

# Flood Mitigation Measures

Flooding can have a devastating impact on homes and communities. Protecting your property and community from being flooded is a very sensible option, but many people do not know how to go about protecting their properties other than with the traditional yet inefficient sandbag.

The following table sets out the various flood protection products and measures currently available and has been adapted from information found on the [“Know Your Flood Risk”](#) campaign website. It aims to clarify the variety of ways in which a community or a property can be protected or made more resilient, and sets out when it is appropriate to use them. Remember that when flood water is too high it is often better to let the floodwater in, and adapt your property to make it flood resilient, which will reduce the devastation the floodwater can have rather than try to hold it back and risk structural damage.

The Flood Mitigation Measures below have been separated into those that are appropriate for use on a community scale, and those appropriate for use on a property scale, including both permanent measures (i.e. those which are fixed in place) and temporary measures (which require action when flooding is likely).

More information on all of the measures below can be found by visiting these websites:

<http://www.bluepages.org.uk/>

<http://www.property-care.org/PCSearch.asp>

<https://www.buywithconfidence.gov.uk/>

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Measure	Indicative Cost (as at 2014 and site dependent)	Pro's and Con's
<b>Community-Level Measures</b>		
<b>Free standing barriers</b>	£10,000> (depending on length required)	Free standing barriers can be used in almost any location to obstruct the flow of water. They need sufficient warning and significant manpower to deploy. Most products need separate storage away from the area of risk. May need measures to deal with seepage past the barrier.
<b>Demountable barriers (groundworks required)</b>	£10,000> (depending on length required)	Demountable barriers fit into pre-constructed fixings, which are unobtrusive in non-flood conditions. Properties are protected to the height of product. Structural strength of buildings is not a limiting factor. Needs sufficient warning. Needs significant manpower to deploy. Most products need separate storage away from the area of risk. Need careful design and construction. May need measures to deal with seepage past the barrier.
<b>Perimeter walls / permanent barrier systems (with gates)</b>	£10,000> (depending on length required)	These are permanent fixed barriers. There are glazed types which minimise visual impact. Properties are protected to the height of product. Structural strength of buildings is not a limiting factor. Need careful design and construction. May need measures to deal with seepage past the barrier.
<b>Telemetry / mass notification &amp; warning systems</b>	£1,500 - £5,000	Warning systems do not reduce flood risk, but are ideal where there is no formal flood warning service, to give communities extra time to prepare for potential flooding. They provide round the clock monitoring. Need careful installation and regular testing/maintenance. May need to obtain permission from landowners/local authorities.

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<b>Ditch clearance</b>	£175 per 100m per visit	Regular ditch clearance reduces limits the flow across land and associated flooding, and can have additional benefits in reducing soil erosion on agricultural land.
<b>Silt clearance</b>	£2.65/100m <sup>2</sup> + £55/m <sup>3</sup> if removed from site	Clearing silt from ditches, watercourses and ponds can prevent blockages and associated flooding and enables the free-flowing movement of water. There are additional costs for disposing of silt properly.
<b>Swales</b>	£15-30/m <sup>2</sup> of swale	Swales are open channels which catch runoff and either store it to let the water infiltrate into the ground or transfer it somewhere safe. This reduces water runoff, restricts flood water, provides biodiversity benefits, and helps to maintain water quality by removing pollutants.
<b>Tree planting</b>	£10-50 per tree	Planting tree belts, hedges and wooded areas can help soak up rainfall and slow down surface water runoff. Alder, Birch and Willow are all water compatible trees that do not mind wet root systems. Never plant Willow near pipe work, foundations or drains as their roots can penetrate.
<b>Permanent Property-Level Measures</b>		
<b>Auto-barriers</b>	£5,000-£10,000	Auto-barriers are usually powered by flood water itself to rise out of the ground. They are unobtrusive. Structure of building is not the limiting factor. High initial cost, including below-ground work. Need careful design and construction. May need measures to deal with seepage past the barrier.

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<b>Water-resisting external doors / windows</b>	£1,500 - £5,000	These are flood resistant doors and windows that look the same as normal ones so are unobtrusive. May be difficult to evacuate if people are trapped inside with rising water. A door may keep water out at depths that are dangerous to the structure of the building.
<b>Sealing around water-resisting external doors / windows</b>	< £100	Permanent elastic seals for use around water-resisting doors and windows. Most products contain fungicide. Unobtrusive and inexpensive, but needs careful application. Not appropriate in conjunction with normal doors/windows, which are not designed to resist high water pressure.
<b>Sealing cracks, service inlets and service entry and exit points</b>	< £100	Cracks and service entry points can be a significant contribution to flood water in properties. Sealing these points is unobtrusive and inexpensive. Needs careful application. Damp problems could result if air-holes are permanently covered.
<b>Waterproof rendering or sealing external walls – also known as tanking</b>	£750 - £1,500	Products are available to seal external walls to make them water resistant. They should be able to seal all cracks even if walls are in relatively poor condition. Below-ground work is likely to be required to reduce seepage under walls. May need planning approval as they can visually alter the building. May lead to damp within the walls.
<b>Re-pointing</b>	£100 - £750	Re-pointing brickwork can reduce penetration rate of flood water. Brickwork needs to be in good condition to be effective. May lead to damp within the walls.
<b>Internal tanking, including cavity drain membrane systems</b>	£10,000 >	Designed to waterproof a property by sealing walls (internally) and floors, and/or basement areas. Needs sumps and pumps for seepage. Primarily designed to protect against groundwater.

