

# **TECHNICAL REPORT ON A SUBSIDENCE CLAIM**

**Crawford Reference: SU1203736**

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NW3 2HR**



Prepared for:

**Aviva  
Household Claims/Subsidence  
Level 3 West  
Perth  
PH2 0NH**

**Claim Reference 12NU602854**

**SUBSIDENCE CLAIM**

DATE 12 September 2012



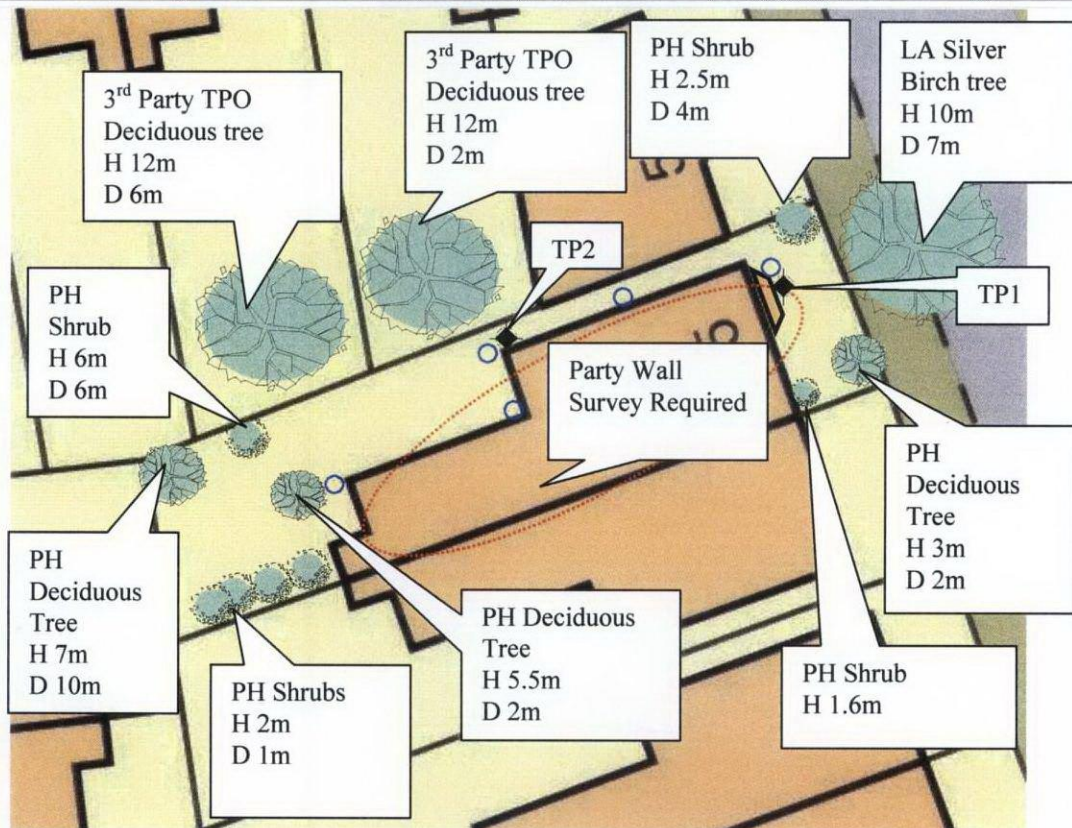
Specialist Property Services – Subsidence Division  
Cartwright House,  
Tottle Road,  
Riverside Business Park, Nottingham, NG2 1RT  
Tel: 0115 943 8260  
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## TECHNICAL REPORT

### Site Plan

**This plan is Not to Scale**

This plan is diagrammatic only and has been prepared to illustrate the general position of the property and its relationship to nearby trees etc. The boundaries are not accurate, and do not infer any rights of ownership or right of way. Position of utilities is only indicative and contractors must satisfy themselves regarding actual location before commencing works.



