ADDENDUM ARBORICULTURAL REPORT

Crawford Reference: 1786071 / SU2206150

Insured:

143 The Greenway

Ickenham

Uxbridge

Middlesex

UB10 8LT

Insurer:

RSA - John Lewis

6th Floor

Bowling Mill

Dean Clough

Halifax

HX3 5WA

Claim Reference: 202210030891

29 July 2024

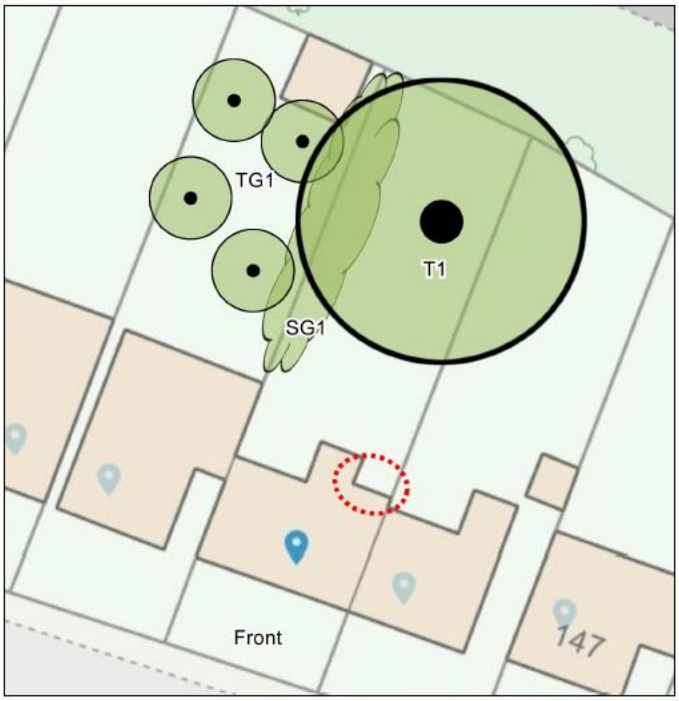
Crawford Claims Solutions – Subsidence

Cartwright House,

Tottle Road,

Riverside Business Park, Nottingham, NG2 1RT

Site Plan



Plan not to scale – indicative only Approximate areas of damage

RECOMMENDATIONS

Oak T1 –Reduce height from 16.5m to circa 14m and Reduce lateral RADIUS to 8m which would leave a lateral SPREAD of 16m leaving balanced crown, leaving a well-balanced crown (in accordance with BRE IP7/06 “Pruning trees to reduce water use” to mitigate root induced clay shrinkage subsidence.

INTRODUCTION

We have been asked by insurers to comment on movement that has taken place to the above property. This report outlines the arboricultural issues and provides justifications for the recommended works. This report should be read in conjunction with the MWA Arboricultural Appraisal Rereport dated 26/07/2024 and the site investigations, which are summarised within this report.

TECHNICAL CIRCUMSTANCES

The damage was first noticed in September 2022 and hence Insurers were notified. A previous application to undertake the recommended crown reduction work was refused. However, this application was determined in the absence of site investigations. **This report is to support a new application that is based on site investigations that are now available and confirm the presence of Oak roots beneath foundations.**

HISTORY & TIMESCALE

Date of Construction ..... Circa 1920
Damage First Noticed ..... 15 September 2022

TOPOGRAPHY

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

OBSERVATIONS

The damage of concern affects the rear kitchen and through lounge of the property with external cracks to the rear elevation.

CATEGORY

Damage Internally: Kitchen - Horizontal cracks across the ceiling - 1-2mm wide. Vertical cracks 1/2mm wide to right of door to lounge and to right of external side door.

