Adhesive patches designed for single use only.

Est. Costs: £30 for a single cover and £20 for a pack of 2 adhesive patches.

Image: The Flood Hub

One-way weep valves

Weep holes provide an outlet for moisture that condenses within the cavity to drain away, but they also allow floodwater inside. One-way weep hole valves work in a similar way to NRVs and are designed to allow condensation to escape, and close off under flood conditions to prevent floodwater from entering the cavity.

Considerations:

- Cheap and easy to install.
- Prevents build-up of moisture within the cavity.
- Requires maintenance and cleaning.

Est. Costs: £4-10 per valve.

Wall re-pointing, sealants & rendering

Re-pointing

Gaps, cracks or holes in brick or stonework can be repaired with a water-resistant mortar. Similarly, any gaps in the wall-floor join of external walls can allow water into the foundations or sub-floor areas of the property.

Considerations:

- A close inspection of all external wall / floor joins and masonry is required.
- Listed buildings may require sampling/testing of existing mortar to create a match for re-pointing.
- On some older properties, a lime mortar specialist may be required.

Est. Costs: Will vary.

Image: The Flood Hub

External wall sealants

Different types of brick / stonework and mortar has varying degrees of porosity which, when in contact with floodwater, can absorb water into cracks and fissures. The application of suitable waterproofing wall sealant, such as a silicone or siloxane water based sealant, can drastically reduce water ingress and even prevent it altogether.

Considerations:

- Easy to apply with a brush, roller or spray applicator.
- Dry to a natural finish.
- Odourless.
- Allows masonry and mortar joints to breathe whilst resisting water.

Est. Costs: Will vary depending on the size of property.

Wall rendering

Water-resistant wall renders can help to slow down water penetration or prevent ingress altogether. Rendering from ground level upwards may not be enough in some cases, and the excavation of soil and earth to render sections of wall below ground may be needed. Rendering above any damp proof course may lead to damp problems within the home.

Considerations:

- Not suitable for all properties and planning permission may be required.
- Seeking professional advice is recommended.
- Can be very effective.

Est. Costs: Will vary.

Gaps around pipework & cable entry points

Holes can be found within masonry for wastewater outlet pipes, utility pipes and cables, aerial and satellite cables, telephone cables etc. Re-pointing mortar and silicone sealants can be used to close off these entry points to prevent floodwater entry. Adhesive patches can also be purchased to wrap around pipework in an emergency situation.

Considerations:

- Silicone sealants will perish over time and need renewing.
- A thorough inspection around the property is required to ensure all entry points are identified.

Est. Costs: £15 - £40

Images: The Flood Hub

Utility meter housings/covers

Standard meter boxes are not watertight, with gaps in the frame and holes for supply pipes and cables to enter the property. External gas, electric and water meters that come into contact with floodwater will need water entry points sealed.

In most cases, the meters themselves belong to the utility service provider, but the housings in which they are located belong to the property owner. Flood-proof meter box covers are available, or you can contact your service provider to discuss replacing the housing.

Considerations:

- Provides 24/7 round the clock protection.
- A made-to-measure solution may be required.
- Regular inspection and replacement of sealant around the frame and door seals is required.

Est. Costs: £450 +VAT including installation.

Image: The Flood Hub

Vent covers

Vent covers protect air vents and vents for some appliances such as tumble dryers. They comprise of a surrounding frame which remains permanently in place, and the cover is clipped in place when floodwater is expected to create a watertight seal. Specialist advice and guidance must be sought when looking to protect a vent or flue for a gas or fuel burning appliance.

Considerations:

- Appliances must not be used when cover is in place.
- Not suitable for all appliances.
- Maintenance of seals is required.

Est. Costs: £60 – £80

Image: The Flood Hub

Non-return valves (NRVs)

In bungalows or properties with ground floor toilets, foul sewer water can back up (surcharge) from the main sewer system via the soil pipe and emerge out of the toilet, flooding the home internally. Water can also back up through other bathroom and kitchen appliances to cause internal flooding.

