



2 The Boulevard, City West One Office Park, Gelderd Road, Leeds, LS12 6NY
01924 428691

Subject Property Address:

21 Freeman Avenue
Henley
IPSWICH
IP6 0RZ



INSURANCE CLAIM

CONCERNING SUBSIDENCE DAMAGE

ENGINEERING APPRAISAL REPORT

This report is prepared on behalf of Fairmead Insurance for the purpose of investigating a claim for subsidence. It is not intended to cover any other aspect of structural inadequacy or building defect that may otherwise have been in existence at the time of inspection.

Date: 16th May 2023

Our Ref: 9255790

INTRODUCTION






















This report has been prepared by our Building Consultant, Stephen Robertson, and is being investigated in accordance with our Project Managed Service.

Unless stated otherwise all directions are referred to as looking towards the front door from the outside the property.

DESCRIPTION OF BUILDING

The subject property is a semi-detached bungalow, in a village location, on a plot that is level. The overall layout is recorded on our site plan:



	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

CIRCUMSTANCES OF DISCOVERY OF DAMAGE

The policyholder and homeowner submitted an insurance claim in May 2021. Whilst the claim was submitted at this time, we can be satisfied that the foundation movement and associated damage commenced before claim submission, as the comments below outline. Namely, that the damage was originally repaired.

The Policyholder noticed cracking and the plaster finish to be in a poor condition in the rear, left-hand bedroom. He instructed a plasterer and the walls were skimmed. Damage later returned and he noticed external cracking. He subsequently contacted his insurers.

NATURE AND EXTENT OF DAMAGE

The principal damage takes the form of internal plaster cracking in the rear left-hand bedroom with corresponding cracking to brickwork externally. This indicates a mechanism of downwards movement towards the rear of the site where the Lime tree is located.

Significance

During our initial assessment the level of damage was considered slight and is classified as category 2 in accordance with BRE Digest 251 - Assessment of damage in low-rise buildings. The initial assessment was carried out in May and hence the soil had experienced winter recovery with associated closure of the fractures.

Aligned with vegetation related clay shrinkage subsidence claims the damage progressed during the summer / autumn months, as demonstrated by the level monitoring which is discussed later within the body of this report. In particular, there was an escalation in damage to the bedroom and flank wall as shown below.



In view of the escalation of damage in terms of both crack width along with additional rooms being affected we can conclude that the damage is Category 3 – Moderate. This conclusion being based on the fact that one fracture is above 5mm in width and that there are several fractures present, and this also defines the category of damage, as detailed in the extract from BRE 251 below;

Table 1 Classification of visible damage to walls with particular reference to ease of repair of plaster and brickwork or masonry
Crack width is one factor in assessing category of damage and should not be used on its own as a direct measure of it.

Category of damage	Description of typical damage <i>Ease of repair in italic type</i>
0	Hairline cracks of less than about 0.1 mm which are classed as negligible. <i>No action required.</i>
1	Fine cracks which can <i>be treated easily using normal decoration.</i> Damage generally restricted to internal wall finishes; cracks rarely visible in external brickwork. Typical crack widths up to 1 mm.
2	<i>Cracks easily filled. Recurrent cracks can be masked by suitable linings.</i> Cracks not necessarily visible externally; <i>some external repointing may be required to ensure weather-tightness.</i> Doors and windows may stick slightly and <i>require easing and adjusting.</i> Typical crack widths up to 5 mm.
3	Cracks which <i>require some opening up and can be patched by a mason. Repointing of external brickwork and possibly a small amount of brickwork to be replaced.</i> Doors and windows sticking. Service pipes may fracture. Weather-tightness often impaired. Typical crack widths are 5 to 15 mm, or several of, say, 3 mm.

Onset and Progression

We are advised that the damage occurred before claim submission and the level monitoring has confirmed a seasonal pattern of movement. The images secured during the summer / autumn of 2022 clearly demonstrates escalation of damage during drier and warmer periods.

Claim Chronology

A brief summary of key events on the claim is detailed below;

May 2021	Initial inspection
March 2022	First TPO application
November 2021	Completion of site investigations

March 2022	Production of Arboricultural report
June 2021	Commencement of level monitoring

SITE INVESTIGATIONS

The site investigation was carried out by Auger on 22/11/2021 and comprised the excavation of a trial pit/borehole to the rear left-hand corner of the building to the rear elevation.