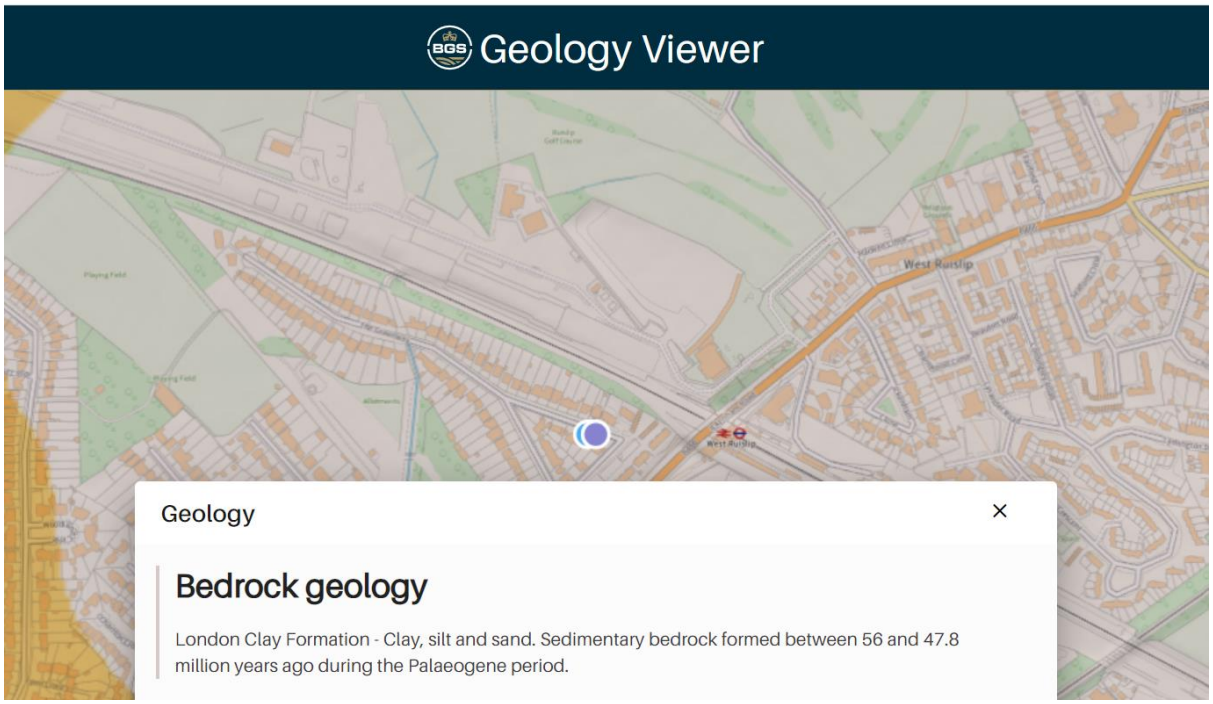
Through Lounge - Vertical crack 3mm wide to left side of door to kitchen and vertical crack 1/2mm wide to right side of door to kitchen. Horizontal cracks across the ceiling 1/2mm wide. Vertical crack -1mm wide above door to hall. Vertical crack - 1mm wide above gap to front section of lounge.

Damage Externally: Vertical cracks 2mm wide above and around side door to kitchen and side door to garage.

Maximum Crack: 3mm
Damage Category: BRE Category 2 (Slight damage with cracks up to 5.0mm wide)

