TECHNICAL REPORT ON A SUBSIDENCE CLAIM

Crawford Reference: SU2206126

Stanton Guildhouse Ltd
The Stanton Guildhouse
Broadway
Worcestershire
WR12 7NE

prepared for

Aviva - Commercial
Commercial Claims/Subsidence, Level 3 West, Perth, PH2 0NH

Claim Reference 4502193098-1

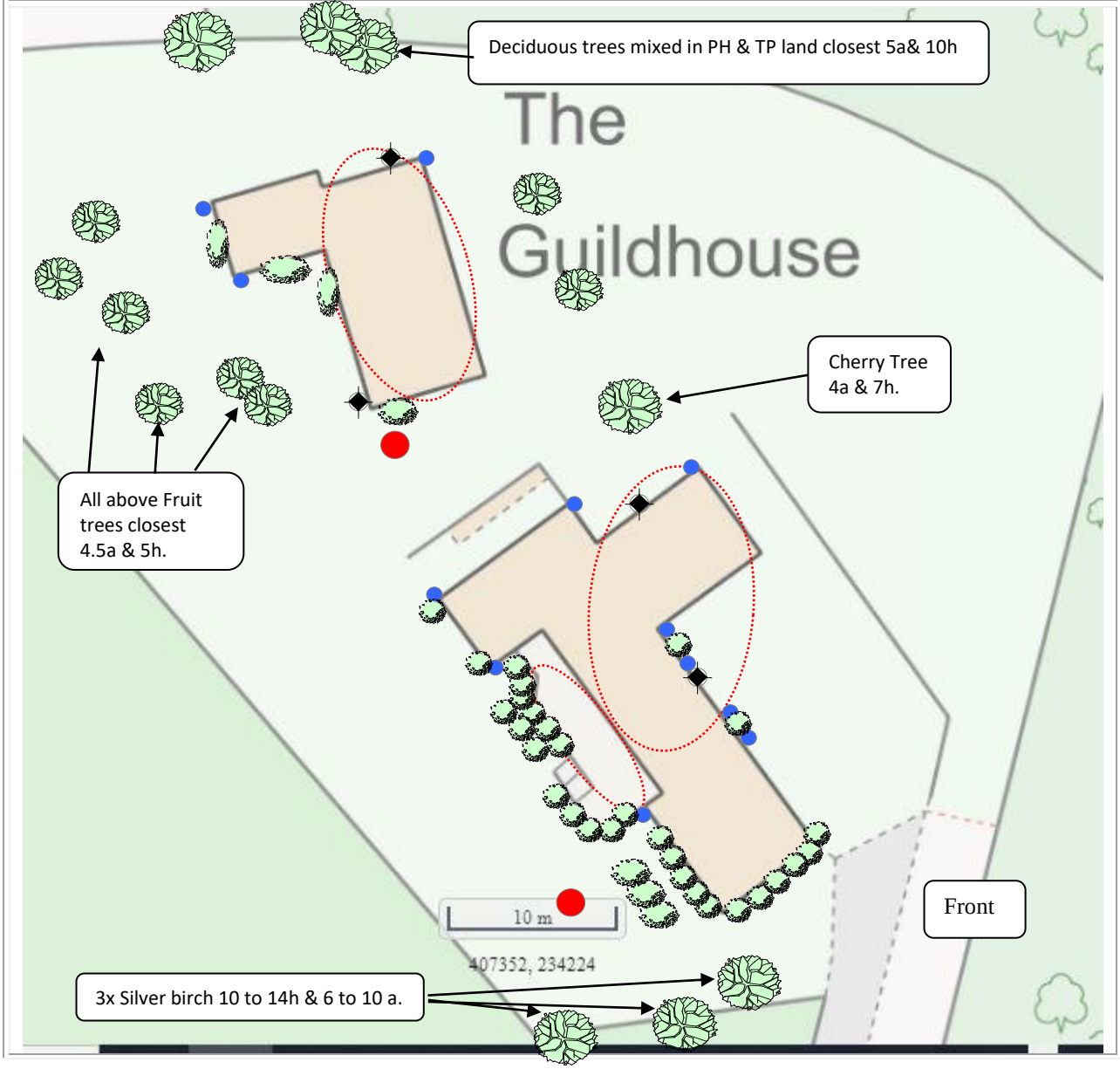
SUBSIDENCE CLAIM

DATE 15 September 2023

Crawford Claims Solutions – Subsidence
Cartwright House,
Tottle Road,
Riverside Business Park, Nottingham, NG2 1RT
Tel: 0115 943 8260
Fax: 0121 200 0309

