

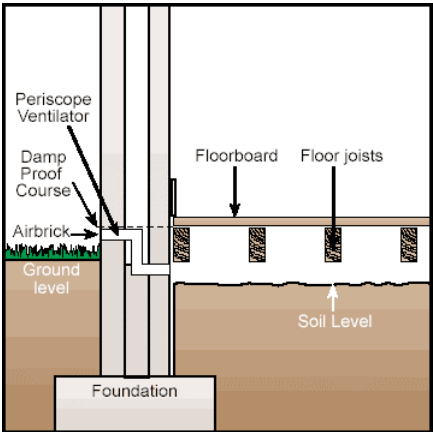
## Improving the flood resistance of your home

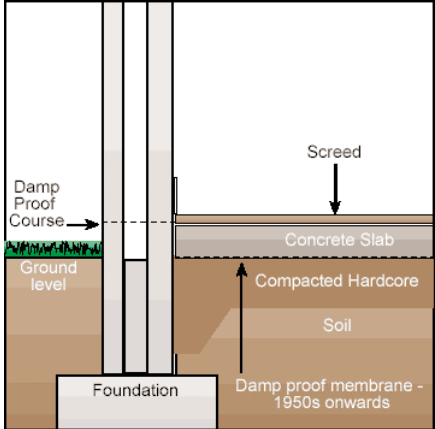
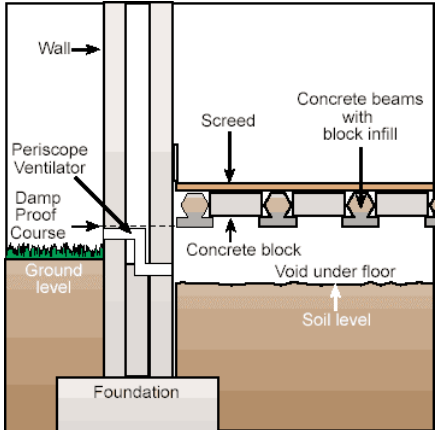
### Advice sheet 6: Flood-resilient floors

This sheet provides guidance on identifying different types of floor, assessing the routes floodwater may enter, and describes methods for reducing the flow of floodwater through them. Advice is also given on removing floodwater from a property through the use of a pump and sump.

#### Types of floors

It is important to know the type of floor in your property and the consequences this has during flooding, before carrying out flood improvement measures. There are three main types of floor: suspended timber floors; solid concrete floors; suspended concrete floors.

Type of floor	Description	Issues
Suspended timber floors	<ul style="list-style-type: none"> <li>• Consist of timber beams or 'joists', placed on edge, and supported at the ends by the walls.</li> <li>• Support may consist of a wooden 'wall plate' attached to the wall, slots in the wall itself or ledges built out from the wall. Supporting walls have gaps to allow air to circulate.</li> <li>• Normally a vent under the floor to the outside to prevent damp building up.</li> <li>• Joists are boarded with tongue-in-groove or plain edged planks (floor boards), or chipboard.</li> <li>• In pre 1960 properties the floor will be higher off the ground and the vent channels will be straight through the wall.</li> </ul> 	<ul style="list-style-type: none"> <li>• Has a cavity that will need to be cleaned and dried after flooding.</li> </ul>

<p>Solid concrete floors</p>	<ul style="list-style-type: none"> <li>• Composed of a concrete slab, typically 100-150mm thick, supported over their whole area by the ground.</li> <li>• The concrete is normally placed over 'hardcore' with a thin layer of sand or concrete 'blinding'.</li> <li>• A damp proof membrane (DPM) of polyethylene sheet or liquid coating of asphalt or bitumen is normally present immediately below or above the slab.</li> <li>• The floor normally then has a layer of smooth sand and cement screed of 40-60mm thickness.</li> </ul> 	<ul style="list-style-type: none"> <li>• Preferable to suspended floors as they tend to reduce the rate and amount of water rising up through the floor. Generally suffer less damage than suspended floors.</li> <li>• Less expensive and faster to restore after flooding.</li> </ul>
<p>Suspended concrete floors</p>	<ul style="list-style-type: none"> <li>• Modern floors (beam and block floors) use precast concrete beams set on sleeper walls at the damp proof course level, infilled with concrete blocks.</li> </ul> 	<ul style="list-style-type: none"> <li>• Has a cavity that will need to be cleaned and dried after flooding.</li> </ul>

### How to find out the type of floor

You should be able to determine the type of floor by checking the outside walls and the top surface of the floor under any carpets or tiles. If you have a suspended timber floor you may be able to see into the cavity beneath by looking between the boards or lifting a board.