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#### Key:

	Tree: Deciduous		Tree: Conifer		Shrub
	Hedge		Area of Damage		Bore Hole
	Trial Hole		Trial & Bore Hole		Level Monitoring
	Rain Water Manhole		Rain Water Gully		Rain Water Pipe
	Waste Water Manhole		Waste Water Gully		Toilet Pipe
	Rain Water Drain		Waste Water Drain		Electricity Cable
	Water Supply Pipe		Gas Supply Pipe		Incoming Gas Pipe
	Incoming Water		Incoming Electrics		



## TECHNICAL REPORT

### INTRODUCTION

We have been asked by Aviva to comment on movement that has taken place to the above property. We are required to briefly describe the damage, establish a likely cause and list any remedial measures that may be needed.

Our report should not be used in the same way as a pre-purchase survey. It has been prepared specifically in connection with the present insurance claim and should not be relied on as a statement of structural adequacy. It does not deal with the general condition of the building, decorations, timber rot or infestation etc.

The report is made on behalf of Crawford & Company and by receiving the report and acting on it, the client - or any third party relying on it - accepts that no individual is personally liable in contract, tort or breach of Statutory duty. Where works address repairs **that are not covered** by the insurance policy we recommend that you seek professional advice on the repair methodology and whether the works will involve the Construction (Design & Management) Regulations 2007. Compliance with these Regulations is compulsory; failure to do so may result in prosecution. We have not taken account of the regulations and you must take appropriate advice.

Investigations have been carried out in accordance with the requirements of The Institution of Structural Engineers<sup>1</sup>.

We have not commented on any part of the building that is covered or inaccessible.

### TECHNICAL CIRCUMSTANCES

There has been some evidence of cracking throughout the house for a number of years, however, this was not considered structurally significant. The onset of further more significant cracking over the last year, particularly in the last six months prompted a call to Insurers to investigate.

### PROPERTY

Three storey semi-detached house of traditional construction with brick walls surmounted by a pitched tiled roof.

### HISTORY & TIMESCALE

Date of Construction.....	1891
Purchased .....	1968
Policy Inception Date.....	19/12/2005
Damage First Noticed.....	11/ 2011
Claim Notified to Insurer.....	03/09/2012
Date of our Inspection .....	11/09/2012
Issue of Report.....	18/09/2012
Anticipated Completion of Claim .....	07/07/2014

<sup>1</sup> Institution of Structural Engineers (1994) "Subsidence of Low Rise Buildings"



## TECHNICAL REPORT

### TOPOGRAPHY

The property occupies a reasonably level site with no unusual or adverse topographic features.

### GEOLOGY

Reference to the 1:625,000 scale British Geological Survey Map (solid edition) OS Tile number TQNW suggests the underlying geology to be London Clay.

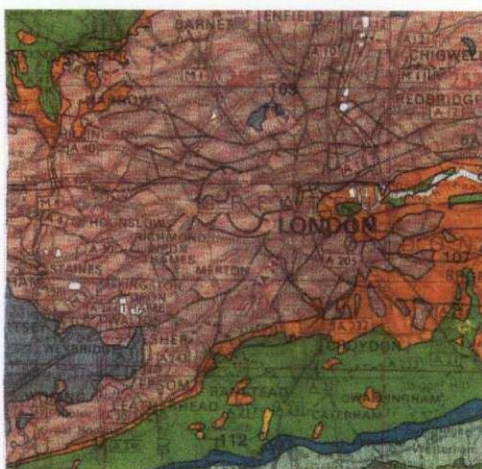
London Clays are marine deposits characterised by their silty, sandy composition. They are typically stiff, dark or bluish grey, weathered dark to mid-brown superficially with fine particle size (less than 0.002mm). Tomlinson<sup>2</sup> describes it as a 'fat' clay with high loadbearing characteristics due to pre-consolidation pressures in its geological history.

The upper horizon is often encountered at shallow depth, sometimes just below ground level. They have high shrink/swell potentials<sup>3,4</sup> and can be troublesome in the presence of vegetation.

The superficial deposits are thought to be Clay Soils.

