TECHNICAL REPORT ON A SUBSIDENCE CLAIM

Crawford Reference: SU1807857

Mrs M Orlowski
42 Stonegate
Cowbit
Spalding
Lincolnshire
PE12 6AH



Prepared for:

Ageas Insurance Ltd
Ageas House
The Square
Gloucester Business Park
Brockworth
Gloucester
GL3 4AD

Claim Reference 6358551V

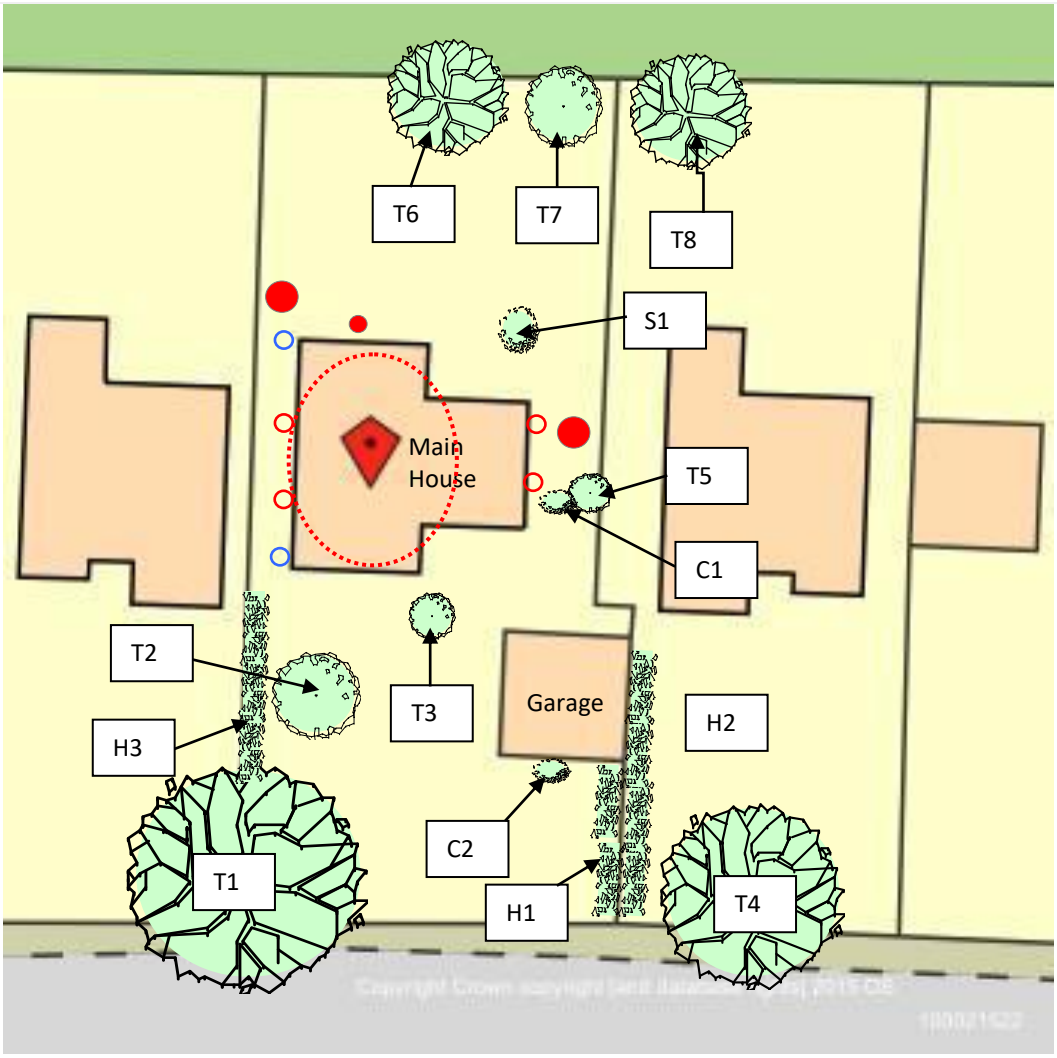
SUBSIDENCE CLAIM

05th February 2019

Crawford®
Subsidence Division
Cartwright House,
Tottle Road,
Riverside Business Park, Nottingham, NG2 1RT
Tel: 0115 943 8203
Fax: 0121 200 0309

Site Plan	This plan is Not to Scale

This is an Aerial Photograph of the property and the immediate surrounding area. The positions of utilities etc are 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 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 Ageas Insurance Ltd 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 2015. 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.

