TECHNICAL REPORT ON A SUBSIDENCE CLAIM

Crawford Reference: SU2205242

2 Acer Way
Cleckheaton
West Yorkshire
BD19 6JQ

Prepared for

AXA Retail
PO Box 7073, Willenhall, WV1 9ZW
Claim Reference 12568787D

SUBSIDENCE CLAIM

DATE 13 July 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.

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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 AXA Retail 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 property owner has noticed thermal cracks appearing each summer over the last 3 years. In July 2022, the cracking was worse than usually and, in more locations, than previously noticed. A family decorator visited and advised there could be a possible subsidence issue, following which a claim was made.

PROPERTY

Two storey detached house of traditional construction with stone walls surmounted by a gabled, tiled roof. There is a single storey extension to the rear right of the property.

HISTORY & TIMESCALE

Site investigations have been organised to confirm the cause of movement.

Date of Construction 1985
Claim Notified to Insurer..... ..... 04/10/2022

TOPOGRAPHY

The property occupies a reasonable level site with no adverse topographic features.

GEOLOGY

Reference to the 1:625,000 scale British Geological Survey Map (solid edition) OS Tile number SESW suggests the underlying geology to be Coal Measures.
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[1],[2]. They are the uppermost measures of the carboniferous system.

[1] Gallois R.W. "The Wealden District" British Geological Survey, Keyworth.
[2] Whitehead T.H.. "Geology of the Country between Dudley & Bridgnorth" British Geological Survey, Keyworth.

Despite their name, coal deposits are most like infrequent, being interspersed with sandstones. Referred to as the Westpahlian measures because they can be traced right across Europe, into Westphalia[3].

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
Ash	13 m	5 m	Minton Homes
Horse Chestnut	14 m	6 m	Minton Homes
Ash	14 m	8 m	Minton Homes

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.

Ash Trees are deciduous and can reach heights between 15-25m depending on health, environment and soil conditions. They have a fast growth rate of around 600mm per year and medium root activity[4].

[3] Fortey R (1993) "The Hidden Landscape" Pimlico
[4] Richardson & Gale (1994) "*Tree Recognition*" Richardson's Botanical Identifications

OBSERVATIONS

The damage of concern effects the main house.

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

INTERNAL

Extension – movement to abutment of main house

Extension – Movement at high level and along ceiling junction

<u>Extension</u>

- Slight cracking above beam, up to 0.5mm.
- Movement towards right hand side, where property adjoins the main house, up to 2mm.
- Cracking around right-side sky light, up to 1mm.
- Wooden flooring has lifted which is thermal related.

<u>Kitchen</u>

- Movement in ceiling unrelated to subsidence.

<u>Hallway</u>

- Cracking towards WC, up to 1mm.
- Cracking above doorway leading to lounge, up to 1mm.

<u>Ground floor WC</u>

- Cracking in ceiling, up to 1mm.

Lounge

- Cracking below window, up to 1mm wide.
- Cracking above window, up to 0.5mm wide.
- Cracking in middle supporting wall which mirrors in hallway, up to 1mm wide.
- Cracking to ceiling, up to 1mm.
- Cracking in coving.
- Multiple thermal cracks in the ceiling.

Landing

- Cracking under window, up to 1mm.
- Cracking either side of window, up to 1mm.

Front right Bedroom

- Cracking below window, up to 1mm.
- Plasterboard ceilings unrelated to subs.

Rear right bedroom

- Cracking below window, up 1mm.
- Cracking to right elevation, up to 1mm
- Cracking along ceiling junction, up to 1mm.

Front left bedroom

- Cracking to left side of window, up to 1mm.
- Cracking below window, up to 1mm.

EXTERNAL

Rear right elevation – separation to extension and main house

Front right elevation – stepped cracking below living room window

Front elevation

- Stepped cracking to right hand side, below living room window, up to 1mm.
- Stepped cracking above living room lintel, moving towards bedroom window, up to 1mm.
- Slight cracking below front door, up to 1mm.
- Stepped cracking above the door, up to 1mm.

Rear right elevation

- Slight cracking along extension where it meets, up to 1mm.

CATEGORY

In structural terms the damage falls into Category 2 of Table 1, Building Research Establishment[5] 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.

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

INVESTIGATIONS

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

TRIAL HOLES

A trial hole was excavated to expose the foundations - see site plan for location and the diagram below for details. Trial pit 1

The foundation are comprised of a bricked foundation with small concrete strip projection to a depth of 1100mm, bearing onto stiff, brown clay.

Trial pit 2

The foundation are comprised of a bricked foundation with small concrete strip projection to a depth of 1000mm, bearing onto stiff, brown clay.

Foundation Details

No.	Borehole Depth	Footing (a)	Underside (b)	Thickness (c)
TH1	2.60 m.	100 mm.	1,100 mm.	300 mm.
TH2	3.00 m.	200 mm.	1,000 mm.	300 mm.

AUGERED BOREHOLES

A 50mm diameter hand auger was sunk - see site plan for location(s). Borehole 1

The geology continues as stiff, brown clay, with roots noted to 1600mm, with a moisture content between 20-26%. The clay subsoil was classified as High to Very High plasticity.

Borehole 2

The geology continues as stiff, brown clay, with roots noted to 1500mm, with a moisture content between 17-25%. The clay subsoil was classified as High to Very High plasticity.