Clay soil superficial deposits are a cohesive soil characterised by their fine particle size and are usually derived from weathering of an underlying "solid geology" clay soil such as London Clay or Oxford Clay.

Like the solid geology sub-soil from which they are derived they shrink when dry, and swell when wet and can be troublesome when there is vegetation<sup>5</sup> nearby and Gypsum and selenite crystals can be encountered (particularly in the south east). Protection using Class II Sulphate Resisting cement is therefore recommended for buried concrete.



Geology. Reproduced with consent of The British Geological Survey at Keyworth.  
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### VEGETATION

There are several trees and shrubs nearby, some with roots that may extend beneath the house foundations. The following are of particular interest:-

Type	Height	Distance	Ownership
Birch	10 m	7 m	Council
Deciduous	12 m	2 m	Neighbour
Deciduous	12 m	6 m	Neighbour
Deciduous	6 m	2 m	Owners
Shrubs	2 m	0 m	Owners
Deciduous	3 m	2 m	Owners

<sup>2</sup> Tomlinson M.J. (1991) "Foundations Design & Construction" Longman Scientific Publishing.

<sup>3</sup> B.S. 5930 (1981) "Site Investigations"

<sup>4</sup> Driscoll L. R. (1983) "Influence of Vegetation on Clays" Geotechnique. Vol 33.

<sup>5</sup> Table 1, Chapter 4.2, Para. 2.3 of N.H.B.C. Standards, 1986.

<sup>6</sup> Driscoll L. R. (1983) "Influence of Vegetation on Clays" Geotechnique. Vol 33.

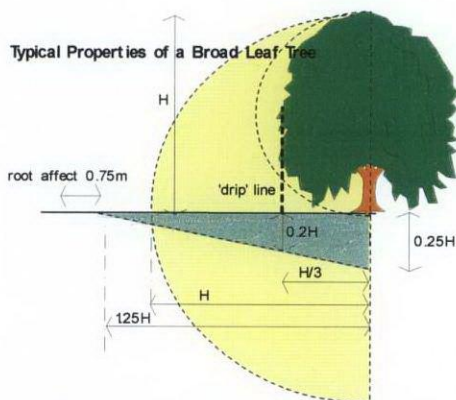


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See sketch. Tree roots can be troublesome in cohesive (clay) soils because they can induce volumetric change. They are rarely troublesome in non-cohesive soils (sands and gravels etc.) other than when they enter drains, in which case blockages can ensue.

Birches, (*Betula* species) are fast growing when young, but short lived, typically declining after 50 - 80 years.

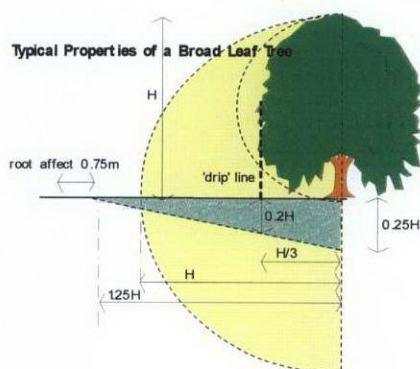
Water demand is low and they are generally a low risk species near buildings. They will tolerate heavy pruning when immature, but not when older and the timber does not resist decay which can lead to structural weakness.



Typical proportions of a birch tree. Note the potential root zone.

They bleed profusely if cut in late winter or spring, but although this is unsightly, it does not normally do lasting harm. They reach heights of between 15 - 25mtrs, growing at a rate of 400mm<sup>6</sup> per year. They have weak root activity generally.

Broadleaf trees typically have wider spreading roots and higher water demands than coniferous species and many are better adapted to growing on heavy clay soils. Some are capable of sprouting from cut stumps or bare wood and most will tolerate pruning better than conifers.



Typical proportions of a broadleaf tree. Note the potential root zone. It must be noted that every tree is different, and the root zone will vary with soil type, health of the tree and climatic conditions.

However heavy pruning of any tree should be avoided if possible, as it stimulates the formation of dense masses of weakly attached new branches which can become dangerous if not re-cut periodically to keep their weight down.