GEOLOGY & SOIL

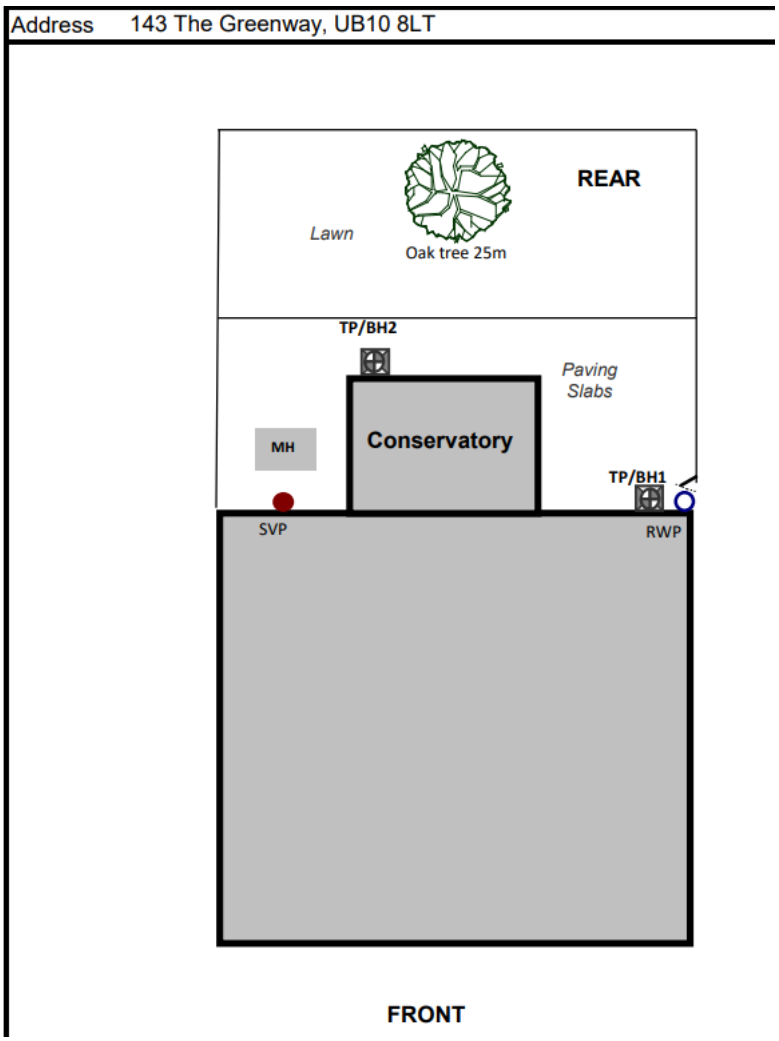
Reference to the British Geological Survey online viewer confirms that the geology comprises of London Clay.



London Clay can significantly change in volume due to seasonal variations in moisture content, particularly if influenced by tree roots extracting moisture.

SITE INVESTIGATIONS

Site investigations undertaken during May 2024, which were not available at the time of the previous application, confirm 700mm deep foundations of the main house and rear conservatory, bearing on soil containing slightly sandy, slightly gravelly clay. The clay has medium to high plasticity meaning it can significantly shrink and swell seasonally due to fluctuations in moisture content.



In BH1 and BH2 the moisture content is less than 50% of the liquid limit and far closer to the plastic limit, indicating that there is the onset of desiccation. It is notable that the sampling was undertaken

Cartwright House, Tottle Road, Riverside Business Park, Nottingham, NG2 1RT. Tel 0115 943 8266 ■ www.crawco.co.uk
Registered Office ■ Crawford & Company Adjusters (UK) Ltd, The Hallmark Building, 106 Fenchurch Street, London, EC3M 5JE ■ Registered in England No 2908444

during May, at a time of year when soil moisture deficits due to root activity would be at their lowest and we would expect significantly drier soil during summer months when roots are active.

SML SUBSIDENCE

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

SUMMARY OF RESULTS

Project No	SU2206150
Project Name	143 The Greenway, Ickenham, Uxbridge
Client	Crawford

Hole ID	Depth (m)	Moisture Content (W%)	Liquid Limit (WL%)	Plastic Limit (WP%)	Plasticity Index (IP%)	Portion retained on 425µm Sieve (%)	Modified PI (I'p%)	Soil Classification	Consistency Index (Ipc)	Sample description	Volume change potential			Remarks
											Low	Medium	High	
BH1	0.50-1.00m	26%	-	-	-	-	-	-	-	-	-	-	-	
BH1	1.00-1.50m	32%	62%	24%	38%	9%	35%	CH	0.80	Brown, grey mottled orangish brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse flint, chalk and brick.	No	Yes	No	
BH1	1.50-2.00m	27%	-	-	-	-	-	-	-	-	-	-	-	
BH1	2.00-2.50m	29%	69%	25%	44%	8%	41%	CH	0.92	Brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to medium flint & mudstone.	No	No	Yes	
BH1	2.50-3.00m	30%	-	-	-	-	-	-	-	-	-	-	-	
BH1	3.00-3.50m	31%	68%	26%	41%	3%	40%	0	0.89	Brown mottled grey CLAY. Occasional fine white crystals observed.	No	No	Yes	

SML SUBSIDENCE

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

SUMMARY OF RESULTS

Project No	SU2206150
Project Name	143 The Greenway, Ickenham, Uxbridge
Client	Crawford