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

TECHNICAL CIRCUMSTANCES

The damage was first noticed in 2015 but the insureds husband was very poorly at the time, so no action was taken. The damage at time was reported as minor and the insured filled in the cracks to the walls.

The damage recently worsened and in September 2018 the insured sought advice from a surveyor who initially inspected the property and undertook initial crack monitoring. It is understood that the insured then contacted insurers to instigate a claim for possible subsidence damage.

PROPERTY

Two storey large detached house of traditional construction with brick walls surmounted by a ridged tiled roof with a detached brick built double garage with tiled pitched roof.

HISTORY & TIMESCALE

We await insurer's advice on how they wish us to proceed with the claim.

Date of Construction	1998
Purchased	1998
Policy Inception Date	22/03/2017
Damage First Noticed	2015
Claim Notified to Insurer	09/11/2018
Date of our Inspection	06/12/2018
Issue of Report	05/02/2019
Anticipated Completion of Claim	12/2019

TOPOGRAPHY

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

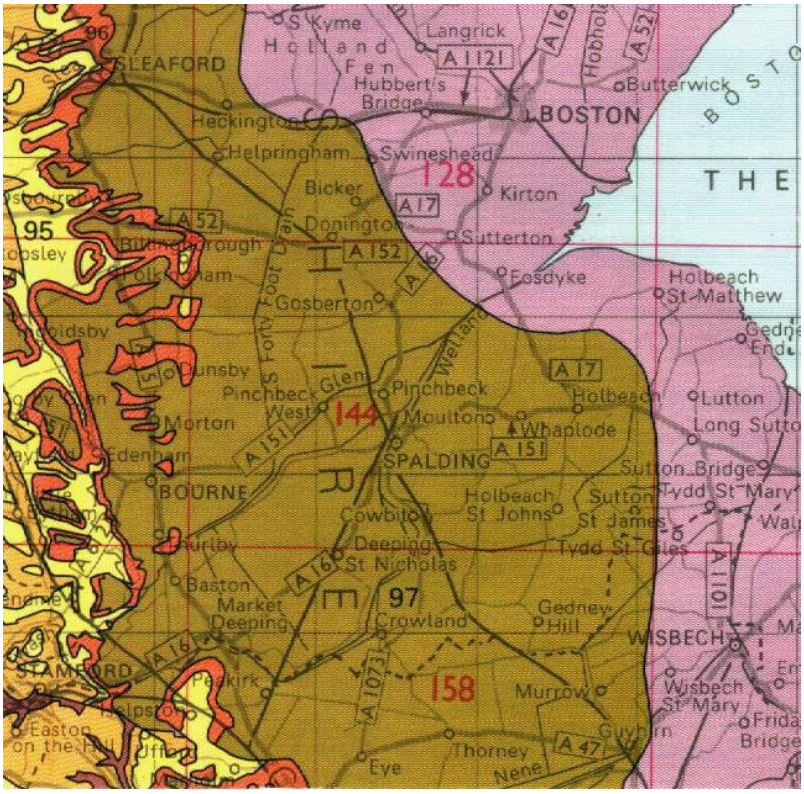
GEOLOGY

Reference to the 1:625,000 scale British Geological Survey Map (solid edition) OS Tile number TFSW suggests the underlying geology to be Oxford Clay. **Oxford Clay** is a bluish or grey clay weathering to brown superficially[1]. Selenite (crystallised hydrated sulphate of lime, i.e. gypsum) and iron-pyrites are abundant

Usually highly shrinkable, Oxford clay is troublesome when vegetation is present and has a Plasticity Index of 50% and above in many cases, placing it in the high shrink/swell category[2].

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[3] 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. Licence IPR/34-7C CSL British Geological Survey. ©NERC. All rights Reserved.

[1] Sherlock R.L. (1962) "*LONDON & THAMES VALLEY*" H.M.S.O.

[2] Table 1, Chapter 4.2, Para. 2.3 of N.H.B.C. Standards, 1986.

[2] B.S. 5930 (1981) *"Site Investigations"*

[3] DriscollL R. (1983) *"Influence of Vegetation on Clays"* Geotechnique. Vol 33.

