TECHNICAL REPORT ON A SUBSIDENCE CLAIM

Crawford Reference: SU1500403

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London
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prepared for

Aviva - Commercial
Commercial Claims Dept., Northfield House, 110-114 Baxter Avenue, Southend On Sea, SS2 6FF

Claim Reference 8276595

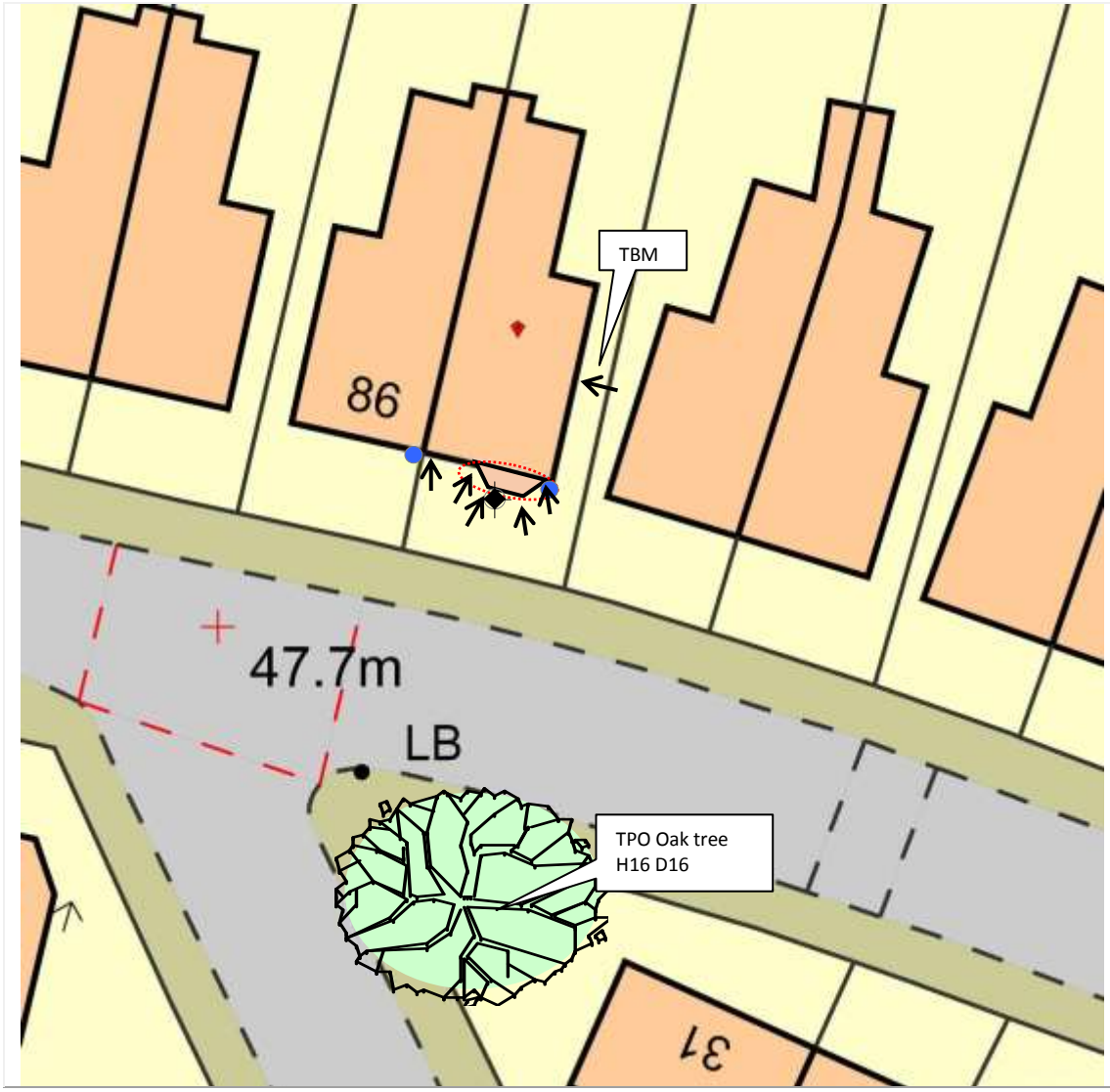
SUBSIDENCE CLAIM

DATE 30 April 2015

Specialist Property Services – Subsidence Division
Second Floor
Sunningdale
The Belfry Business Park
Colonial Way
Watford
WD24 4WH

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 or confer 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.



Key:

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

- - - -	Water Supply Pipe	- - - -	Gas Supply Pipe		Incoming Gas Pipe
	Incoming Water		Incoming Electrics		

INTRODUCTION

We have been asked by Aviva - Commercial 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[1].

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

TECHNICAL CIRCUMSTANCES

The first floor flat is tenanted and on recent inspection the insured became aware of cracking to the bay in the same location as the previous subsidence damage and subsequently notified insurers.

PROPERTY

The property comprises a four storey end-terrace house of traditional construction with brick walls surmounted by a pitched tiled roof.

HISTORY & TIMESCALE

Site investigations are being organised and level monitoring established.

Date of Construction ..... Circa 1900
Purchased ..... To be confirmed
Policy Inception Date 01/02/2009
Damage First Noticed ..... November 2014
Claim Notified to Insurer..... ..... 02/02/2015
Date of our Inspection..... 23/04/2015
Issue of Report 29/04/2015
Anticipated Completion of Claim ..... Autumn 2016

[1] Institution of Structural Engineers (1994) *"Subsidence of Low Rise Buildings"*

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[2] describes it as a 'fat' clay with high loadbearing characteristics due to pre-consolidation pressures in its geological history.

