



Improving the flood resistance of your home

Advice sheet 3: How does floodwater enter a house below ground?

Water can move through the ground before it becomes visible at the surface, affecting foundations, flooding cellars and basements and damaging floors and their coverings. It is important to remember that most flood protection products (such as flood boards) will not necessarily protect against floodwater entering through the ground. This sheet provides more information on how floodwater can get into a house through the floors and foundations.

What you need to do

If you have determined that your property is at risk from flooding (see Advice sheet 1) you will need to assess how the floodwater may enter the building. Floodwater may enter from either above ground (Advice sheet 2) or below ground (Advice sheet 3). To improve the flood resistance of your property from floodwater below ground you need to:

- Carry out a visual inspection of your property to identify where water could get in.
- Carry out maintenance and repairs that improve flood resilience (see Advice sheets 6 and 8).

Routes for water ingress below ground

Floodwater may seep through the ground under your home and up through gaps or cracks in floors or other weak spots. The severity of this will depend on:

- The height of floodwater
- The length of time the floodwater is present
- The type of soil or ground around and beneath the house.

Floodwater is more likely to seep through floors in permeable ground than in impermeable ground. Permeable ground allows floodwater to pass through it and includes chalk, gravel or sand. Impermeable ground will prevent water passing through it and includes clay. However a number of factors, such as permeable soil in drainage trenches, may increase the permeability of clay soils.

Determining your soil type

There are a number of ways to determine your soil type.

Before carrying out a test it is worth checking if the property builder has records of the soil survey, which would have been carried out prior to construction as part of the planning process.

Reference to a geological and soil map of your area may help you to determine your local soil type and its permeability – public libraries often have local large-scale geological maps available for reference. However it should be remembered that geological descriptions can be misleading and local variations are common. If in doubt you should consult a specialist – see further assistance.

If you are unable to discover your soil type from the above routes you can carry out the following test. The type of ground can change with depth so you will need to find out what type of ground is present at the depth of the foundations of your house. You can do this by digging a small hole or trench, at least 3m distant from the nearest wall, to a depth of 0.7m, and examining the materials. You can then see if water drains into the hole from the sides of the excavation. If water enters the excavation from the ground over the next 24 hours, the soil may be permeable. If no water has collected in the excavation you should then fill the hole with water and see how long it takes for this to drain away. If the water level does not fall more than two inches over 24 hours, the ground is impermeable. Remember to cover the excavation for safety and to prevent rainwater flowing into it. When you have finished testing the soil for permeability refill the hole with the excavated material.

Do not rely on impermeable ground as the sole means of defence. Its permeability may be raised by drainage trenches (for example for water or sewerage pipes) and other construction techniques thus allowing water to reach below your home.

Further assistance with determining you soil type:

You local authority may be able to provide you with details of ground conditions in your area see www.lga.gov.uk.

The British Geological Survey and National Soil Resources Institute may also be able to help with determining your soil type see www.bgs.ac.uk or www.silsoe.cranfield.ac.uk/nsri

Specialist surveyors may also be able to advise you on your soil type. The Royal Institution of Chartered Surveyors can advise you on professionals to undertake these surveys. Visit www.rics.org.uk/index.html or contact RICS on 0870 333 1600. Alternatively contact a local surveyor. See Yellow Pages for contact details www.eyp.co.uk

How to inspect your property

Water building up in the ground, and above ground outside the house, can come into basements, cellars, voids under the floor and even through the ground floors. This can be through the materials making up the floor (e.g. bricks, blocks, stone, concrete and mortar) or through cracks, gaps and holes in the floor. The following table provides a checklist for surveying your property for potential underground routes for floodwater into the building. It also directs you to the relevant Advice sheet for further details of how to assess that aspect of the property and how to improve its flood resistance.

Aspect to inspect	Look for	Further information
Solid ground floors	<ul style="list-style-type: none"> Absence of a water-resisting membrane. Poor seal between floor and walls. 	Advice sheet 6
Suspended ground floors	<ul style="list-style-type: none"> A void under the floor for floodwater to seep into. 	Advice sheet 6
Basements and cellars	<ul style="list-style-type: none"> Absence of waterproofing on floors and walls. Cracks and gaps in the walls and 	Advice sheet 4 and 6

	floors. <ul style="list-style-type: none"> • Damage to tanking or treatment of walls and floors. 	
Foundations	<ul style="list-style-type: none"> • Cracks in the foundations. 	Advice sheet 4 and 6
Drainage or sewer system	<ul style="list-style-type: none"> • Potential backflow through nearby blocked or overloaded drainage or sewer system. 	Advice sheet 8