

Addendum Arboricultural Report

Subsidence Damage Investigation at:

61 Lodge Lane
Hassocks
BN6 8LX



CLIENT:	Crawford & Company
CLIENT REF:	SU2103539
MWA REF:	SUB220113-9789Rev01
MWA CONSULTANT:	Mark Bisley (BSc Hons)
REPORT DATE:	01/02/2022
REVISION DATE: Rev01	22/05/2023

SUMMARY

Statutory Controls		Mitigation (Current claim tree works)	
TPO current claim	No	Policy Holder	Yes
TPO future risk	No	Domestic 3 rd Party	No
Cons. Area	No	Local Authority	No
Trusts schemes	No	Other	No
Local Authority: -	Mid Sussex District Council		

Introduction

This is an addendum to our initial appraisal report dated 01/02/2022 and has been produced following mitigation works, level monitoring, additional site investigations and a root radar survey. 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.

Acting on instructions from Crawford & Company, the insured property was visited on 25/01/2022 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 two storey, detached house, built c. 1900. There is a garage to the right, a single storey extension to the rear left and conservatory 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

The property was the subject of a previous claim for subsidence in the 1970s when underpinning was employed but no details are available. The floor slab was also partially underpinned in 2005 when the left side of the dwelling and central hall were included. The garage, conservatory and two rooms to the right of the main dwelling were not included.

The current damage affects the right side of the dwelling in areas not previously underpinned. Internal and external cracking is present on both floors. It was first noticed in 1999 but with the most recent episode in 2018/2020.

At the time of the engineer's inspection (19/10/2021) the structural significance of the damage was found to fall within Category 2 (slight) of Table 1 of BRE Digest 251. For a more detailed synopsis of the damage please refer to the building surveyor's technical report.

Site Investigations

Initial site investigations were carried out by Auger on 09/12/2021, when a single trial pit was hand excavated to reveal the foundations, with a borehole sunk through the base of the trial pit to determine subsoil conditions. A remote borehole was also sunk to the rear of the dwelling to allow installation of a deep datum. A drains survey was also undertaken.

A second investigation was conducted by Fastrack on 21/04/2023 when an additional two trial pits and boreholes were sunk.

Foundations:

Ref	Foundation type	Depth at Underside (mm)
TH1 09/12/21	Brick corbel	700
TP1 21/04/23	Concrete	1200
TP2 21/04/23	Concrete	1000

Soils:

Ref	Description	Plasticity Index (%)	Volume change potential (NHBC)
TH1 09/12/21	Moist, stiff, silty, fine to medium gravelly CLAY to 3.10m. Terminated at 3.10m.	42 – 49	High
TP/BH1 21/04/23	CLAY to 3.00m. Terminated at 3.00m.	43	High
TP/BH2 21/04/23	CLAY to 3.00m. Terminated at 3.00m.	51	High

Roots:

Ref	Roots Observed to depth of (mm)	Identification	Starch content
TH1 09/12/21	700	<i>Leguminosae spp.</i>	Absent
TP/BH1 21/04/23	2000	<i>Rosa spp.</i> <i>Quercus spp.</i>	Present Present
TP/BH2 21/04/23	2000	<i>Fraxinus spp.</i> <i>Quercus spp.</i>	Present Present

Leguminosae spp. includes false acacia, honey locust, Judas tree, laburnum, wisteria, broom and lupins.

Rosa spp. are roses.

Quercus spp. are oaks.

Fraxinus spp. are ash.

Drains: The drains have been surveyed and defects identified, although leaking drains are concluded not to be a cause of the current damage.

Monitoring: Level monitoring is in progress.

Discussion

Opinion and recommendations are made on the understanding that Crawford & Company are satisfied that the current building movement and the associated damage is the result of clay shrinkage subsidence and that other possible causal factors have been discounted.

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 did not suggest moisture depletion at the time of sampling for the initial site investigation. Moisture depletion was present in TP/BH1 and was near the threshold in TP/BH2 during the 2023 investigation.

A comparison of soil suction data with Table 1 of BRE Digest 412 suggests severe to very severe desiccation (398 – 1150kPa) in TH1 09/12/21.

Roots were observed to a depth of 700mm bgl in TH1 09/12/21 and recovered samples have been positively identified (using anatomical analysis) as *Leguminosae spp.*, the origin of which could not be determined at the time of our survey. The sample was however noted to be very thin and this identification was therefore tentative.

Roots were observed to a depth of 2000mm bgl in TP/BH1 21/04/23 and recovered samples have been positively identified (using anatomical analysis) as *Rosa spp.* and *Quercus spp.*, the origin of which will be SG1 and T1 respectively, confirming their influence on the soils below the foundations.