Trial Pit 1/Borehole 1

This revealed the building to be built off a 250mm thick concrete strip foundation, the underside of which is located 600mm below external ground floor level. In turn, this is supported by a sub-soil of brown, slightly sandy, gravelly, silty clay with roots observed directly beneath the foundations.

A borehole was extended at the same location and from c1800mm a moist, stiff, brown, sandy clay was encountered which extends to c2700mm. From 2700mm to 3000mm a brown, fine to medium, gravelly, silty clay was encountered. Roots were again observed and recovered for sampling at 1100mm in depth and the borehole was abandoned at 3000mm as target depth was reached.

Laboratory testing of the clay soils sampled within the trial pit and borehole has confirmed it to have an initially intermediate (underside of foundation), becoming low and finally high potential for volumetric change. It has also confirmed the soil to be in a state of desiccation to the underside of foundations.

Laboratory analysis of roots sampled from within the trial pit/borehole has identified them as follows:

TH1, 0.6m		
2 no.	Examined root: TILIA (Lime).	Alive, recently*.
TH1, 1.1m		
2 no.	Examined root: very THIN. We cannot rule out TILIA (Lime). Less than 0.15mm in diameter.	Dead* (note this 'dead' result can be unreliable with such thin samples).
3 no.	All sections or pieces of BARK only - alas insufficient material for identification.	

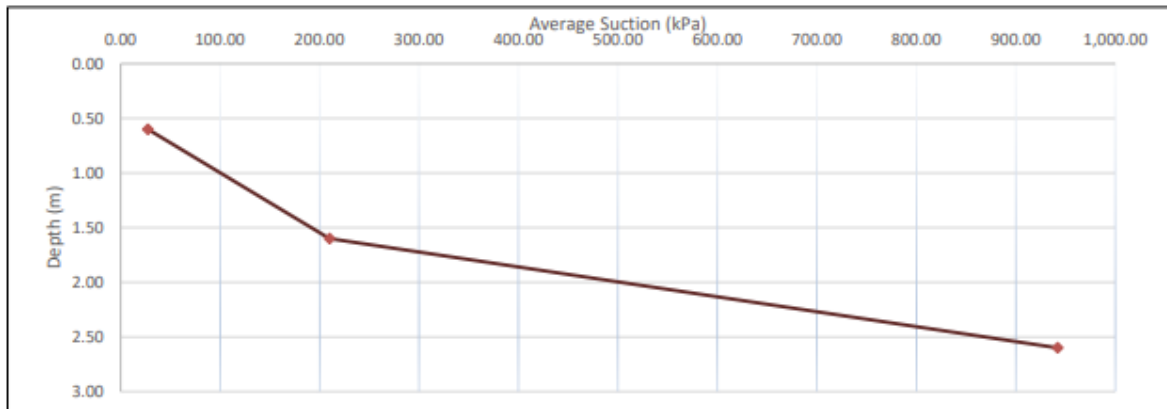
A heave calculation has been provided and shows no concern.

TH Trial Hole	Depth (m)	Filter Paper Location	Filter Paper	Sample Prep Method	Test Duration (Days)	Water Content (%)	Soil Suction Pk (kPa)	Average Soil Suction Pk (kPa)	Cumulative Heave Potential (mm) from bottom of the hole
TH1	0.60	Top	I	D	5	72.4	27	27	11
TH1		Middle	II	D	5	72.4	27		
TH1		Bottom	III	D	5	72.3	28		
TH1	1.10								
TH1									
TH1									
TH1	1.60	Top	I	D	5	40.8	201	210	14
TH1		Middle	II	D	5	40.7	203		
TH1		Bottom	III	D	5	39.9	227		
TH1	2.10								
TH1									
TH1									
TH1	2.60	Top	I	D	5	30.1	931	942	14
TH1		Middle	II	D	5	30.0	948		
TH1		Bottom	III	D	5	30.0	946		

Heave potential is calculated from the bottom of the hole and heaves above the bottom of the hole are reported as a cumulative value.