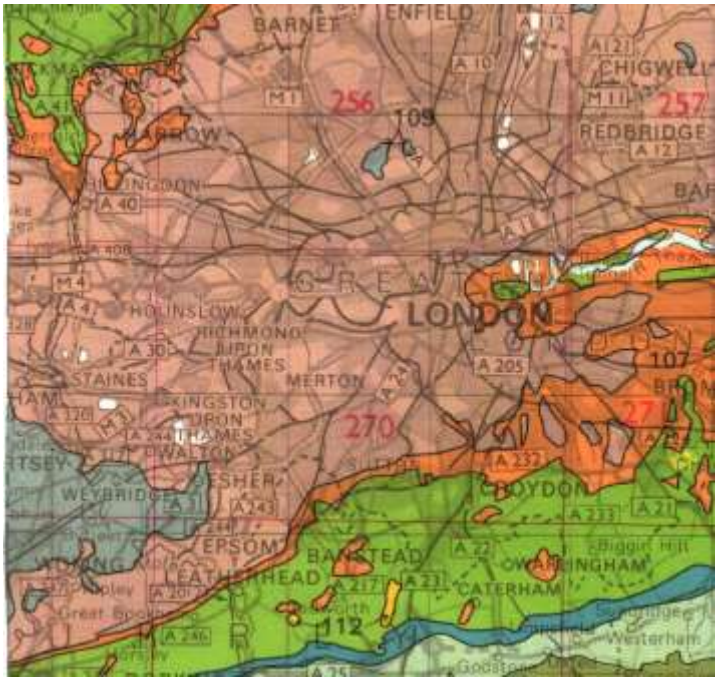
The upper horizon is often encountered at shallow depth, sometimes just below ground level. They have high shrink/swell potentials[3],[4] and can be troublesome in the presence of vegetation.

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[5] 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.

[2] Tomlinson M.J. (1991) *"Foundations Design & Construction"* Longman Scientific Publishing.
[2] B.S. 5930 (1981) *"Site Investigations"*
[3] DriscollL R. (1983) *"Influence of Vegetation on Clays"* Geotechnique. Vol 33.
[4] Table 1, Chapter 4.2, Para. 2.3 of N.H.B.C. Standards, 1986.
[5] DriscollL R. (1983) *"Influence of Vegetation on Clays"* Geotechnique. Vol 33.



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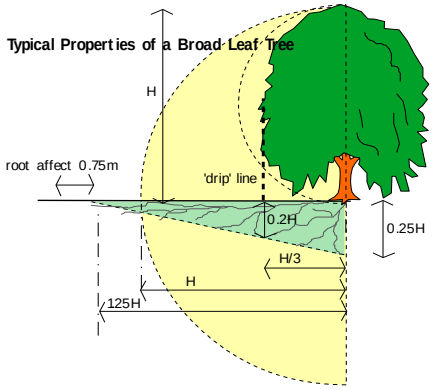
VEGETATION

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
Oak	16 m	16 m	Neighbour 1

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.
Oak trees (Quercus) are deciduous and native to Europe. They can reach heights in excess of 35m, but more typically grow to between 18 - 25m, depending on health, environment and soil conditions. They have a medium growth rate of around 250mm per year and strong root activity[6].



Typical proportions of an Oak showing the potential root zone. They have by far the most aggressive of root systems,

[6] Richardson & Gale (1994) "*Tree Recognition*" Richardson's Botanical Identifications

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often spreading considerable distances (1.5 x height or more).

Maximum tree-to-damage distance recorded in the Kew survey was 30mtrs, with 50% of all cases occurring within 9.5mtrs[7]. Life expectancy > 100 years, although they are vulnerable to insect and fungal attack. Old and young trees are tolerant of quite heavy pruning and crown reduction, although re-growth can be an ongoing problem.

Oaks are, in my experience, worthy of considerable respect when dealing with subsidence claims. Their root system extends for surprising distances and can be associated with particularly high soil suctions.

Because of difficulties in controlling the oak, and its vigorous root system, I regard it as being far more significant (in terms of a subsidence league table) than either the willow or poplar tree.

[7] Cutler & Richardson (1991) *"Tree Roots & Buildings"* Longman Scientific

OBSERVATIONS

The front bay is the focal point of the Insured's concerns / movement.

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

INTERNAL

Diagonal cracking to first floor bay.

Diagonal cracking to ground floor bay.

First Floor Flat 2 Front Lounge

3mm diagonal Cracking under window to left hand side of bay.
2mm vertical/diagonal cracking under window to right hand side of bay.

Ground Floor Flat Front Study

2mm diagonal cracking under window to left hand side of bay.
2mm diagonal cracking under window to right hand side of bay.

EXTERNAL

Separation to abutment of bay.

Diagonal stepped cracking to ground floor bay.

Front Bay

2mm diagonal stepped cracking under window to left side of bay.
2mm separation to abutment of left side of bay with main house.

CATEGORY

In structural terms the damage falls into Category 2 of Table 1, Building Research Establishment[8] 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.

[8] Building Research Establishment, Garston, Watford. Tel: 01923.674040

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 the vegetation is subject to a Preservation Order. Unfortunately, current legislation requires certain investigations to be carried out to support an application for the tree works.

Typically, these investigations would involve trial pit(s) 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 provided must be sufficient 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.

It will also be necessary to obtain a specialist Arboricultural Report.

We will report further once these investigations have been completed.

Gordon McEwan BSc (Hons) Building Surveying Cert CILA
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30 April 2015

PHOTOGRAPHS

Vegetation to front

Diagonal cracking below bay window to ground floor flat.

Diaognal cracking below bay window to first floor flat.