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 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

After the dry Summer it was noted that the patio to the rear of the house had its heavy paving slabs start to move and become loose. At the same time cracking was noticed to the workshop building. The customers then checked further within the properties and noted cracking had also appeared within the main building especially on the first floor landing around the window.

PROPERTY

Two storey detached house of traditional construction with stone walls surmounted by a ridged tiled roof.

HISTORY & TIMESCALE

We await insurers advice on how they wish us to proceed with the claim.

Date of Construction	1963
Purchased	1963
Policy Inception Date	23/10/2021
Damage First Noticed	25/09/2022
Claim Notified to Insurer	27/10/2022
Date of our Inspection	05/12/2022
Issue of Report	12/12/2022
Anticipated Completion of Claim	Autumn 2024

TOPOGRAPHY

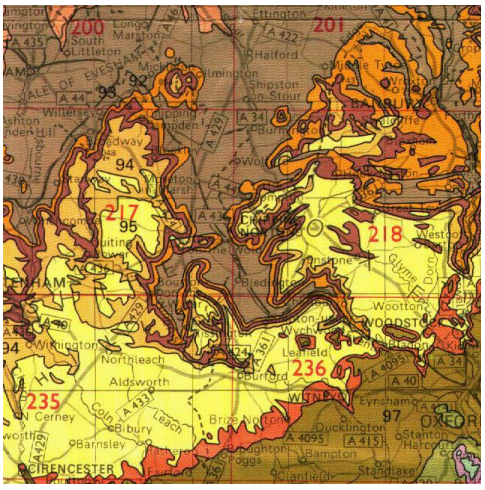
The property occupies a reasonably level site with no unusual or adverse topographic features.

GEOLOGY

Reference to the 1:625,000 scale British Geological Survey Map (solid edition) OS Tile number SPSW suggests the underlying geology to be Sandstone.
Sandstones comprise cemented sand particles. They have an average porosity of around 30% or more, depending on the degree and nature of the cementitious material that binds the grains. Although not shrinkable, the superficial weathered deposits may be.
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[1] 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.



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

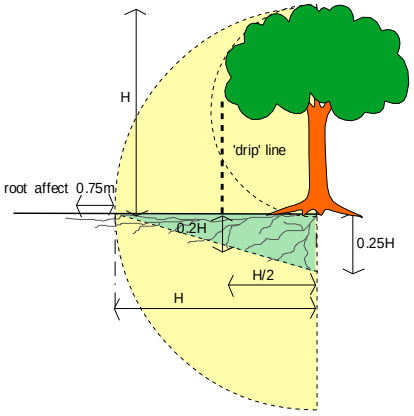
VEGETATION

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
Cherry	7 m	4 m	Owners
Apple	5 m	4 m	Owners
Deciduous	10 m	5 m	Owners
Deciduous	14 m	10 m	Neighbour 1
Shrubs	4 m	1 m	Owners
Birch	10 m	6 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.
Cherries, Prunus species, include Japanese flowering species, which are mainly small growing short lived moderate water demanders and the native wild cherry, Pavium, which is generally longer lived and capable of reaching over 20m.

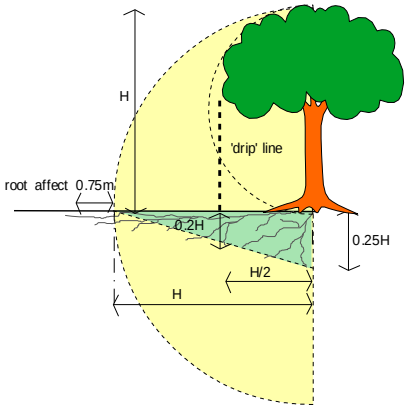
The growth rate is 300mm a year and they have medium root activity. They can be associated with subsidence, although they are not regarded as a particularly aggressive tree.