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 have instructions to test the samples to determine if there is evidence of root induced desiccation.

ROOTS

Roots were retrieved from the trial hole and have been submitted to a botanist for identification.

Root ID

The samples you sent in relation to the above on 20/12/2022 have been examined. Their structures were referable as follows:

TH1, 1.1m		
8 no.	Examined root: FRAXINUS (Ash).	Alive, recently*.
1 no.	Examined root: a conifer - particularly like the family CUPRESSACEAE (cypresses ('macrocarpa', 'Leylandii' etc.), Thuja (Western Red Cedar), Junipers).	Alive, recently*.
3 no.	Unfortunately all with insufficient cells for identification.	
TH1, 1.6m		
2 no.	Examined root: FRAXINUS (Ash). Very THIN.	Dead* (note this 'dead' result can be unreliable with such thin samples).
3 no.	All pieces of BARK only - not enough material for identification.	
3 no.	Unfortunately all with insufficient cells for identification.	
TH2, 1.0m		
2 no.	Examined root: FRAXINUS (Ash).	Alive, recently*.
4 no.	Examined root: the family CUPRESSACEAE (as listed above).	Alive, recently*.
1 no.	Examined sample: very immature (under 0.15mm in diameter). NOT a conifer. Could well be only a section of TWIG, rather than a root.	Alive, recently*.
4 no.	Unfortunately all with insufficient cells for identification.	

DRAINS

No CCTV survey of the underground drainage was undertaken whilst on site because there was no drainage in the area of concern.

Monitoring

Level monitoring was instructed to record the rate of movement. Monitoring starting in December 2022, and shows clear recovery during the winter months, particularly on points 5-8. Monitoring is expected to continue to evidence the influence of implicated vegetation.

Site Plan

5
6
7
4
8
9
3
2
1

Level Readings for All Points
Difference in Reading (mm)
15
10
5
0
-5
13/12/2022
15/02/2023
13/04/2023
12/06/2023
Visit Dates
Level Stations
DATUM
1
2
3
4
5
6
7
8
9

Arborist Recommendations

Independent arborists, MWA Ltd were instructed to provide their expert advice regarding applicable mitigation required to arrest the subsidence related movement at the property. Below, are there recommendations.

Conclusions

- Conditions necessary for clay shrinkage subsidence to occur related to moisture abstraction by vegetation have been confirmed by site investigations and the testing of soil and root samples.
- Engineering opinion is that the damage is related to clay shrinkage subsidence.
- There is significant vegetation present with the potential to influence soil moisture and volumes below foundation level.
- Roots have been observed underside of foundations and identified samples correspond to vegetation identified on site.
- Replacement planting may be considered subject to species choice and planting location.

Table 1 **Current Claim** - Tree Details & Recommendations

Tree No.	Species	Ht (m)	Dia (mm)	Crown Spread (m)	Dist. to building (m)	Age Classification	Ownership
T2	Ash	13	360	12	5	Older than extension(s)	Third Party Minton Homes Limited of 1st Floor, Blayd's Mews, LS1 4AD
Management history		No significant recent management noted.					
Recommendation		Remove (fell) to near ground level and treat stump to inhibit regrowth.					
T3	Horse Chestnut	14	470	9	6	Older than extension(s)	Third Party Minton Homes Limited of 1st Floor, Blayd's Mews, LS1 4AD
Management history		No significant recent management noted.					
Recommendation		Remove (fell) to near ground level and treat stump to inhibit regrowth.					
T4	Ash	14	430	14	8	Older than extension(s)	Third Party Minton Homes Limited of 1st Floor, Blayd's Mews, LS1 4AD
Management history		No significant recent management noted.					
Recommendation		Remove (fell) to near ground level and treat stump to inhibit regrowth.					

Ms: multi-stemmed * Estimated value

Table 2 **Future Risk** - Tree Details & Recommendations

Tree No.	Species	Ht (m)	Dia (mm)	Crown Spread (m)	Dist. to building (m)	Age Classification	Ownership
T1	Maple (Japanese)	1.8	80	1.5	4	Younger than Property	Policy Holder
Management history		Subject to past management/pruning.					
Recommendation		Maintain broadly at no more than current dimensions by periodic pruning.					
H1	Cypress with ivy	2	50	0.5	1.5	Younger than Property	Policy Holder
Management history		Pruned on a regular basis.					
Recommendation		Do not allow to exceed current dimensions.					

Ms: multi-stemmed * Estimated value

Site Plan

Plan not to scale – indicative only Approximate areas of damage

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. Furthermore there has been no previous underpinning installed

RECOMMENDATIONS

The implicated trees, T2, T3 and T4 should be removed to abate the subsidence related movement and return an equilibrium to the clay subsoils beneath the affected property. Level monitoring has shown clear recovery to the rear extension and roots found beneath the subsoil are causing root induced clay shrinkage.

If the implicated vegetation is removed swiftly, a period of monitoring will confirm if stability can be achieved. At this stage, we are satisfied there is no risk of heave.

We await your comments in due course.

Leigh Edwards BSc, Dip CILA ACABE
Crawford Claims Solutions – Subsidence
Direct Dial: 0115 943 8260
subsidence@crawco.co.uk

13 July 2023

PHOTOGRAPHS

Stepped cracking above living room window

View of rear elevation

Rear extension – Cracking near French doors

Living room – crack below window

Landing – Cracking above window

Front right bedroom – cracking below window