Arboricultural Appraisal Report

Subsidence Damage Investigation at:

33 St. Martins Approach
Ruislip
HA4 7QH

CLIENT:	Crawford & Company
CLIENT REF:	SU2204240
MWA REF:	SUB230918-14249
MWA CONSULTANT:	Giles Mercer
REPORT DATE:	23/11/2023

SUMMARY

Statutory Controls			Mitigation (Current claim tree works)	
TPO current claim	Yes – T2, T4		Policy Holder	Yes
TPO future risk	Yes – T1		Domestic 3rd Party	Yes
Cons. Area	No		Local Authority	No
Trusts schemes	No		Other	No
Local Authority: -	London Borough of Hillingdon			

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Introduction

Acting on instructions from Crawford & Company, the insured property was visited on 11/10/2023 to assess the potential role of vegetation in respect of subsidence damage.

We are instructed to provide opinion on whether moisture abstraction by vegetation is a causal factor in the damage to the property and give recommendations on what vegetation management, if any, may be carried out with a view to restoring stability to the property. The scope of our assessment includes opinion relating to mitigation of future risk. Vegetation not recorded is considered not to be significant to the current damage or pose a significant risk in the foreseeable future.

This is an initial appraisal report and recommendations are made with reference to the technical reports and information currently available and may be subject to review upon receipt of additional site investigation data, monitoring, engineering opinion or other information.

This report does not include a detailed assessment of tree condition or safety. Where indications of poor condition or health in accessible trees are observed, this will be indicated within the report. Assessment of the condition and safety of third-party trees is excluded and third-party owners are advised to seek their own advice on tree health and stability of trees under their control.

Property Description

The property comprises a 2 storey detached house with a single-storey addition to the rear.

External areas comprise gardens to the front and rear.

The site is generally level with no adverse topographical features.

Damage Description & History

Damage relates to the rear extension where cracking indicates downward movement.

For a more detailed synopsis of the damage please refer to the building surveyor's technical report.

We have not been made aware of any previous claims.

Site Investigations

Site investigations were carried out by Auger on 02/02/2023, when a single trial pit was excavated to reveal the foundations, with a borehole sunk through the base of the trial pit to determine subsoil conditions.

Foundations:

Ref	Foundation type	Depth at Underside (mm)
TP/BH1	Concrete	800

Soils:

Ref	Description	Plasticity Index (%)	Volume change potential (NHBC)
TP/BH1	Brown fine to medium gravelly silty CLAY	40 - 46	High

Roots:

Ref	Roots Observed to depth of (mm)	Identification	Starch content
TP/BH1	800	*Quercus* spp.	Present
TP/BH1	800	*Prunus* spp.	Present

Quercus spp. are Oaks.
Prunus spp. are Cherries, Plums and Damsons, Almonds, Peaches and Apricots, Blackthorn/Sloe, as well as the shrubby Cherry-laurel and Portugal-laurel.

Drains: No information available at the time of writing.

Monitoring: Crack and level monitoring are in progress. Level monitoring to date shows recovery during the winter months and downwards movement during the summer consistent with vegetation related clay shrinkage subsidence.

Discussion

Opinion and recommendations in this report are made on the understanding that Crawford & Company have identified clay shrinkage subsidence as a cause of building movement and damage.

Site investigations and soil test results have confirmed a plastic clay subsoil susceptible to undergoing volumetric change in relation to changes in soil moisture. A comparison between moisture content and the plastic and liquid limits suggests moisture depletion at the time of sampling in TP/BH1 at depths beyond normal ambient soil drying processes such as evaporation indicative of the soil drying effects of vegetation.

Roots were observed to a depth of 0.8m bgl in TP/BH1 and recovered samples have been positively identified (using anatomical analysis) as *Quercus* spp. (Oak) and *Prunu*s spp., the origin of which will be the Oak trees (T2 and T4) and the Laurel hedge (H1).

Irrespective of the identification of recovered root samples, the roots of the Hornbeam (T5) are also likely to be present below foundation level in proximity to the area of movement/damage and influencing soil moisture and volumes.

Based on the technical reports currently available, engineering opinion and our own site assessment we conclude the damage is consistent with shrinkage of the clay subsoil related to moisture abstraction by vegetation. Having considered the information currently available, it is our opinion that the Hornbeam (T5) and the Laurel hedge (H1) the principal cause of or the current subsidence damage.

Whilst the influence of the Oak is confirmed by the root identification the trees are positioned at the limit of their normally accepted influencing distance and their influence will in our view be secondary to that of H1 and T5.

If an arboricultural solution is to be implemented to mitigate the influence of the implicated trees/vegetation we recommend that the Hornbeam (T5) and the Laurel hedge (H1) are removed and the Oaks (T2 and T4) reduced. Other vegetation recorded presents a potential future risk to building stability and management is therefore recommended.

Consideration has been given to pruning alone as a means of mitigating the vegetative influence, however in this case, this is not considered to offer a viable long-term solution due to the proximity of the responsible vegetation.

Recommended tree works may be subject to change upon receipt of additional information.

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.