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

Most Prunus species have wide spreading roots and a tendency to send up sucker shoots, often a long way from the parent tree. The genus includes plums, laurels, Portugal laurel, the roots of which are indistinguishable from each other.

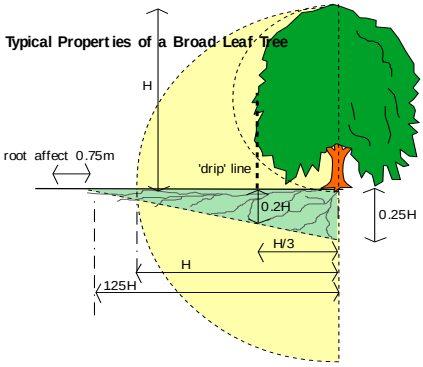
Apple trees, cultivated Malus varieties are common in gardens. Most are small to medium sized trees with lifespans of 40 - 60 years, but Bramleys seedling is far more vigorous, longer lived and larger growing than most of the others. They are moderate water demanders and tolerate pruning well if started when young. Traditional fruit tree pruning, consisting of regular light reduction and thinning can be effective in controlling water demand and root spread where there is a risk of damage in buildings, but long neglected trees often respond poorly.



Typical proportions of an Apple tree. Note the potential root zone.

The trees grow at a rate of 250mm a year to reach heights of around 7 - 10mtrs[2]. They have medium root activity and water demand, and can be associated with subsidence when planted close to the building, or in groups.

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.

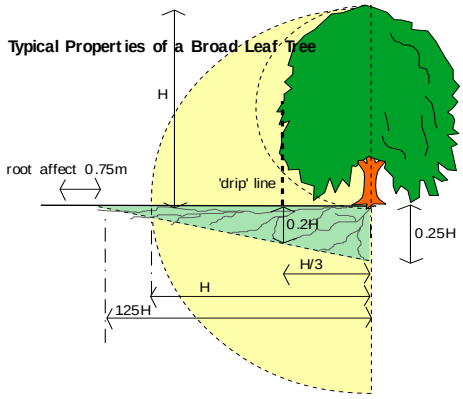
However heavy pruning of any tree should be avoided if possible, as it stimulates the formation of dense masses of weakly attached new branches which can become dangerous if not re-cut periodically to keep their weight down.
Shrubs. Sometimes even small shrubs can cause localised subsidence damage. In 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.

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

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

OBSERVATIONS

There are three areas of damage at the property. In the main building. A raised patio to the rear of the building and to a detached workshop. These are the focal points of the insureds concerns.

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

INTERNAL

Internally there is damage in the following locations:-
First floor landing.
First floor hallway off the landing.
Rear bedroom off the landing opposite the damage around the window.
Ground floor front righthand bedroom.
Ground floor entrance hallway.

We also have damage in the detached workshop buildings on the ground and first floor workshops.

The cracking internally shall need raking out and filling with decorative works to follow.

EXTERNAL

Externally there is crack damage to the front elevation of the main building mirroring the internal cracking on the landing. This shall require raking out and repointing.

The raised patio to the rear elevation of the main building has become uneaven with mortar between the paving stones loosened. Some of the paving has sunk and there are also loose pavers on the steps from the garden beneath. The patio is surrounded by vegetation.

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

There are also cracks to the front and rear elevations of the workshop which shall require raking out and repointing.

The external mortar is lime mortar.

CATEGORY

In structural terms the damage falls into Category 3 of Table 1, Building Research Establishment[4] 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.

INVESTIGATIONS

The following investigations were undertaken to identify the cause of movement.

TRIAL HOLES

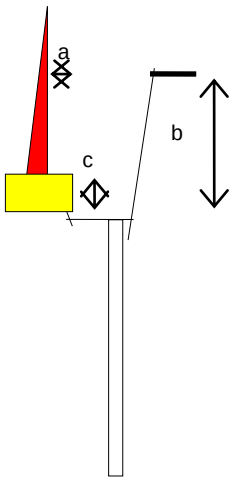
Four trial holes were excavated to expose the foundations - see site plan for location and the diagram below for details.
Trial hole one was undertaken on the front elevation of the main building to its lefthand side. This confirmed that at this point the structure benefitted from a concrete foundation which stepped out from the face of the buildings wall by 180mm. This foundation was 680mm thick in total and the underside of the foundation was 1100 deep underground and sited in soils described as being stiff brown and grey CLAY.