The following table details features to look for and the floor type these features indicate.

Feature	Floor type
Cellar or other room or storage beneath the house	Suspended floor
Airbrick is found in the outside face of any external wall, below floor level	
When checking from below in cellar/basement joints are concrete	Concrete suspended floor
When checking from below in cellar/basement joists are timber	Timber suspended floor
Ground floor has floorboards	
No visible airbricks	Solid concrete floor
Floor feels and sounds solid rather than hollow (carefully tap the surface with a heavy object)	

If you are in doubt over the floor type, you can make a small hole with an electric drill\* to determine whether there are any cavities. You may need to make more than one hole if you suspect you have drilled into a joist. These holes may damage any damp proof membrane and should be repaired using a waterproof filler or repair material.

*\*Safety note: beware of hidden electric cables, water or gas pipes and other utilities. If in doubt turn off at source before drilling.*

### What you can do to a floor to improve flood resistance

One of the most effective ways of reducing the impact of flooding is to raise the floor level of the property above expected flood levels. For existing houses, this will not normally be possible.

#### *Solid floors*

Many solid floors do not have an effective connection between the damp-proof membrane for the floor and the damp proof course in the wall. This means water can seep into your home through gaps at the floor/wall joint. If you are replacing an existing floor with a solid concrete floor, special attention should be given to this detail.

If the solid floor is pre 1960 there may not be a damp proof membrane, and replacement of the floor should be considered. Cracks in existing floors may allow water through the floor and replacement should be considered.

#### *Suspended floors*

For suspended floors, a low point or well can be created in the surface of the soil or concrete sub-floor. This will assist cleaning and drainage after a flood. This can be particularly effective when a pump is installed at the low point to remove water (see *Pump and sump* below). Alternatively, the void can be filled completely to reduce the rate of future water ingress and prevent 'puddles' of water remaining inside the property for a long time after flooding.

Suspended floors that are regularly flooded can be replaced with solid concrete floors (see above).

#### *Floor board materials and finishings*

Chipboard flooring is likely to be damaged by floodwater and should be replaced with more resistant materials such as treated floorboards, WBP plywood, screed or tiles.

Avoid fixed finishings that cannot be removed before a flood and might be damaged by exposure to water, such as carpets, parquet and laminate wooden floors. Suitable finishes will depend on your floor type. Alternative finishings include:

Solid concrete floors	Suspended floors
<ul style="list-style-type: none"> <li>• Ceramic tiles with a suitable water resistant grout or tile resin.</li> </ul>	<ul style="list-style-type: none"> <li>• Less expensive synthetic floor covers that can be replaced without too much expense.</li> </ul>
<ul style="list-style-type: none"> <li>• Loose fitting rugs that can be moved out of floodwater's reach.</li> </ul>	<ul style="list-style-type: none"> <li>• Removable floorboarding</li> </ul>
<ul style="list-style-type: none"> <li>• Removable carpets fixed with Velcro or hooks and eyes set into the floors.</li> </ul>	<ul style="list-style-type: none"> <li>• Removable carpets fixed with Velcro or hooks and eyes set into the floors.</li> </ul>

### *Insulation*

Insulation may be found in suspended floors. Water resistant insulation, such as solid boards of expanded polystyrene can be removed, cleaned, sanitised and reused after flooding.

### *Leaking joints*

A number of products are currently available on the market that are specifically designed for the purpose of sealing a leaking joint between walls and floors. Speak to your local builders merchant for advice.