Hole ID	Depth (m)	Moisture Content (W%)	Liquid Limit (WL%)	Plastic Limit (WP%)	Plasticity Index (IP%)	Portion retained on 425µm Sieve (%)	Modified PI (I'p%)	Soil Classification	Consistency Index (Ipc)	Sample description	Volume change potential			Remarks
											Low	Medium	High	
BH2	0.50-1.00m	29%	-	-	-	-	-	-	-	-	-	-	-	
BH2	1.00-1.50m	29%	57%	22%	35%	35%	23%	MH	0.81	Brown, grey mottled orangish brown slighlty sandy slightly gravelly CLAY. Gravel is fine to coarse flint. Rare rootlets observed.	No	Yes	No	
BH2	1.50-2.00m	29%	-	-	-	-	-	-	-	-	-	-	-	
BH2	2.00-2.50m	29%	68%	26%	42%	3%	40%	CH	0.92	Grey brown slightly sandy slightly gravelly CLAY. Gravel is fine coarse flint.	No	No	Yes	
BH2	2.50-3.00m	30%	-	-	-	-	-	-	-	-	-	-	-	
BH2	3.00-3.50m	30%	71%	26%	45%	7%	42%	CV	0.91	Grey brown mottled grey CLAY. Occasional fine white crystals.	No	No	Yes	

VEGETATION

There are trees and shrubs nearby, some with roots that may extend beneath the foundations. The following are of particular interest and recommendations have been made to provide a remedy to the damage:-

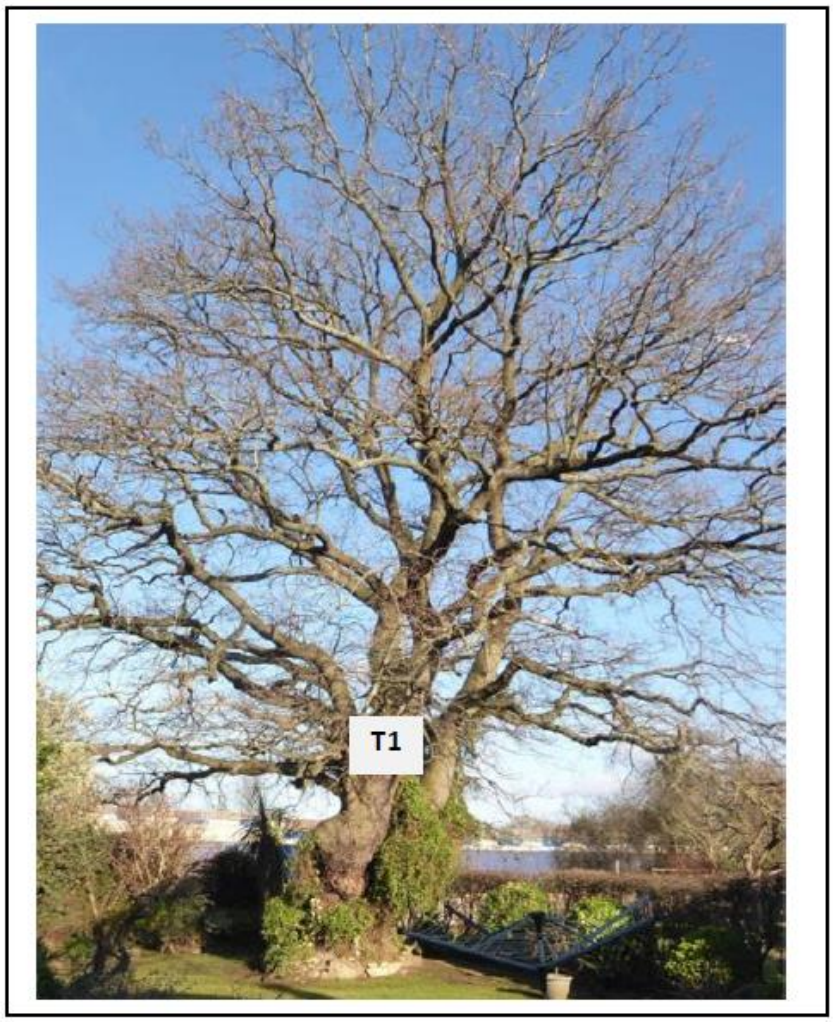
Table 1 **Current Claim** - Tree Details & Recommendations

Tree No.	Species	Ht (m)	Dia (mm)	Crown Spread (m)	Dist. to building (m)	Age Classification	Ownership
T1	Oak	16.5	1600 *	20.0	14.0	Significantly older than property	Policy Holder
Management history		No significant past management noted					
Recommendation		Reduce height to ~14.0m and crown radius to ~8.0m leaving balanced crown. Re-prune thereafter on a triennial cycle to maintain at broadly reduced dimensions.					