Trial hole two was undertaken against the main building on the internal courtyard side of the outrigger on the building which housed the ground floor bedroom. This confirmed that the building at this point had a concrete foundation which projected 190mm out from the external face of the wall. This foundation was 700mm thick and it was 1000mm deep underground to its underside. The foundations at this point sat in soils described as being stiff brown and grey CLAY.

Trial hole three at the property was undertaken on the front lefthand corner of the workshop beside the entrance door and the external stairs. This confirmed that the structure benefitted from a concrete foundation which projected 170mm out from the face of the building and was 110mm thick. The foundations of the workshop were found to be 810mm deep underground at this point of the building and they sat in soils described as being stiff brown and grey CLAY.

A final trial hole, trial hole 4 was taken on the rear right hand side of the workshop and this confirmed that at this point the structure benefitted from a concrete foundation which projected away from the external face of the building by 100mm, the foundation was found to be 500mm thick and it was 1900mm deep to its underside. As with each other trial hole the foundations were found to be sitting in soils described as being stiff brown and grey CLAY.

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



Foundation Details

No.	Borehole Depth	Footing (a)	Underside (b)	Thickness (c)
TH1	3.00 m.	180 mm.	1,100 mm.	680 mm.
TH2	3.00 m.	190 mm.	1,000 mm.	700 mm.
TH3	3.00 m.	170 mm.	810 mm.	110 mm.
TH4	3.00 m.	100 mm.	1,900 mm.	500 mm.

AUGERED BOREHOLES

A 50mm diameter hand auger was sunk - see site plan for location(s). Boreholes were taken from within each trial hole to a depth of 3000mm underground.
Borehole number one confirmed that from 1300mm deep underground to 3000mm deep underground that the soils changed to become stiff grey-brown slightly gravelly clay. Roots were recovered within this borehole soil sample beneath the depth of the foundations of the building and to a depth of 2500mm underground.
Borehole number two confirmed that there were no changes in the soils to the terminated borehole depth of 3000mm underground. Vegetation roots were recovered in this borehole from the underside of the foundations to a depth of 2500mm underground.
Borehole number three confirmed that from 1100mm underground the soils changed to become stiff grey-brown slightly gravelly clay to the terminated borehole depth of 3000mm underground. Vegetation roots were recovered in the soils sampled beneath the depth of the foundations of the structure at this point to a depth of 3000mm underground where the borehole was terminated.
Borehole number four confirmed that there were no changes in the soils recovered for sampling to the terminated borehole depth of 3000mm underground. Roots were recovered in the soil samples taken from beneath the foundations and to the depth of 3000mm underground.

SOIL SAMPLES

Soil samples were retrieved from the bore, wrapped in clingfilm before being bagged and deposited with a testing laboratory the same day. The laboratory were instructed to test the samples to determine whether there was evidence of root induced desiccation. This was evidenced to be present in each borehole and was also noted to be consistent with vegetation roots being present.

ROOTS

Roots were retrieved from the trial holes and have were submitted to a botanist for identification. The following vegetation roots were recovered and identified:-

- Salix spp. (Willow Trees)
- Laurus spp. (Laurel)
- Pomoideae spp. (Apple, Hawthorn, Pear trees etc)
- Fraxinus spp. (Ash Trees)

DRAINS

A CCTV survey has been undertaken to the drainage systems at the property and this has highlighted some defects with the drains which shall need to be attended to under a separate accidental damage to drains claim if your policy provides such cover.
The drains are evidenced not to be the cause of the subsidence at the structure due to the root presence in desiccated clay soils beneath the foundations of the structures.

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 have though been advised that the side room within the workshop has previously been underpinned.

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 has been necessary to obtain a specialist Arboricultural Report.

We will report further once these investigations have been completed.

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15 September 2023

PHOTOGRAPHS