

TECHNICAL REPORT

Crawford Reference: SU1200023

**Mr K Firth
Stonecroft
Hall Royd Lane
Barnsley
S75 4PP**



Prepared for

**Chubb Insurance Company of Europe SA
106 Fenchurch Street, London,, EC3M 5NB**

Claim Reference 32647655/3

SUBSIDENCE CLAIM

DATE 18 January 2012



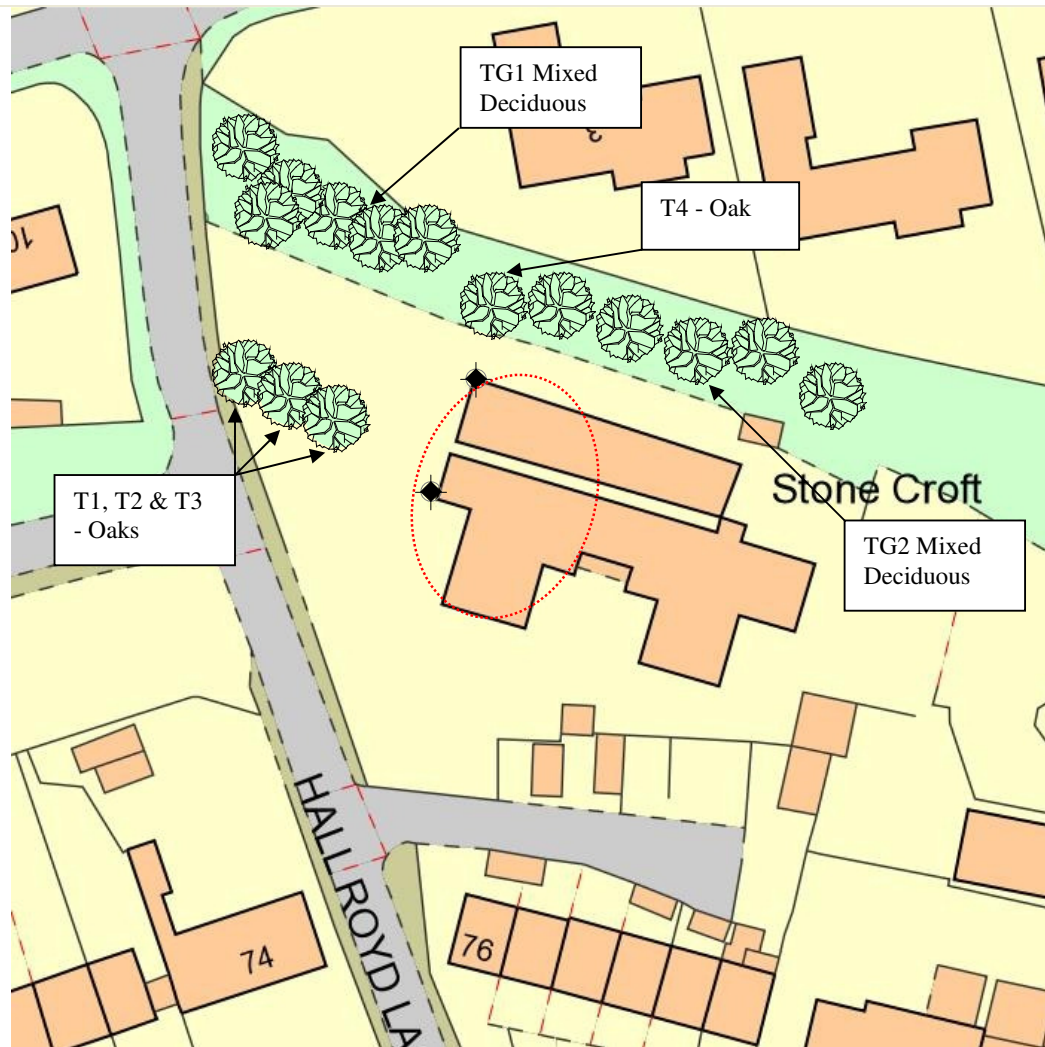
Crawford Home - Subsidence
Cartwright House,
Tottle Road,
Riverside Business Park, Nottingham, NG2 1RU
Tel: 0115 943 8260
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Site Plan

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.



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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		

INTRODUCTION

We have been asked by Chubb Insurance Company of Europe SA 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 Engineers¹.