Ms: multi-stemmed * Estimated value

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.

PHOTOGRAPHS



View of T1 Oak

VEGETATION INFLUENCE

According to the standard published work on the subject (Cutler, D.F. and I.B.K. Richardson, (1989) further confirmed by Mercer, Reeves & O'Callaghan (2011) in shrinkable clay soils, Oak species are capable of causing subsidence damage at distances up to 30m, with 75% of cases occurring where the tree was within 18m. The Oak T1, at only 14m, is therefore well within its species' potential rooting and influencing distance of the building and would be capable of causing seasonal soil drying beneath foundations.

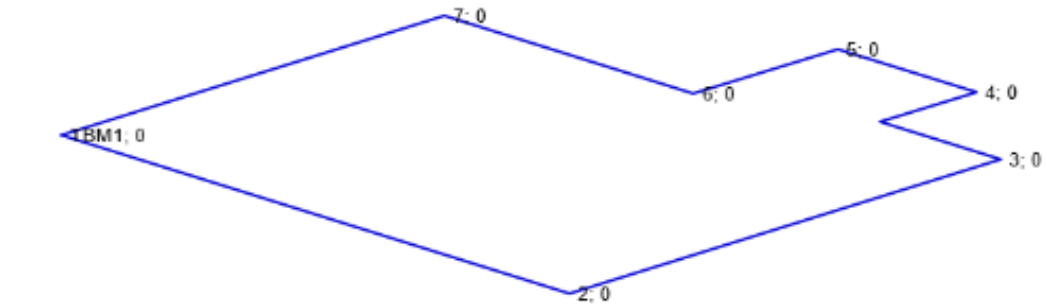
PATTERN OF MOVEMENT

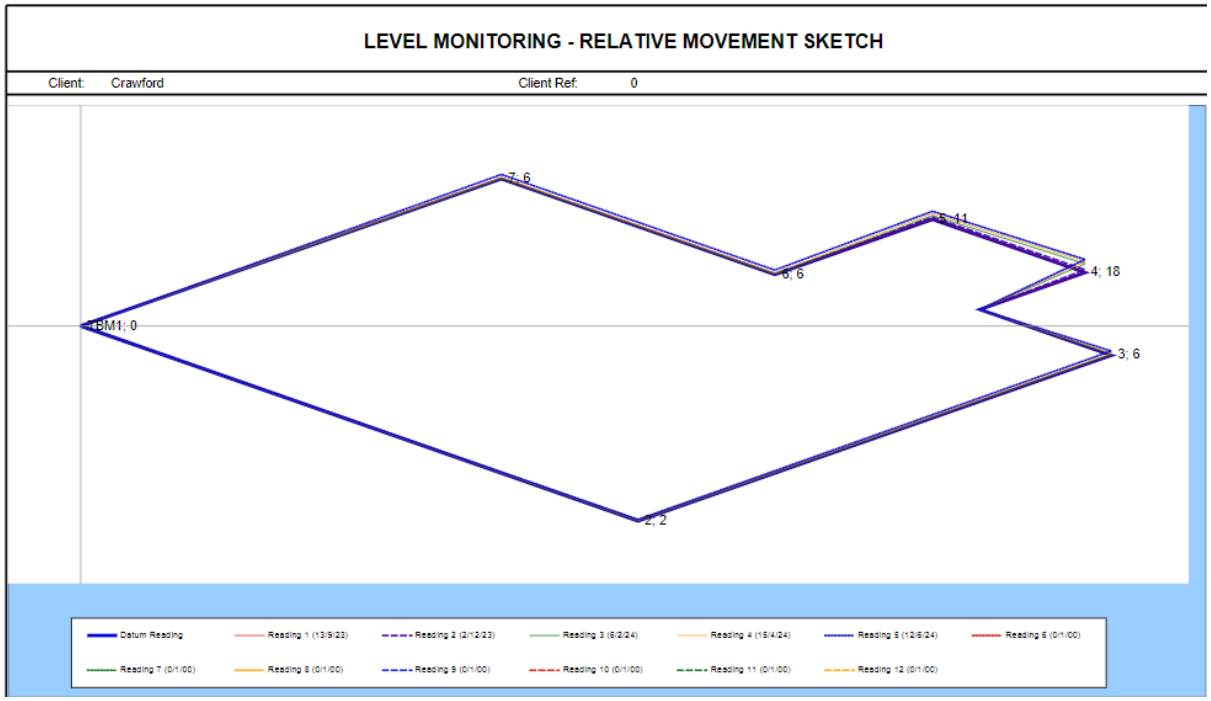
Damage was observed to occur during September 2022 during a time of year when soil moisture deficits due to tree root activity would be reaching their peak.