Waste pipes can be protected from backflow with non-return valves (NRVs) which can be installed in-line to the pipe itself where access is available. Where access is not available, they can be installed in-line between the toilet and the inspection chamber outside, though this requires excavation works.

Alternatively, one-way ‘push-fit’ flap gates can be installed within the inspection chamber itself to prevent foul water backflow into the bathroom.

Considerations:

- Permanently protect against the backflow of foul water, foul smells and rodents 24/7.
- Large NRVs can require some external excavation for installation.
- Flap gates installed within the chamber can be a quick and more affordable solution.
- With NRVs installed, toilets should not be flushed, and other appliances should not be used during a flood.
- Require periodic maintenance, cleaning, and replacement of rubber seals etc.

Est. Costs: Small wastewater NRVs from £15 plus installation, flap gates from £25, and in-line NRVs from £200 plus installation.

Image: The Flood Hub

Inflatable toilet pan seals / bungs

To protect properties against the backflow of sewage and floodwater through the toilet where non-return valves cannot be easily installed, inflatable toilet pan seals and bungs offer an alternative solution. Both products can be inflated with a standard bicycle tyre type pump.

Pan seals are designed to work with oval shaped bowls and are placed into the bowl and inflated to create a watertight seal beneath the rim of the bowl. Bungs are designed to be pushed down in the U-bend of the toilet and inflated when in place.

Considerations:

- Requires manual installation when flooding is expected.
- Quick and easy solution with minimal installation.
- Pan seals are not designed to work with square toilet bowls.
- Regular testing and inspection for puncture marks is recommended.

Est. Costs: £40 - £50

Image: The Flood Hub

Raised utility meters and electrics

Water, electricity, and gas meters and electrical sockets that sit within the level of floodwater on ground floors are subject to damage when flooding occurs. The meters, wiring and sockets can be raised or moved to a higher location above the anticipated level of floodwater to prevent future damage to electrical services. Electrics can also be wired from the ceiling downwards instead of coming up from under the floor.

Utility meters often remain the property of the service provider, so it is recommended that you contact them first to discuss moving the meter and ensure a competent and qualified tradesperson undertakes the work.

Boiler units and ancillary devices should be installed above the predicted flood level and preferably on the first floor of a building. Electrical equipment such as TVs or PCs should be installed above the flood level by wall mounting or placing on raised cabinets.

Considerations:

- Moving utility meters and re-wiring the whole ground floor can be complex and expensive.

Est. Costs: Dependant on the works needed.

Image: The Flood Hub

Internal doors & skirting boards

Replacing doors with hardwood or other water-resistant alternatives and replacing skirting boards with a uPVC alternative reduces flood damage as these materials will avoid absorbing water or being warped. Following flooding they can easily be cleaned and won't need to be replaced.

Quick release hinges can be fitted to internal doors allowing them to be lifted off their hinges and easily moved to a higher location when flooding occurs.

Considerations:

- Replacing hinges is a cheaper option to replacing the doors themselves.
- Moving doors would need to be done before floodwater enters.

Est. Costs: Quick release hinges £10-20. Hardwood doors £50-100. uPVC skirting boards £10-20 per board.

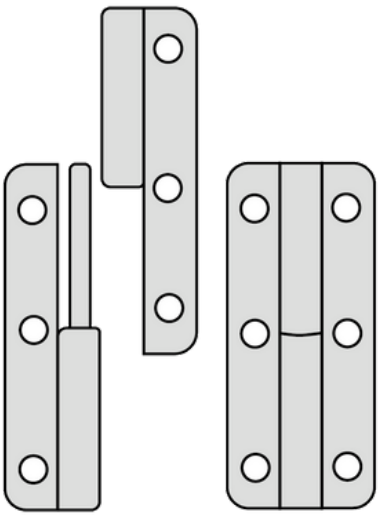


Image: The Flood Hub

Water resilient internal walls & floors

Walls

Waterproof wall boards such as dragon board, aqua board and magnesium oxide board are more resilient to water than traditional gypsum-based plaster boards. If using traditional gypsum plaster boards, installing them horizontally can reduce the amount of remedial work needed after flooding. Materials such as lime plaster or cement render with waterproof additive reduces the likelihood that walls will be damaged by floodwater.