VEGETATION

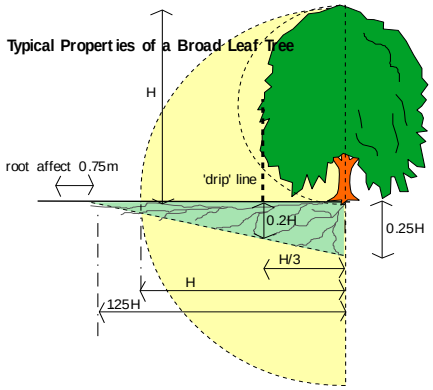
There are several trees and shrubs nearby, some with roots that may extend beneath the house foundations. The following are of particular interest:-

Type	Height	Distance	Ownership
T1 Oak	12 m	16 m	Owners
T2 Conifers	6 m	7 m	Owners
T3 Conifers	5 m	3 m	Owners
T4 Deciduous	10 m	22 m	Neighbour 5
T5 Conifers	3 m	3 m	Owners
T6 Birch	10 m	12 m	Owners
T7 Conifers	6 m	12 m	Owners
T8 Birch	9 m	15 m	Neighbour 5
C1 Ivy	2 m	1 m	Owners
C2 Ivy	2 m	1 m	Owners
S1 Laurel	3 m	1 m	Owners
H1 Conifers	1 m	0 m	Owners
H2 Shrubs	2 m	0 m	Neighbour 5
H3 Laurel	2 m	1 m	Owners

Note: T1 and T4 may be protected by Tree Preservation Orders (TPO's)

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[4].



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).

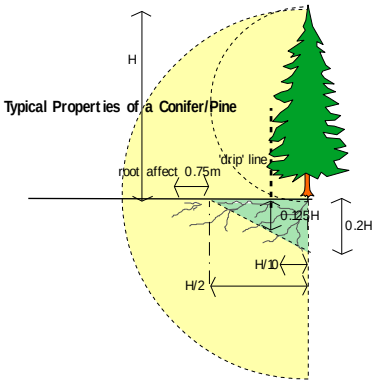
Maximum tree-to-damage distance recorded in the Kew survey was 30mtrs, with 50% of all cases occurring within 9.5mtrs[5]. Life expectancy > 100 years, although they are vulnerable to insect and fungal attack. Old and young trees are tolerant of quite heavy pruning and crown reduction, although re-growth can be an ongoing problem.

[4] Richardson & Gale (1994) "*Tree Recognition*" Richardson's Botanical Identifications
[5] Cutler & Richardson (1991) *"Tree Roots & Buildings"* Longman Scientific

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.

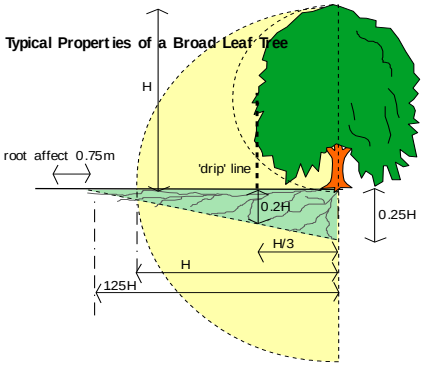
Conifers ~ The term is usually used to refer to cypresses and close relatives, but in the broader sense includes any trees that bear cones and nearly all of them have simple needle or scale like leaves, sometimes arranged into fronds as in the cypresses.



Typical tree proportions showing the root zone. This is a conservative estimate, as the zone can equal the height of the tree.

Generally they have less invasive roots and lower water demands than broadleaved species, but cypresses are often associated with subsidence as they are very fast growing, popular hedge plants that are frequently planted near houses.

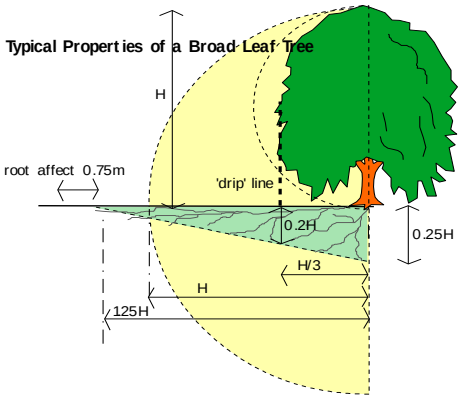
Broadleaf trees typically have wider spreading roots and higher water demands than coniferous species and many are better adapted to growing on heavy clay soils. Some are capable of sprouting from cut stumps or bare wood and most will tolerate pruning better than conifers.



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.
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[6] per year. They have weak root activity generally.

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.

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

OBSERVATIONS
The main area of damage affects the main house.

