

**Cunningham Lindsey United Kingdom**

Subsidence Scanning Centre, Woodhead House, Centre 27 Business Park, Woodhead Rd, Birstall, WF17 9TD  
Telephone 01489 567700 Facsimile 01489 565816

Policyholder: Mrs R Posner

Subject Property Address:

4, Keats Close  
London  
NW3 2RP

**INSURANCE CLAIM**

**CONCERNING SUBSIDENCE DAMAGE**

**ENGINEERING APPRAISAL REPORT**

This report is prepared on behalf of Aviva for the purpose of investigating a claim for subsidence. It is not intended to cover any other aspect of structural inadequacy or building defect that may otherwise have been in existence at the time of inspection.

Date: 19 November 2009

Cunningham Lindsey Ref: SOHPC/STM/3336947

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## INTRODUCTION

This report has been prepared by our Chartered Surveyor, Richard Ross FRICS and is being investigated in accordance with our Project Managed Service.

Unless stated otherwise all directions are referred to as looking towards the front door from the outside the property.

## DESCRIPTION OF BUILDING

The subject property is a two storey semi detached house built around 1900 of traditional materials and forming part of a residential estate development in a suburban setting.

The site slopes down moderately from back to front. The 1:50,000 Geological Drift Map indicates that the subsoil in the area is London clay.

The general layout of the site is shown on the attached sketch plan.

There are trees within influencing distance of the property. An 18 m high Ash (T1) grows in the rear garden at a distance of 10 m from the rear right corner and a 12 m high Conifer (T2) grows in the rear garden at a distance of 9 m from the rear. Hydrangea and Pyracantha shrubs, 5 m and 3 m high respectively, grow directly against the rear elevation. The drainage is a combined system which is shown on the attached plan.

## CIRCUMSTANCES OF DISCOVERY OF DAMAGE

The policyholder Mrs R Posner discovered damage suddenly and notified Insurers.

## NATURE AND EXTENT OF DAMAGE

Sketches showing the layout of the site and the damage are attached.

## Description and Mechanism

The principal damage takes the form of tapering diagonal cracks extending through structural openings in the rear and right flank elevations. Internally the damage affects most rooms with cracks in the rear and right hand walls broadly corresponding with those externally and diagonal cracks across ceilings at ground and first floor levels.

The indicated mechanism of movement is downwards to the rear right corner of the house in the direction of Ash T1 as confirmed by the pattern of the cracks.

## Significance

The damage would be placed in Category 2 the BRE Digest 251 classification, ie slight cracks over 1 mm and less than 5 mm width.

## Onset and Progression

We consider that the cracks are recent in origin and likely to be cyclical in nature with cracks opening in summer/autumn and closing in winter/spring but with some progression during periods of prolonged dry weather unless mitigated by the measures specified below.

## SITE INVESTIGATIONS

The ground investigation was carried out by CET Safehouse Ltd on 5 and 26 October 2009 and took the form of a single trial pit extended by hand augered borehole located close to the rear right corner of the building. A cctv survey of the drains in this area was also undertaken. For details of the trial pit and borehole locations, together with test results, please refer to the attached CET Factual Report.

Briefly, the investigation revealed a concrete strip foundation bearing on very stiff silty clay at a depth of 925 mm below finished ground level. The clay continued to a depth of 5 m. Roots up to 4 mm in diameter were recovered from underside of foundation, reducing to 2 mm diameter at 1.5 m and becoming hair and fibrous to a depth of 2 m.

Analysis revealed the clay to be of high plasticity with a corresponding capacity for volumetric change in response to variations in moisture content. High shear strength was recorded in samples down to 2.5 m with corresponding increases in soil suction values and reduction in moisture content over approximately the same range coinciding with the zone of root activity. An increase in moisture content corresponding with reducing shear strength and decreasing soil suction peaked at 3 m before more normal results re-established at lower depth.

The roots were identified as *Fraxinus* (Ash) corresponding to T1 and were found to be live when tested.

The drainage system in the area of the damage to the building was surveyed and damage associated with root ingress and ground movement was revealed. There is no indication of excess moisture in the trial pit or borehole, however.

The site investigation results provide reasonable confirmation that the clay beneath the foundations was drier than normal due to the uptake of moisture by Ash T1. The influence of other vegetation was considered but Conifer T2 and the nearer shrubs are not implicated by the root activity and the *Pyracantha*, whilst located at the affected corner, is relatively small. Although there is no obvious reason for the reversal of moisture content and other indicators around 3 m, the bearing capacity remains adequate.

Further investigations were considered and discounted. A remote borehole for comparative data was not undertaken because of the likely influence of other vegetation.

## MONITORING

Crack width and level monitoring is considered necessary in this case and comparative readings will be made available.

## CAUSE OF DAMAGE

Taking an overview of all the site investigation results referred to above, it is considered that the damage results from clay shrinkage subsidence brought about by the action of roots from the Ash T1 tree located in the rear garden of the risk address

This diagnosis is based on the fact that the foundations of the property in the area of damage have been built at a relatively shallow depth, bearing onto shrinkable clay subsoil. The soil is susceptible to movement as a result of changes in volume of the clay with variations in moisture content and analysis of the site investigation results indicates that the soil has been affected by shrinkage. Ash roots are present in the clay subsoil beneath the foundations. In this case, we are satisfied that the damage has therefore been caused by clay shrinkage subsidence following moisture extraction by the Ash T1.

We have also considered whether there could be any other influencing factors. Other vegetation to the rear is insignificant in relation to the risk address and there is no evidence of its involvement in the root identification. There is no indication that the soil strength has been significantly affected by the increase in moisture content and reversal of other indicators at around 3 m although the reason for this is unclear. We are therefore satisfied that there is no factor, other than the Ash T1 that is causing the damage.

## RECOMMENDATIONS

It is considered that the removal of Ash tree T1 will be sufficient to restore stability to the building. It is understood that this tree may be the subject of a preservation order. We have therefore instructed Oriel Services Ltd to seek the removal of this with expert arboricultural input from OCA UK Ltd as required.

In the meantime, we will arrange for the drains located close by the property to be repaired.

## REPAIRS

We have not yet decided the final form of repairs but have made an outline of the most likely requirements. These will involve structural crack repairs and reinstatement. We have taken this decision based on our experience in dealing with similar claims. In addition, the results of the site investigation and soils analysis have been taken into account.

for CUNNINGHAM LINDSEY

R J Ross FRICS

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