Walls can be painted with water-resistant paints or tiled. Ceramic tiles and water-resistant grout should be laid over sand or cement render, not gypsum-based plaster. Closed cell insulation is more resistant to water than traditional insulation materials.

Considerations:

- Using water-resistant paints an easier option to tiling.
- Extra consideration for the building fabric of older properties.

Est. Costs: Waterproof boards £5-10 per square metre. Water-resistant paints £20-30.

Image: The Flood Hub

Floors

Solid concrete, concrete-based stone, and ceramic tiled flooring are resilient to floodwater and easy to clean. Wood effect tiles are also available. All tiles should be laid on cement-based adhesive using water-resistant grout.

Replacing floorboards and joists with water-resistant, treated timber will reduce water absorption and allow the floor to dry out quicker, reducing rot and distortion. Installing a chemical damp-proof course below suspended timber floor minimises sub-floor condensation, preventing rotten joists and floorboards.

Considerations:

- Easily removable carpets and rugs can be used to keep comfort.
- Replacing flooring can be expensive.

Est. Costs: Dependant on material used and size of flooring.

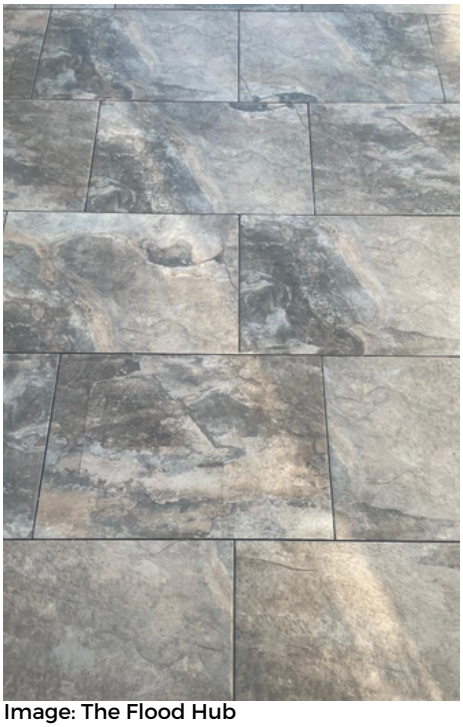


Image: The Flood Hub

Water resilient kitchens

Water resistant materials such as stainless steel, bio composite, hardwood, or waterproof construction board can be sued for kitchen units. These can easily be cleaned down following flooding to avoid replacement.

Appliances such as fridges and washing machines can be raised on plinths and electrics raised above the likely flood level. Baskets can be used to store kitchen utensils so they can be moved or taken upstairs when flooding is expected.

Considerations:

- Helps for a quick recovery following flooding.
- Can look the same as "normal" kitchen units.
- May be expensive to replace all kitchen units.

Est. Costs: Dependant on size of kitchen and materials desired.

Image: The Flood Hub

Basement tanking

For basements experiencing damp and small puddles of water, applying a cementitious wet tanking slurry to the floor and walls can help to seal small gaps and cracks and create a waterproof layer.

Basements prone to significant flooding from groundwater that need to be made completely waterproof can be protected by a cavity drain membrane system. This is complex and involves the installation of a sump chamber with pump system to the floor, drainage channels, and a cavity drain membrane for the walls and floor.

Once in place, wall and floor insulation can be installed, followed by a range of finished wall surface options.