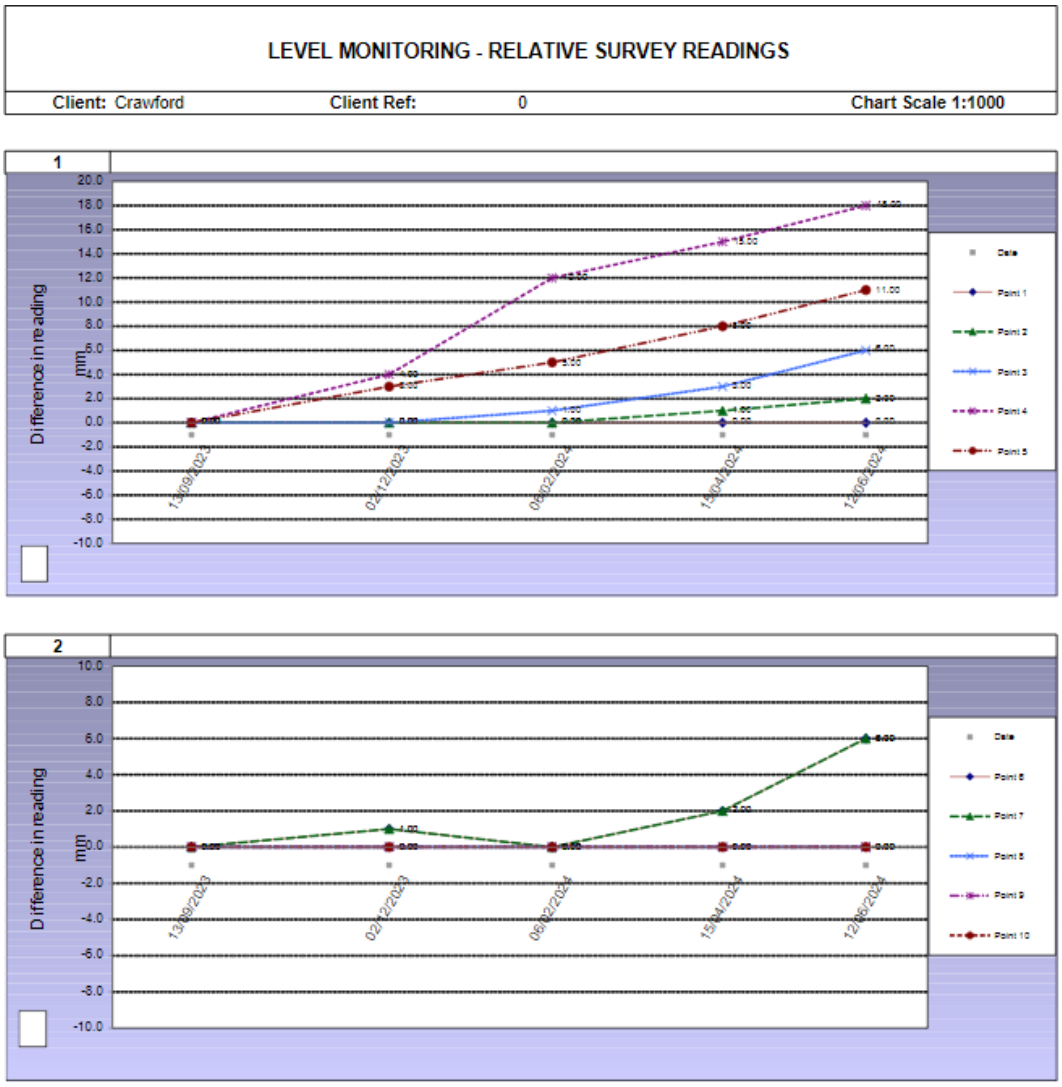
The area of movement and damage is consistent with the locations of the subject Oak T1 and this is by far the most significant item of vegetation nearby that is likely to be causal.