Shrubs. Sometimes even small shrubs can cause localised subsidence damage. In the Kew Garden Survey data was collected between 1979 - 86 to record the number of roots of each species received for identification. Of the 1009 roots identified, 367 (36%) belonged to the family *Rosoideae* or Rose. Next came the family *Oleaceae* (Forsythia, Jasmin, Privet and Lilac) with 354 (35%) enquiries.

*Berberis*, *Viburnum*, *Hedera* (ivy), *Hydrangea* and *Pyracanthus* are also regularly associated with foundation movement, the latter having surprisingly large roots on occasions.

<sup>6</sup> Richardson & Gale (1994) "Tree Recognition" Richardson's Botanical Identifications



## TECHNICAL REPORT

### OBSERVATIONS

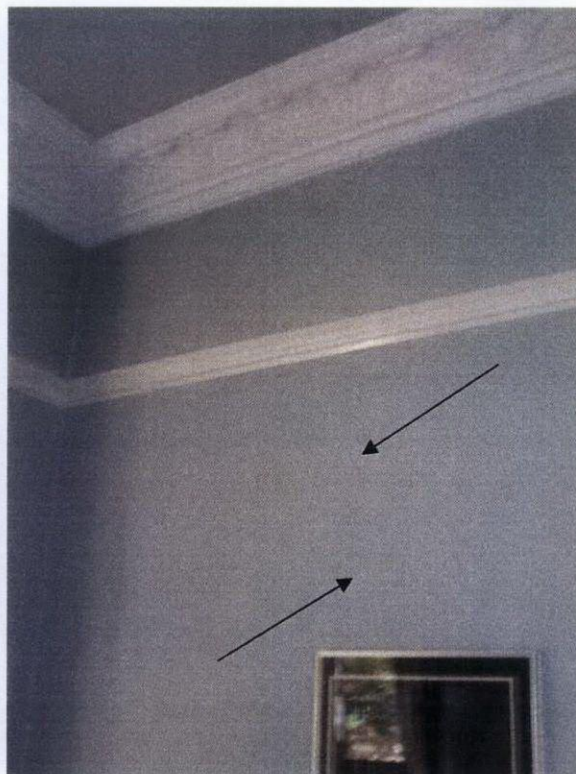
The main area of damage affects the front bay and junction of the main house and rear projection.

The following is an abbreviated description. Photographs accompanying this report illustrate the nature and extent of the problem.

#### INTERNAL



2mm Vertical/Diagonal cracking below bay window at ground floor level.



1mm Diagonal/Vertical crack to the left hand wall (spine wall) at ground floor level.

#### Ground Floor Front Bay Fronted Through Lounge/Diner

2mm Vertical/Diagonal cracking below bay window.

1mm Diagonal/Vertical crack to the left hand wall.

#### Conservatory

Damp ingress and differential movement between the conservatory and rear elevation (conservatory structure and window units are nearing the end of their life cycle)

#### Kitchen

1mm Vertical cracking to the right hand wall and ceiling and to the right hand side of the cabinets to the rear wall.

#### Hall, Stairs and Landing

##### Ground Floor

Raised/Rucked wallpaper at junction of front wall and right hand wall.

1mm vertical crack to left hand party wall.

##### First Floor

2mm vertical crack in left hand party wall, 4mm across ceiling; 2mm parallel cracking around roof light.

##### Second Floor

2mm vertical crack below left hand corner of the window.

#### Rear First Floor Room



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1-2mm Vertical/Diagonal crack to right hand wall.  
1mm Vertical crack below each corner of the window in the rear wall.  
1-2mm separation between left and right hand wall and ceiling.

### First Floor Front Room

1mm Diagonal/Vertical cracking below bay window.

### First Floor Middle Room

Hairline to 1mm Diagonal crack above left hand corner of the fireplace.

### Second Floor Front Room

1-2mm Diagonal cracking below the right hand corner of the right hand window.  
1mm cracking in the coving.