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

TECHNICAL CIRCUMSTANCES

The Insured first noticed the damage approximately two years ago, but cracking has significantly worsened over the summer months of 2011 prompting the insured to make a claim. Insurers were subsequently notified.

PROPERTY

Single storey detached bungalow of traditional construction with stone walls surmounted by a pitched tiled roof.

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

HISTORY & TIMESCALE

We are arranging site investigations and have instructed level monitoring. We will also be obtaining a mining report.

Date of Construction	Circa 1977
Purchased	1984
Policy Inception Date	28/07/1999
Damage First Noticed	30 July 2012
Claim Notified to Insurer	03/01/2012
Date of our Inspection	11/01/2012
Issue of Report	18/01/2012
Anticipated Completion of Claim	Autumn 2013

SITE DETAILS

TOPOGRAPHY

The property occupies a site sloping from and sloping from the left down to the right

GEOLOGY

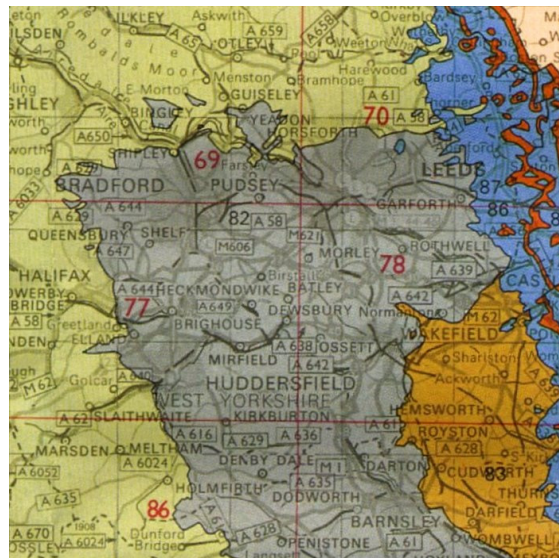
Reference to the 1:625,000 scale British Geological Survey Map (solid edition) OS Tile number SESW suggests the underlying geology to be Westphalian. Coal measures comprise deposits of decaying vegetation laid down with mud, silt and sandstones in anaerobic conditions, in sequence coinciding with subsidence of the basin in which they were deposited^{2, 3}.

Despite their name, coal deposits are most like infrequent, being interspersed with sandstones. Referred to as the Westphalian measures because they can be traced right across Europe, into Westphalia.

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 vegetation⁴ 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.



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C03/129-CSL CSL British Geological Survey. ©NERC. All rights reserved.

² Gallois R.W. "The Wealden District" British Geological Survey, Keyworth.

³ Whitehead T.H.. "Geology of the Country between Dudley & Bridgnorth" British Geological Survey, Keyworth.

⁴ Driscoll R. (1983) "Influence of Vegetation on Clays" Geotechnique. Vol 33.

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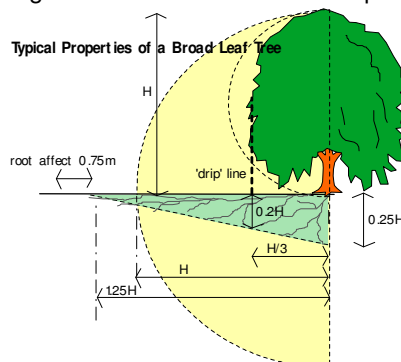
VEGETATION

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
T1 - Oak	18 m	12 m	Owners
T2 - Oak	18 m	13 m	Owners
T3 - Oak	16 m	15 m	Owners
T4 - Oak	12 m	5 m	Owners
TG1 - Mixed Deciduous	12-16 m	8-16 m	Owners
TG2 - Mixed Deciduous	12-16 m	5-10 m	Owners

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 activity⁵.



Typical proportions of an Oak showing the potential root zone. They have by far the most aggressive of root systems, 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 9.5mtrs⁶. 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.

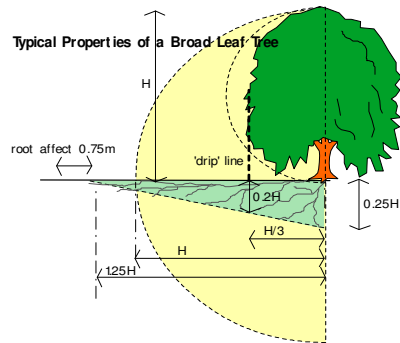
Because of difficulties in controlling the oak, and its vigorous root system, I regard it as being far more significant (in terms of a subsidence league table) than either the willow or poplar tree.