Considerations:

- Professional advice and installation are required.
- Tanking systems can fail if not installed correctly.
- Cavity systems are designed to be completely waterproof, often guaranteed for 20+ years.
- Cavity systems are expensive and can be susceptible to damage from future alterations to the room.

Est. Costs: Expensive and dependant on size of basement.

Sump & pump systems

Sump & pump systems remove water that has accumulated in a collection sump. They are usually installed in basements and sub-floor voids and self-activate when water enters the sump pit. The water is then pumped through a discharge pipe to the outside of the building, with a non-return valve on the discharge pipe to prevent backflow.

Pump systems reduce the amount floodwater within properties and the length of time it remains there, reducing damage and helping to speed up the cleaning and drying process. The size of the system will need to be large enough to cope with the anticipated load and it is recommended that a suitable system is installed by a competent professional. The pump should be hard-wired on its own circuit to prevent loss of power from a circuit tripping out during a flood.

Considerations:

- Specialist advice and professional installation is recommended.
- Servicing and maintenance required.
- Electricity supply can be cut off during a flood so a battery backup unit or a backup generator may be needed for electric pumps.
- Great for dealing with groundwater flooding.

Est. Costs: £1,000 - £3,000

Image: The Flood Hub

Puddle sucker pumps

Submersible / puddle sucker pumps are stand-alone pump units which can be deployed to help remove minor water ingress. Discharge hoses need to be connected and placed through a window, letter box, over a flood barrier etc.

Considerations:

- Good to have as a failsafe or back up in the event of water entry.
- Can be used as part of a package of flood resistance or resilience measures to help remove minor water seepage and leaks.
- Need to be manually installed and operated. Only powered when in contact with floodwater. These units are designed to be run dry.

Est. Costs: £150 - £300

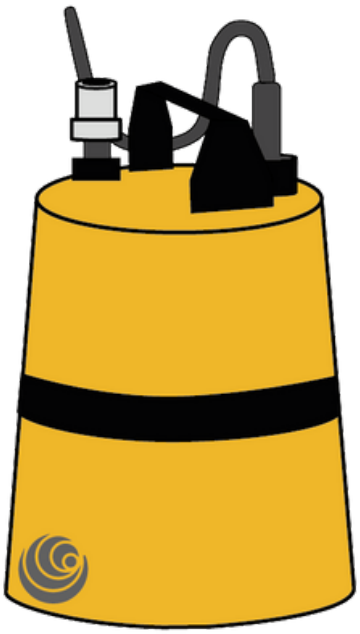


Image: The Flood Hub

Further Considerations

It is worth noting that this list of property flood resilience options provides examples of the types of products that can be used, and there may be different options available for your home or business that are not listed here. As a last resort if flooding happens unexpectedly and you are unprepared, the use of sandbags or alternative sandbags may provide some level of protection.

Flood alarms

For properties close to rivers or watercourses, private flood level alarm systems can provide an audible alarm warning when water levels are raised or flooding is likely to occur, which provides time to install temporary PFR measures.

Sustainable Drainage Systems (SuDS)

These improve the drainage of rainfall and surface water that accumulates around buildings to reduce possible flooding. There are various SuDS options you can install on your property, including water butts and retention ponds. Find a link to our SuDS booklet below.

Relocation of important or valuable items

Some things cannot be replaced as part of an insurance claim, so it is important that important or valuable items such as photo albums, documents, certificates and antiques, are stored on shelving, within water-proof containers, or moved upstairs where possible.

Useful Links

Property Flood Resilience Toolkit

https://thefloodhub.co.uk/property-flood-resilience-toolkit/

An Introduction to Sustainable Drainage Systems (SuDS) booklet

https://thefloodhub.co.uk/wp-content/uploads/2018/09/An-Introduction-Sustainable-Drainage-Systems-SuDS-booklet.pdf

Explore our Knowledge Hub for many more flood related resources:

www.thefloodhub.co.uk/knowledge-hub