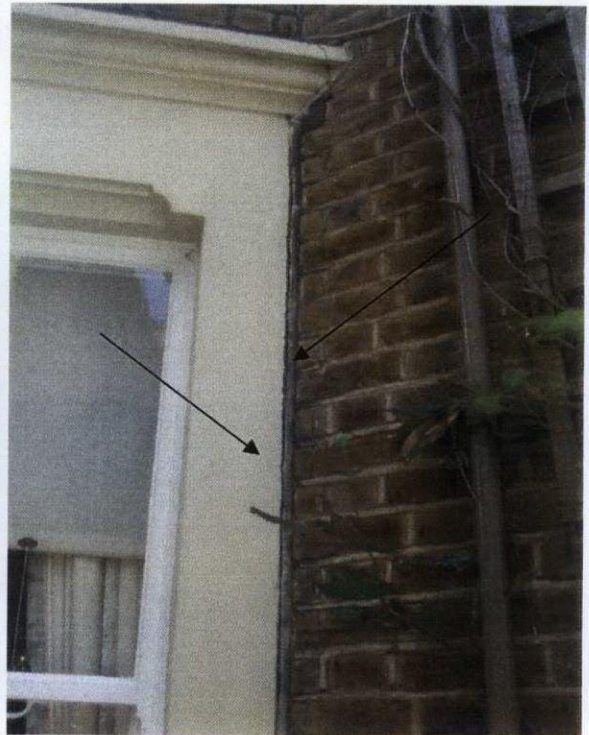
### Roof Conversion

Minor cracking and damp, potentially minor roof spread and dampness commensurate with age of roof and renovation works.

## EXTERNAL



3mm Stepped cracking in brickwork above the door.



2mm separation at junction of bay and front elevation.

### Front Elevation

2-4mm vertical cracking either side of the bay below the bay window.  
2mm separation at junction of bay and front elevation.

### Rear 1 Storey Storage Shed

3mm Stepped cracking in brickwork above the door.



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### CATEGORY

In structural terms the damage falls into Category 2 of Table 1, Building Research Establishment<sup>7</sup> Digest 251, which describes it as "slight".

Category 0	"negligible"	< 0.1mm
Category 1	"very slight"	0.1 - 1mm
Category 2	"slight"	>1 but < 5mm
Category 3	"moderate"	>5 but < 15mm
Category 4	"severe"	>15 but < 25mm
Category 5	"very severe"	>25 mm

Extract from Table 1, B.R.E. Digest 251  
Classification of damage based on crack widths.

### DISCUSSION

The pattern and nature of the cracks is indicative of an episode of subsidence. The cause of movement appears to be clay shrinkage.

The timing of the event, the presence of shrinkable clay beneath the foundations and the proximity of vegetation where there is damage indicates the shrinkage to be root induced. This is a commonly encountered problem and probably accounts for around 70% of subsidence claims notified to insurers.

Fortunately, the cause of the problem (dehydration) is reversible. Clay soils will re-hydrate in the winter months, causing the clays to swell and the cracks to close. Provided the cause of movement is dealt with (in this case, vegetation) there should not be a recurrence of movement.

### RECOMMENDATIONS

Although the cause of the movement needs to be dealt with, we note that one of the trees is a Local Authority tree; others have Tree Preservation Orders. Unfortunately, they will require certain investigations to be carried out to demonstrate the influence of their vegetation.

Typically, these investigations would involve trial pits to determine the depth and type of footings, boreholes to determine the nature of the subsoil/influence of any roots and monitoring to establish the rate and pattern of movement.

The monitoring data would usually need to show a pattern of movement consistent with the influence of the vegetation and therefore it may be necessary to carry out the monitoring for up to a 12 month period.

An Arborist's report will also be necessary as will a survey of the drains in the area of damage. The odour noted is consistent with damage to the services.

Yours Faithfully,

***Michele Onofrio***

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12 September 2012

<sup>7</sup> Building Research Establishment, Garston, Watford. Tel: 01923.674040