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	Oak	23	800 *	21	26.7	Similar Age to Property	Policy Holder
Management history		No significant recent management noted.					
Recommendation		Reduce height to ~18m and spread to ~16m balancing the crown. Prune on a 3-5 year cycle to maintain broadly at reduced dimensions as necessary.					
T4	Oak	23	800 *	21	28.5	Similar Age to Property	Policy Holder
Management history		No significant recent management noted.					
Recommendation		Reduce height to ~18m and spread to ~16m balancing the crown. Prune on a 3-5 year cycle to maintain broadly at reduced dimensions as necessary.					
T5	Hornbeam	4.5 *	40 Ms *	2.5	1.3	Younger than Property	Third Party 31 St Martins Approach HA4 7QH
Management history		No significant recent management noted.					
Recommendation		Remove (fell) to near ground level and treat stump to inhibit regrowth.					
H1	Laurel	3	125 Ms *	3.5	2	Younger than Property	Boundary Policy Holder and/or Third Party 31 St Martins Approach HA4 7QH
Management history		Managed hedge.					
Recommendation		Remove (fell) to near ground level and treat stumps 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	Scots Pine	15.5	600 *	11	10.7	Younger than Property	Policy Holder
Management history		No significant recent management noted.					
Recommendation		Maintain broadly at no more than current dimensions by periodic pruning.					
T3	Oak	14	475 *	14	23 *	Similar Age to Property	Third Party 29 St Martins Approach HA4 7QH
Management history		No significant recent management noted.					
Recommendation		Do not allow to exceed current dimensions.					
H2	Cypress	3.5	150 Ms *	2.5	3.2	Younger than Property	Boundary Policy Holder and/or Third Party 35 St Martins Approach HA4 7QH
Management history		Managed hedge.					
Recommendation		Do not allow to exceed current dimensions.					
H3	Laurel	2.5	100 Ms *	2	2.5	Younger than Property	Policy Holder
Management history		Managed hedge.					
Recommendation		Do not allow to exceed current dimensions.					

Ms: multi-stemmed * Estimated value

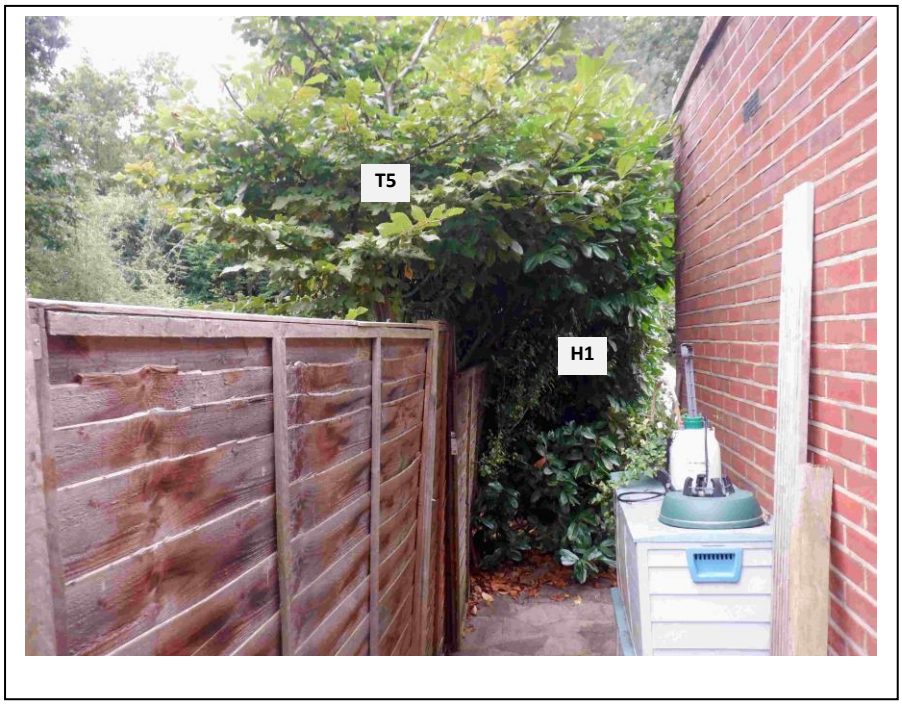
Site Plan

Plan not to scale – indicative only

Approximate areas of damage

Images

View of the front elevation and H3



View of H1 & T5

View of H1

View of H2

View of the rear elevation

View of H1 & T1

View of T2 & T4

View of T3

Management of vegetation to alleviate clay shrinkage subsidence.

All vegetation requires water to survive which is accessed from the soil. Clay soils shrink when water abstracted by vegetation exceeds inputs from rainfall, which typically occurs during the summer months. When deciduous vegetation enters dormancy and loses its leaves and rainfall increases during the winter months, soil moisture increases and the clay swells. (Evergreen trees and shrubs use minimal/negligible amounts of soil water during the winter).

Buildings founded on clay are susceptible to movement as the clay shrinks and swells which can result in cracking or other damage.

Where damage does occur, pruning (reducing leaf area) can in some circumstances be effective in restoring stability however, removal of the influencing vegetation (trees, shrubs, climbers) causing the ground movement offers the most predictable and quickest solution in stabilising the clay and hence the building and for this reason is frequently initially recommended as the most appropriate solution.

Often this is unavoidable due to the size or number of influencing trees, shrubs etc and their proximity to the building. Very heavy pruning of some species to a level required to effectively control its water use can result in the trees decline and ultimately death and is one factor considered when making recommendations for remedial tree works. Pruning alone, whilst reducing soil moisture uptake is often an unpredictable management option in restoring building stability either in the short or long term.

In some circumstances however, where vegetation initially recommended for removal is subsequently pruned and monitoring indicates the building has stabilised, removal becomes unnecessary with decisions based on best evidence available at the time.