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.

⁵ Richardson & Gale (1994) "Tree Recognition" Richardson's Botanical Identifications

⁶ Cutler & Richardson (1991) "Tree Roots & Buildings" Longman Scientific

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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.

OBSERVATIONS

The main house 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



Cracking and de-bonded plaster to left-hand side of window in front left-hand bedroom.



Cracking to bottom right-hand corner of window in front right-hand bedroom.

Front Right Bedroom

- Cracking of up to 5mm is evident to the left-hand wall behind the wardrobe.
- There is cracking of approximately 4mm wide to the bottom right-hand corner of the window.
- Vertical tapered cracking of up to 2mm wide is evident to the left-hand wall.

Front Left Bedroom

- There is de-bonded plaster and cracking of up to 7mm wide to the top left-hand corner of the window.
- Cracking of approximately 2mm is evident underneath the window.
- There is cracking of up to 2mm wide above the door leading into the en-suite bathroom.

Lounge

- There is minor cracking of less than 1mm wide underneath the window to the right-hand side of the fireplace.

Hallway

- There is cracking of up to 2mm wide to the right-hand side of the front window to the link section of the hallway adjacent the study area.

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Games Room / Bar Area

- Cracking of approximately 1mm wide is noticeable underneath the left-hand window to the left-hand wall.

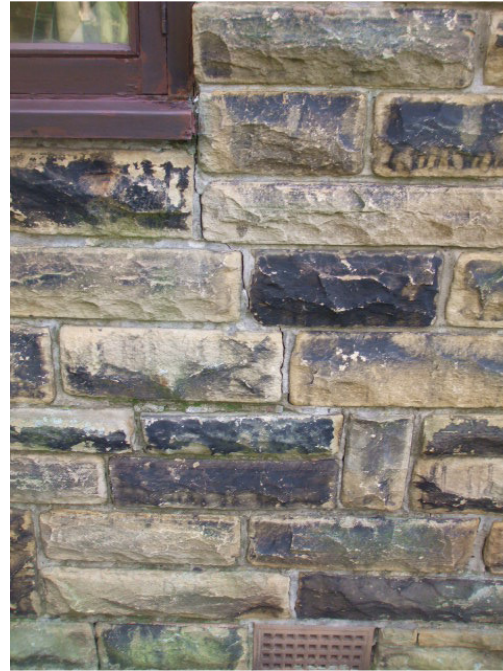
Cloak Room Off Games Room

- There is cracking of up to 1mm wide through the tile grouting under the bottom right-hand corner of the window.

EXTERNAL



Stepped cracking to right-hand wall of front right-hand projection, where the front right bedroom is located.



Stepped cracking to front elevation.

Front Right Projection

- Stepped cracking of up to 5mm wide is evident at high level on the right-hand elevation.
- Stepped cracking of up to 2mm is evident underneath the front right-hand bedroom window.

Front Left Projection

- Stepped tapered cracking of approximately 3mm in width is evident at high level to the left-hand elevation.

Left Elevation

- There are several cracks of up to 1mm wide underneath the windows along this elevation.

Right Elevation

- Cracking of approximately 1mm wide is evident underneath the lounge window.

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CATEGORY

In structural terms the damage falls into Category 3 of Table 1, Building Research Establishment⁷ Digest 251, which describes it as “moderate”.

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.

We understand that old mine workings are present in the front garden, but the pattern of movement and timing of the damage would suggest a clay shrinkage problem is more likely. We are unable to dismiss the old mine workings as a possible cause of movement until we have undertaken further investigations and a period of monitoring.

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.

⁷ Building Research Establishment, Garston, Watford. Tel: 01923.674040

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In relation to the mine workings we feel it would be prudent to obtain a mining report.

We will report further once these investigations have been completed.

18 January 2012

Craig Martin

Craig Martin BSc (Hons) MCIOB MBE

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PHOTOGRAPHS



Cracking to left-hand wall in front right-hand bedroom.



Cracking in hallway link / study area.



Large Oak trees in the front garden.



Mixed deciduous trees to left-hand side of property.



Stepped cracking to front elevation.



Mixed deciduous trees in front garden.