## **Pump and sumps**

Once you have improved the flood resilience of your basement and/or ground floor you may consider the installation of a pump and sump. When the walls and floor leak, the pump will take the water out of the house as fast as it comes in. It works by diverting the floodwater to an area, the sump, where water can collect and be pumped out before it causes any damage. Consideration should be given when pumping from a basement or cellar, as there may be structural risk, particularly in a terrace where neighbours are not also pumping out the water.

### *The pump*

There are two basic sump pumps that can be used:

- Pedestal/upright – this pump has a motor (which is not meant to get wet) on top of the pedestal and the pump at the base, which sits at the bottom of the sump. The pump may be turned on and off automatically when the water reaches a certain level.
- Submersible – these are designed to be submerged in the water and sit on the bottom of the sump, also activated automatically by the water level.

Whichever option you choose, the pump should have a check valve on the water outlet pipe so that water doesn't flow back into the sump when the pump shuts off.

Submersible pumps can be hired for flooding events, which can prove the most cost-effective solution for infrequent use. Hiring a pump will also guarantee that the pump is operational when you need to use it – this may not be the case if you purchase a pump for infrequent use. If using your own pump it is advisable to test that it is in working order at regular intervals and ensure that it is appropriately maintained.

The pump size should be selected on the basis of the area of the drainage connected to the sump, the depth to groundwater and the depth of the basement. However a 1/3 horsepower or 1kW pump is satisfactory for most houses. The use of a solar powered or battery pump should be considered and may be the best option as often mains electricity is isolated during

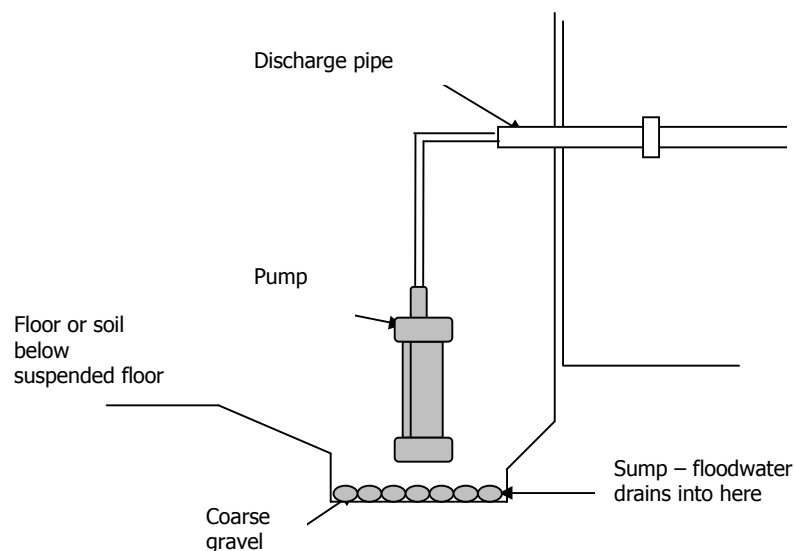
and following flooding and to be effective the pump will require electricity supply to be maintained.

#### *The sump*

Sump holes should be about 2 feet (600mm) in diameter. They should be lined, preferably with plastic but non-corroding metal can also be used, and about 3-4 inches (75-100mm) of coarse gravel should be placed on top of the liner in the bottom of the hole. Alternatively domestic plastic water tanks can provide a cheap and effective lining for the sump. Sumps should be situated in the middle of the room to be drained and when not in use should be suitably covered using a sheet of plywood, or metal or a grating.

#### *The sump and pump drain*

The water can be expelled through any hole that will take it outside (e.g. a window), however thought needs to be given to keeping the building secure when unoccupied. The discharge pipe also needs to be higher than the expected level of the flood. If the ground outside isn't yet flooded, i.e. if you are dealing with rising groundwater in your basement, the water should be discharged at least 20 feet (6m) away from the house in such a way that it does not flow straight back towards the house. If your house is protected by a demountable barrier, ensure that the water is discharged external to this. In all cases care should be taken that the discharge will not have a detrimental effect on a neighbour, nearby houses or the environment.



*Note: the Figures in this sheet are from 'Preparing for Floods' published by the Office of the Deputy Prime Minister.*