The values reported for heave above only apply to the strata the suction and plasticity have been performed on. The shallowest depth reported is assumed to be a strata thickness to GL and Heave is calculated based on that layer thickness, if the next sample is in 0.5m increments the heave is calculated based on the layer thickness of 0.5m and depths 1m from the sample above will include heave over 1m.

Consideration should be made for other stratas where values are not reported and when working out the heave potential over the entire trial hole.

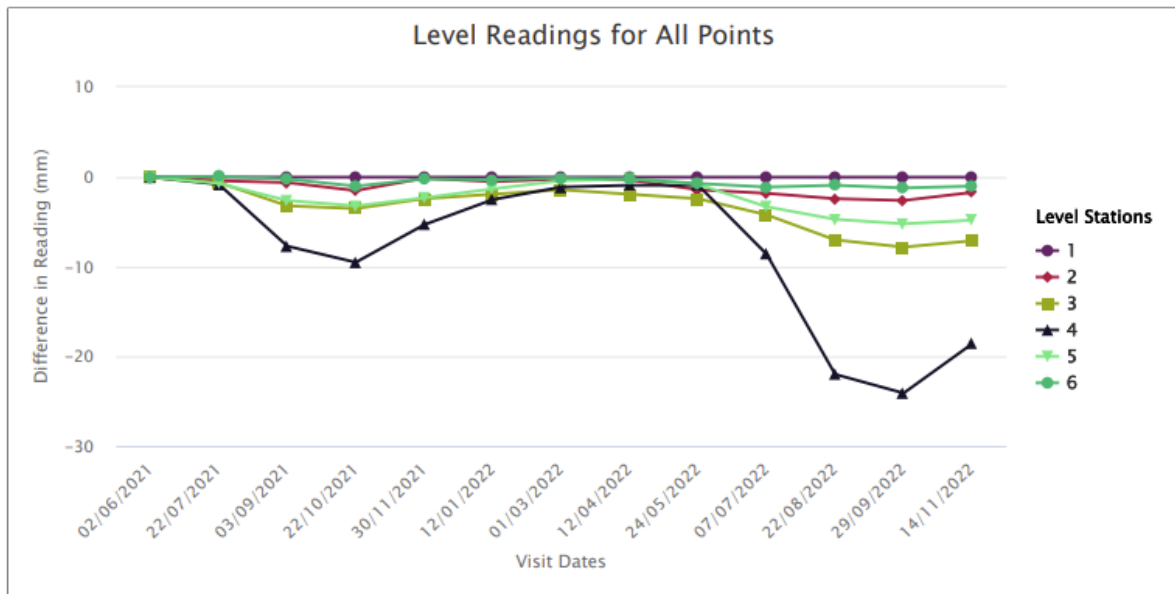
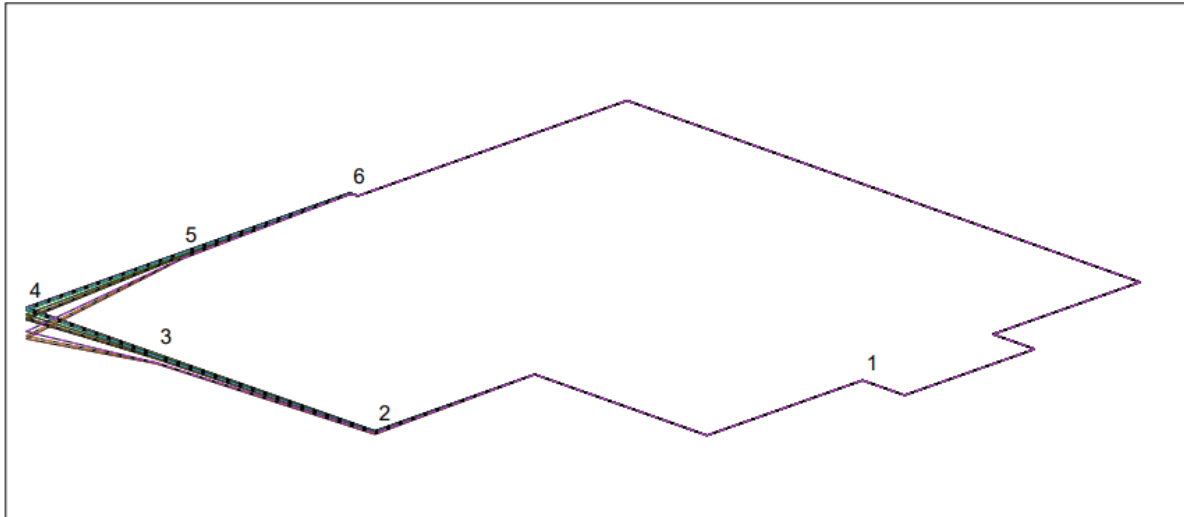