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<b>Water resisting air bricks / permanent air brick covers</b>	<£100 (single product) £750-£1,500 (including fitting costs for multiple units)	Unobtrusive measures to avoid flood water entering through air bricks. Needs careful installation and maintenance. May need measures to deal with seepage.
<b>Anti-backflow valves for sewer pipes. Non-return valves for appliance waste-pipes</b>	< £100 - £1,500	Unobtrusive measures to avoid backflow of sewage and waste water through pipes into property. May need to assess the impact on neighbours.
<b>Built-in sump and pump systems</b>	£100 - £5,000	Sump and pump systems help remove flood water where resistance products may leak. Can remove flood water in an emergency as well as continual removal of groundwater seepage in basements. Must be positioned and sized correctly. May require ancillary power supply in case of mains power loss. Will need servicing and maintenance.
<b>Permanent barrier walls with demountable gates / concealed gates / permanent swing gates</b>	£1,500 - £5,000	These are permanent fixed barriers. There are glazed types which minimise visual impact. Properties are protected to the height of product. Structural strength of buildings is not a limiting factor. Need careful design and construction. May need measures to deal with seepage past the barrier. Can be used for individual properties or wider community protection.

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<b>Raised threshold/porch</b>	£1,500 - £5,000	Raise the threshold of the property to increase the depth before internal flooding could occur. Unobtrusive, but disabled access may need to be considered. Suitable for low flood depths only; waterproof door may also be needed. More effective than sealing existing wall. May need planning approval as it can visually alter the building.
<b>Flood alarm systems (domestic)</b>	£100 - £750	Warning systems do not reduce flood risk, but can give homeowners extra time to prepare for potential flooding where there is no formal flood warning service. They provide round the clock monitoring. Need careful installation and regular testing/maintenance. May need to obtain permission from landowners/local authorities. Mass warning systems are also available for community-wide alerts.
<b>Water butts</b>	£20-50 (above ground butt). £1,000-6,000 plus fitting (underground butt)	Water butts are used to collect rainwater from roofs for reuse around the property/garden. This reduces the volume of runoff entering the drainage systems. They can fill up very fast, and some are unsightly. A filter should be fitted to prevent organic debris from entering the butt. Need to make sure that no daylight can get in – locate the butt in a shady spot if possible. The advantages of an underground tank and filter are that the leaves are filtered out properly and the cool of the earth prevents bacterial action.

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<b>Green roofs</b>	£60-£100m <sup>2</sup> (extensive roofs) £100m <sup>2</sup> to £140m <sup>2</sup> (semi-intensive or intensive roofs)	Green roofs have numerous benefits and can contribute positively to issues surrounding climate change, flooding, biodiversity and declining green space in urban areas. They can reduce storm-water runoff, reduce energy use, increasing biodiversity and wildlife, improve air and water quality, reduce sound transfer and provide amenity space. They can be more expensive to install than traditional roofs, require intensive maintenance, irrigation and are limited by climate conditions.
<b>Permeable paving</b>	Gravel £3.75/m <sup>2</sup> , Brick pavers £16/m <sup>2</sup> , Cellular paving £9.50/m <sup>2</sup> , Grass reinforcement £22/m <sup>2</sup> .	Permeable paving is ideal for reducing the amount of runoff from large areas of tarmac and paving such as parking areas. There are a range of materials available, and the finished product can be hard and durable with a very long service life if correctly constructed. However it is likely to be significantly more expensive than other options. Requires a knowledgeable contractor to construct correctly.
<b>Temporary Property-Level Measures</b>		
<b>Barriers for doors / windows / garages</b>	£100 - £750 (single product) £1,500 - £5,000 (whole home package)	Temporary barriers are fitted in place once a flood warning is received. Most products require a fixed frame to be fitted to the opening but they are generally designed to be unobtrusive, and others products are available that do not require any permanent fixings. They can be low weight and easily deployed, but may be physically difficult for some individuals. Items require storage space. These would be necessary in conjunction with barriers for airbricks etc. May need measures to deal with seepage around the barrier. Needs sufficient warning to put products in place.

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<b>Covers / barriers for appliance vents / airbricks / pet-flaps</b>	£100 - £750	There is a wide range of temporary products available to protect other openings such as air vents, airbricks and pet flaps. These would be necessary in conjunction with barriers for doors etc. Needs sufficient warning to put products in place. Items require storage space. May need measures to deal with seepage around the barrier.
<b>Modern versions of sandbags</b>	£100 - £750	Whilst traditional sandbags are not considered efficient for individual properties, a number of modern alternatives are available. These are usually absorbent bags which are lightweight and quick to deploy. Most can hold tens of litres of water. Sufficient bags must be stored ready for use. Some types of used bags will be single-use and need to be disposed of after use. May need measures to deal with seepage around the barrier.
<b>Toilet seals / bungs</b>	< £100	Contaminated flood water can enter a property through the toilet via the sewers. Bungs are available to prevent this. No permanent installation is required, but sufficient warning is needed to install and storage space is required.
<b>Pipe bungs/seals</b>	< £100	Contaminated flood water can enter a property through pipes connected to domestic appliances. Bungs are available to prevent this. No permanent installation is required, but sufficient warning is needed to install and storage space is required.
<b>Free-standing pumps</b>	£100 - £750	Pumps are available to deal with seepage around other products, or flood water that enters the property. The pumps must be sized, positioned and deployed correctly. May require ancillary power supply. Will need servicing and maintenance.

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