The pattern of movement is entirely consistent with the seasonal, cyclical influence of tree roots on soil moisture, foundations moving down during summer months when roots are active and extracting soil moisture, then returning to recovery and uplift as soil moisture increases during winter when tree roots are inactive.

Monitoring shows 18mm of upward differential movement from Sept 23 to June 24. We anticipate that downward movement will again occur later during summer 2024. The degree of uplift/recovery indicates that there must have been significant downward movement during summer 2023, despite it being a much wetter summer than that of summer 2022 when damage occurred.




LEVEL MONITORING - RELATIVE MOVEMENT SKETCH
Client: Crawford
Client Ref: 0
7; 6
5; 11
6; 6
4; 18
BM1; 0
3; 6
2; 2
Datum Reading
Reading 1 (13/9/23)
Reading 2 (2/12/23)
Reading 3 (6/2/24)
Reading 4 (15/4/24)
Reading 5 (12/6/24)
Reading 6 (0/1/00)
Reading 7 (0/1/00)
Reading 8 (0/1/00)
Reading 9 (0/1/00)
Reading 10 (0/1/00)
Reading 11 (0/1/00)
Reading 12 (0/1/00)



DISCUSSION

The pattern and nature of the cracks is indicative of an episode of subsidence. The cause of movement is clearly attributable clay shrinkage exacerbated by tree root activity.

The timing of the event, at a time of year when soil moisture deficits due to tree root activity would be reaching their peak.

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.

TREE AGE

The subject tree appears to pre-date the construction of the damaged structure therefore there is a theoretical risk of adverse soil heave occurring if the tree was to be removed entirely.

MITIGATION OPTIONS

Tree reduction option -.

The publication "CONTROLLING WATER USE OF TREES TO ALLEVIATE SUBSIDENCE RISK" © 2004 BRE on behalf of the Link Consortium for Horticulture Link Project No. 212 concluded that:

• For practical soil moisture conservation, severe crown-reduction 70-90% of crown volume would have to be applied. Reduction of up to 50% crown volume is not consistently effective for decreasing soil drying.

• To ensure a continued decrease in canopy leaf area and maximise the period of soil moisture conservation, crown reductions should be repeated on a regular managed cycle with an interval based on monitoring re-growth.

This is reinforced in the publication BRE IP7/06 "Pruning trees to reduce water use".

We would also refer to the "Pilot study to determine the feasibility of using existing claims data to determine the impact of tree pruning on subsidence incidents on swelling clay soils" Hipps & Atkinson 2014

Conclusions of that publication are as follows:

"1. Nine cases were studied

2. In three cases pruning eliminated foundation movement

3. In four cases pruning reduced foundation movement

4. In two cases pruning had no effect

Pruning can be used as a reasonable way of minimising risk and preventing first instance of subsidence: (30% linear crown reduction every two years).

However, if pruning rather than felling is desirable then 40 – 50% linear crown reduction is required."

Root barrier option - Root pruning as a form of mitigation is inherently unreliable as the level of excavation required could include many cubic meters of soil to be guaranteed to have removed all roots causing a nuisance, to effect such a remedy might materially make the tree unsafe or so biologically damaged as to destroy the amenity being the subject of the attempted remedy. Also, new roots will immediately seek to colonise the soil subject to the root cutting and the nuisance will recur. Due to the juxtaposition of T1 in relation to the damage, a root barrier would not be practical to instal.