MONITORING

Level monitoring has been underway since June 2021. In summary, the results to date show downwards movement to the rear left-hand corner of the building over the drier summer months, and recovery (upwards movement), over the wetter winter months.

The greatest level of downward movement was recorded to station 4. Downward movement in excess of 20mm was captured on the 29th September 2022 followed by 5.5mm of recovery by 14th November 2022.

This pattern of movement is consistent with the operation of a clay shrinkage mechanism and confirms the dewatering effects of the Lime tree roots on the shrinkable clay sub-soil:



CAUSE OF DAMAGE

Taking an overview of all the site investigation, and monitoring results referred to above, it is my opinion that the cause of damage results from clay shrinkage subsidence brought about by the action of roots from the Lime tree located in the rear garden.

I base this view on the fact that the foundations of the property in the area of damage have been built at a relatively shallow depth, bearing onto shrinkable clay subsoil. The soil is susceptible to movement as a result of changes in volume of the clay with variations in moisture content and analysis of the site investigation results indicates that the soil has been affected by shrinkage. Tree roots are present in the clay subsoil beneath the foundations. In this case, I am satisfied that the damage has therefore been caused by clay shrinkage subsidence following moisture extraction by the Lime tree.

I have also considered whether there could be any other influencing factors and there are none. It should be noted that a drainage survey was completed as a matter of course with numerous defects found, and these were subsequently repaired in August 2022, and subsequent readings have continued to show a trend of ongoing seasonal movement, thus discounting the drainage defects as a factor in the damage.

RECOMMENDATIONS

An arboricultural report was secured to provide guidance on mitigation, noting the ground investigations clearly demonstrated that the foundation instability was caused by root induced clay shrinkage. The report concluded that the dominant cause of movement was the Lime tree (T1) and recommended removal accordingly. No other vegetation was implicated.

Consideration was given to pruning but this was not considered to be an effective long-term solution and hence the recommendation for removal.

REPAIRS

Superstructure repairs

The first, and arguably the simplest repair solution, would be to commence with superstructure repairs to the property involving crack repairs and redecoration. However, due to the degree of the movement recorded we are satisfied that this will not provide a long-term solution and the repairs will fail once again when a drier and warmer period ensues.

Whilst a formal quotation for the above-mentioned remedial works has not been secured, we envisage the cost of this could be around £9,000 for this form of repair.

Masonry reinforcement

Masonry reinforcement provides a useful option to accommodate moderate movement with localised areas of movement such that masonry reinforcement can be used to span across the local area of movement. Having reviewed the data on this claim we do not consider this to be a viable option. Firstly, in our opinion, the movement captured is greater than moderate and hence further damage is likely, particularly at the end of masonry reinforced sections of the structure.

We anticipate the cost of completing a masonry reinforcement scheme would be in the region of £8,000. This would be in addition to the cost of superstructure repairs.

Root barrier

Whilst we have not secured arboricultural advice regarding the feasibility of a root barrier, we do consider this could be a potential solution noting the distance the vegetation is from the area of damage. Therefore, if the vegetation is not removed this mechanical stabilisation arrangement would be considered in the first instance.

On the basis access can be secured and services do not preclude the introduction of a root barrier then the cost of this solution is likely to be in region of £30,000.

Substructure works

If it is not feasible or practical to introduce a root barrier, then a traditional substructure scheme will be required, and this will need to stabilise the rear and left-hand flank wall of the property. This work is likely to result in the need for Party Wall notice to be issued. We envisage the cost associated with enablings, the stabilisation and associated professional fees (design, Party Wall, Building Regulation approval) could result in costs of this solution being in the order of £70,000.

Stephen Robertson
Building Consultant

Ellie Herd
Claims Technician
Direct dial: 01924 428721
E-mail: Eleanor.Herd@uk.sedgwick.com