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

INTERNAL



Landing – cracking to ceiling



Hall – cracking to stairs at junction with wall

Front Left Hand Bedroom
- Cracking from front wall through coving into ceilings from front to back up to 5mm wide
- Cracking below front window less than 1mm wide

En-suite
- Diagonal crack above left hand window up to 1mm wide
- Cracking through coving to ceiling from bedroom to rear wall with disturbance of artex finish

Landing
- Cracking up to 10mm wide through from front to back in a 'Z' shaped pattern
- Cracking through coving into ceiling above landing up to 3mm wide
- Diagonal cracking above and below front window up to 1mm wide
- Diagonal cracking above and below rear window up to 1mm wide

Front Right Hand Bedroom
- Vertical tapering crack to right hand wall up to 0.5mm wide
- Cracking through ceiling/coving up to 3mm wide from front to back

En-suite
- Cracking through ceiling/coving front to back up to 3mm wide

Main Bathroom
- Diagonal crack above left hand window up to 1mm wide
- Cracking through ceiling/coving up to 1mm wide

Rear Left Hand Bedroom

- Cracking through coving/ceiling from door onto landing to rear wall up to 5mm wide
- Vertical cracking to rear left hand corner up to 1mm wide
- Cracking under rear window up to 0.5mm wide

Rear Mid Bedroom

- Cracking through coving/ceiling from front to back up to 1mm wide
- Cracking above door onto landing up to 1mm wide
- Cracking under rear window up to 1mm wide

Hallway

- Gap at floor/landing connection where stairway returns at top up to 10mmw wide
- Cracking between wall and coving to lounge/diner door area up toward front up to 6mm wide
- Diagonal crack above front door of less than 0.5mm wide

Lounge/Diner

- Cracking between wall and coving to hall door wall up to 3mm wide
- Diagonal cracking above left hand window up to 1mm wide

Study

- No damage observed

Toilet

- No damage observed

Utility

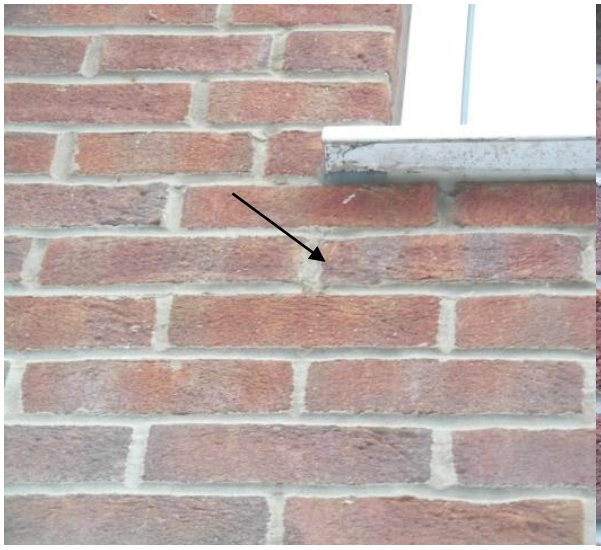
- No damage observed

Kitchen

- Cracking between wall and coving up to 2mm wide

Note: All ceilings throughout have artex finish

EXTERNAL



Minor cracking below left hand ensuite window



Minor cracking above left hand lounge/diner window

Front Elevation

- Minor cracking to junction at return junction by landing window.

Right Hand Elevation

- No damage observed.

Rear Elevation

- No damage observed.

Left Hand Elevation

- Hairline crack to solider course above lounge/diner window.
- Stepped crack under ensuite window up to 0.5mm wide.

Double Garage

- No external cracking evident.

CATEGORY

In structural terms the damage falls into **Category 3 of Table 1**, Building Research Establishment[7] 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.

[7] 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.

No structural changes to the building have been carried out which has contributed to the current subsidence related damage under investigation We are not aware of any previous underpinning.

RECOMMENDATIONS

Although the cause of the movement needs to be dealt with, we note the vegetation is likely to the subject of a Preservation Orders. Subject to this being confirmed, then 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.

Peter Cleland - HNC
Subsidence Consultant - Subsidence Division
Direct Dial : 07387 414562
subsidence@crawco.co.uk

PHOTOGRAPHS



View of Tree T1



Rear View



Minor cracking at front junction



Cracking to front right bedroom window



Cracking above rear left hand bedroom door way onto landing



Cracking to ensuite (LHS)



Cracking between wall and coving to lounge/diner



Cracking above front door to hallway