

PROTECTING YOUR HOME FROM SUBSIDENCE DAMAGE

The shortage of rain experienced by much of the country during recent years has caused an increase in the amount of damage to buildings by subsidence. In extreme cases such damage can result in houses being uninhabitable while repairs are being carried out.

This leaflet gives advice on sensible precautions to help avoid the problem and the first steps to take if damage still occurs.

Domestic properties are addressed mainly but the advice can also apply to generally smaller commercial buildings if they have shallow foundations.

The Problem

Subsidence is the downward movement of the ground supporting the building. Damage occurs because the movement is often uneven, causing cracks in walls, floors and ceilings. The main cause of subsidence in the UK is the shrinkage in dry weather of clay soils which expand and contract with changes in their moisture content. The escape of water from leaking or damaged drains below the ground can also cause subsidence.

Subsidence damage to buildings is generally distinctive in appearance, cracks in walls usually having the following features:

- Apparent from both inside and outside the property
- Tapered
- Extending below the damp proof course

This is often accompanied by doors and windows sticking, reflecting the distortion of the building.

Much less common but causing damage of a similar nature are:

- "Heave" which is an upward movement of the ground supporting the building i.e. the opposite of subsidence
- "Landslip" which is the movement of a mass of ground down an incline or slope trying to find a natural level.

All buildings can suffer minor cracking arising from a number of causes other than subsidence, heave or landslip, the most common of which are:

- Consolidation settlement of soil due to the weight of the building. This normally occurs early in the life of a building
- Temperature changes of the building superstructure causing expansion and contraction
- Drying and shrinkage of building materials

Cracks arising from these causes are usually uniform in width and narrow (hairline to 3mm) and can be dealt with during routine maintenance or redecoration.

The Cause

Most of the shrinkable clays in the UK are located in Southern England, the area most affected by the lack of rainfall over recent years. In normal circumstances clay will shrink in the summer and recover by swelling in the wetter winter months. With the advent of the recent series of dry summers and winters, in many cases the ground has been unable to recover.

As a general rule clay with a high shrinkage potential will only have its moisture content vary up to 1m in depth. Modern day foundations should not be affected, as they are normally at least this deep. Where trees and shrubs are present, moisture content will be affected to a much greater depth.

Trees and shrubs need large amounts of water to survive, a mature deciduous tree can remove in excess of 50,000 litres per year. In drought conditions moisture removal up to a depth of 6m can take place and trees will send out extensive root systems looking for water.

Heave is normally caused by the removal of trees or large shrubs. While the tree is growing the surrounding soil is dried out but when the tree is removed the moisture content builds up, causing the ground to swell. The process can take many years but the damage caused by heave is, in most cases, much more severe than that caused by subsidence. Problems can arise if mature trees near houses are cut down or if a site is cleared of vegetation before construction commences.

Other causes of subsidence not so commonly encountered are mining excavations; swallow holes or solution cavities, improperly compacted ground, and leaching of sandy or silty soils often caused by leaking or broken drains.

Landslip is usually caused by the removal or failure of a feature supporting the building (e.g. The building of new houses nearby), and the action of water to lubricate the movement.

The Solution

Whilst southern England is particularly vulnerable, where shrinkable clays predominate and where rainfall is lowest, problems also occur in other parts of the country where clay forms a significant proportion of the soil. Research has shown that the majority of subsidence problems involve trees to some degree. Trees more likely to cause problems than others have fine root structures, longer than other species, such as poplars, willows, elms and oaks.

The results of recent survey showed that the trees most often involved in subsidence incidents were Oak, Willow, Sycamore, Ash, Plane and Poplar.

A few simple actions can be taken to protect your property and prevent long-term problems if you live in a clay soil area:

- Do not plant trees or large shrubs close to the house, garage or outbuildings. Table 1 gives distances from buildings at which it is generally accepted various species can safely be planted. These are also presented in hazard order in Fig (1). Remember that small trees or shrubs can quickly grow to substantial heights.

NB Initially small hedges of Leylandii bushes (*Cupressus-cyparis leylandii*), which singly may not cause a problem, will have a much greater desiccating effect when massed together (and can grow large)

- If trees have been planted within the safe distance from your property after the house was built, it is recommended that they are moved.
- If they are older than the structure but within the safe distance can be managed - that is to say a programme of pollarding or crown thinning carried out to control the amount of foliage produced, which will in turn reduce the amount of water it requires.
- Trees which are older than the structure should not be removed as this could cause uplift of the ground and heave
- Never remove or in anyway alter a tree on which there is a preservation order, without the appropriate consent.
- If in doubt obtain specialist advice from a tree surgeon or similar professional. (Initially the cost involved will normally have to be borne by the policyholder and will only be reimbursed by the insurer if a claim is met)
- The tree may be within a neighbouring garden or in the street. If you are worried about the potential subsidence problems that a neighbour's tree could cause, discuss it amicably and try to persuade him or her to take an appropriate action. Only if your neighbour is uncooperative, or the tree is the property of the local authority, write a letter expressing your concern and keep a copy for future reference.

Putting Matters Right

Minor cracking can occur in any building for reasons not related to subsidence. This can be dealt with during routine maintenance and decoration.

If your home is in a shrinkable clay area, minor cracks with widths up to 5mm can occur during unusually dry spells and can then be treated by redecoration when they have closed again after the normally wetter winter months.

If the cracks do not close, or continue to open beyond widths of 5mm, there is a long-term problem and you should immediately consult your insurance company.

Fig 1. Relative Subsidence Hazard of Full-grown Tree, i.e. Safe distance (metres) from tree to building.

Safe Distance		
(metres)		
40-	Willow	(40)
35-	Poplar	(35)
30-	Oak, Elm	(30)
25-	Horse Chestnut	(23)
	Plane	(22)
	Ash	(21)
	Cypress, Lime, Maple	(20)
	Sycamore	(17)
	Beech	(15)
	Walnut	(14)
	Hawthorn	(12)
	Cherry, Plum, Rowan	(11)
10	Apple, Pear, Birch	(10)
	Laburnum	(9)
	Pine	(8)
	Spruce	(7)
	Holly, Laurel Magnolia,	(5)
	Yew	

Table 1. Typical safe distance to tree, outside which the tree is unlikely to affect subsidence of the building

Species	Normal Mature Height (m)	Safe Distance (m)
Apple/Pear	12	10
Ash	23	21
Beech	20	15
Birch	14	10
Cypress	25	20
Cherry	17	11
Damson	12	11
Elm	25	30
Hawthorn	10	12
Holly	14	6
Horse Chestnut	20	23
Laburnum	12	9
Laurel	8	6
Lime	24	20
Magnolia	9	5
Maple	21	20
Oak	24	30
Pine	29	8
Plane	30	22
Plum	12	11
Poplar	28	35
Sycamore	24	17
Spruce	18	7
Walnut	18	14
White Beam/Rowan	12	11
Willow	24	40
Yew	12	5

This list is not exhaustive and should be regarded as a GUIDE only

The insurance company will advise you on the next steps to be taken. Where appropriate, specialists will be appointed to investigate the cause of the damage and to arrange for repair work to be carried out (the effects of even quite serious subsidence damage can often be rectified by means other than under-pinning).

In the most serious cases, the investigation including monitoring of the movement causing the damage can take a considerable period of time in order that a proper and lasting repair is made to the property. Where monitoring of this nature is required the time taken by the investigation work may well exceed 12 months.

Most household insurance policies require policyholders to pay the first thousand pounds (the normal "excess" figure) of a subsidence claim. The policyholder should prepare to meet this expense.