Underpinning – if the tree was to continue causing seasonal soil drying following pruning then the only appropriate solution would be underpinning to stabilise foundations, the cost of which is currently estimated at £60,000. The current reserve for superstructure repairs only is £5,000.

Tree removal – The removal of any trees that are causal or contributory will allow the soil beneath foundations to rehydrate and to recover its original moisture content. However, due to a theoretical risk of adverse soil heave occurring if the tree is removed, crown reduction pruning has been recommended as a potential remedy. If crown reduction pruning fails to provide an effective remedy

then soil testing and heave calculations would be required prior to considering entire removal of the tree.

Drains - There are apparent issues in relation to drains, but soil softening/washing by an escape of water is not considered to be a factor in the damage. This is confirmed by the dry condition of the soil beneath foundations.

RECOMMENDATIONS

Oak T1 –Reduce height from 16.5m to circa 14m and Reduce lateral RADIUS to 8m which would leave a lateral SPREAD of 16m leaving balanced crown, leaving a well-balanced crown (in accordance with BRE IP7/06 “Pruning trees to reduce water use” to mitigate root induced clay shrinkage subsidence. (subject to TPO consent being granted).

Statutory Controls – The Oak T1 is covered by a Tree Preservation Order administered by the London Borough of Hillingdon, therefore an application is required and consent needs to be granted prior to any tree works occurring.

The tree is located within the rear garden of the risk address.

RESERVES

Superstructure repairs - **£5,000**
Estimated Engineering solutions - **£60,000**

Yours faithfully

Chris Davies **Dip.Arb.(RFS), F.Arbor.A**

Arboricultural Consultant - Subsidence Team
Crawford & Company

Standard References:

Anon, British Standard BS 5837 (2012), "Trees in Relation to Design, Demolition & Construction, Recommendations", British Standards Institute. London.

Anon, British Standard BS 3998 (2010), "Tree Work - Recommendations", British Standards Institute. London.

Biddle, P.G, (1998), "Tree Root damage to Buildings", Willowmead Publishing Ltd. 2 Volumes, 376 & 299 pp.

Building Research Establishment, BRE Digests 63, 64, 67, Soils & Foundations, 240, 241 & 242, Low Rise Buildings on Shrinkable Clay Soils.

Cutler, D.F., (1995), "Interactions of Tree Roots & Buildings", In Watson, G., and Neely, D., (Eds.), Proceedings of Trees & Buildings Conference, Lisle, Illinois, ISA Publications.

Cutler, D.F. and I.B.K. Richardson, (1989). Tree Roots and Buildings. Longman Scientific and technical. 2nd Ed. 71pp.

Gasson, P.E. and Cutler, D.F. (1990) Tree root plate morphology. Arboric. Journal 14, 193-264

Hipps, N.A., Atkinson, C.J. & Griffiths, H. 2006. "Pruning Trees to Reduce Water Use". Information Paper 7/06 Building Research Establishment. Watford UK. 8pp.

Lonsdale L (1999) Principles of Tree Hazard Assessment and Management HMSO

Marshall, D., D. Patch and M. Dobson, (1997) Root barriers and building subsidence. Arbor Practice Note 4, AAIS. 8pp.

Mattheck, C. and Breloer, H. (1994) The body language of trees. HMSO 240 pp

Matheny N.P & J.R.Clarke, (1994), "A photographic guide to the Evaluation of hazard trees in urban areas", 2nd Edition, International Society of Arboriculture.

Mercer G, A Reeves and D O'Callaghan "The Relationship between Trees, Distance to Buildings and Subsidence Events on Shrinkable Clay Soil" Arboricultural Journal 2011, Vol. 33, pp. 229–245, © AB Academic Publishers 2011

Shigo, A.L., (1986) A new tree biology. Shigo & trees, associates, Durham, New Hampshire, USA, 595 pp

Shigo, A.L. (1991) Modern Arboriculture. Shigo & trees, associates. Durham, New Hampshire, USA , 490pp

Strouts R.G & T.G. Winter (1994) "Diagnosis of ill health in trees", HMSO 307pp

Town & Country Planning Act Part VIII (1990). Issued by the Secretary of State for the Environment, HMSO