SG1 is not considered to be a major factor due to the extent of the moisture depletion.

Roots were observed to a depth of 2000mm bgl in TP/BH2 21/04/23 and recovered samples have been positively identified (using anatomical analysis) as *Fraxinus spp.* and *Quercus spp.*, the origin of which will be H2 and T1 respectively, confirming their influence on the soils below the foundations.

Irrespective of the identification of recovered root samples, the roots of T5 are also likely to be present below foundation level in proximity to the area of movement/damage and influencing soil moisture and volumes. This tree, however, is not considered to be of sufficient size to cause the level of desiccation suggested by the soil suction values.

We understand that the ash within H2 and T5 were removed in June 2022 as per our recommendations, so would not be a factor in the moisture depletion in the latest site investigation. T1 was not subject to works.

The root radar report shows extensive rooting below the front garden. There is a large number of roots associated with the hawthorn hedge on the front boundary, but roots are also present closer to the dwelling across the entire garden.

Level monitoring for the period 04/01/2022 to 16/03/2023 shows some ongoing seasonal movement at the majority of pins, but this is not generally of high amplitude. The exception is Pin 9 (and to a lesser extent Pin 10) which shows a high amplitude of seasonal movement indicative of the action of vegetation.

Pin 9 is located approximately at the location of SG1 but this is far too small to be the cause of the movement. This is also the approximate location of TP/BH1 which was found to contain oak roots.

We do note the presence of drains in this area, but no defects leading to an escape of water were found. Run 2 was previously patched but this is not close to Pin 9 so root proliferation due to a past leak in that location is not thought significant.

There is therefore no clear indication as to why, based upon the type, size and location of vegetation, it is impacting this location more than any other, although the evidence does clearly show this to be the case.

The presence of significant rooting across the whole garden, oak roots identified in the site investigation and the presence of very severe desiccation in as wet a year as 2021 suggests strongly that T1 is a significant factor in the damage.

The tree is older than the dwelling and of considerable size and age so retention is likely to be desirable, but the type of heavy reduction required to address subsidence has the potential to result in decline and death of mature trees. It would therefore be advisable to assess the potential impacts from the loss of the tree before such works are conducted.

If an arboricultural solution is to be implemented to mitigate the influence of the implicated trees/vegetation we still recommend that T1 is reduced to previous pruning points, but that further works are conducted on a shorter rotation in order to minimise the potential for vigorous regrowth to affect the dwelling.

Recommended tree works may be subject to change upon receipt of additional information. Other vegetation recorded presents a potential future risk to building stability and management is therefore recommended.

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	English Oak	13	1010	10	12	Older than Property	Policy Holder
Management history		Subject to past management/pruning - appears regularly pruned.					
Recommendation		Original recommendation: Reduce to previous pruning points. Repeat reduction on a triennial cycle to maintain at broadly reduced dimensions. New recommendation: Reduce to previous pruning points. Repeat reduction on a biennial cycle to maintain at broadly reduced dimensions.					
T5	Autumn olive	5.5	135 Ms	8	7	Younger than Property	Policy Holder
Management history		Subject to past management/pruning - appears regularly pruned.					
Recommendation		Remove (fell) to near ground level and treat stump to inhibit regrowth. Completed June 2022.					
H2	Includes Ivy, Ash	2.5 to 5	65 *	2 *	1	Younger than Property	Policy Holder
Management history		Subject to past management/pruning - appears regularly trimmed. Ash saplings established behind olive.					
Recommendation		Remove (fell) ash trees to near ground level and treat stumps to inhibit regrowth. Do not allow remainder to exceed current dimensions. Completed June 2022.					

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
T2	Birch	13	310	8	9	Younger than Property	Policy Holder
Management history		No significant recent management noted.					
Recommendation		Do not allow to exceed current dimensions.					
T3	Japanese Maple	3	80	3	4	Younger than Property	Policy Holder
Management history		Subject to past management/pruning - appears regularly pruned.					
Recommendation		Do not allow to exceed current dimensions.					
T4	Apple	3	80	4	10	Younger than Property	Policy Holder
Management history		Subject to past management/pruning - appears regularly pruned.					
Recommendation		Do not allow to exceed current dimensions.					
SG1	Abelia, Rose	1.5	5 Ms *	1	0	Younger than Property	Policy Holder
Management history		Subject to past management/pruning - appears regularly pruned.					
Recommendation		Do not allow to exceed current dimensions.					
G1	Bamboo, Hazel, Rose, Privet	4.5	85	4	3.5	Younger than Property	Policy Holder
Management history		Subject to periodic reduction as part of an ongoing management regime.					
Recommendation		Maintain broadly at no more than current dimensions by periodic pruning.					

Ms: multi-stemmed

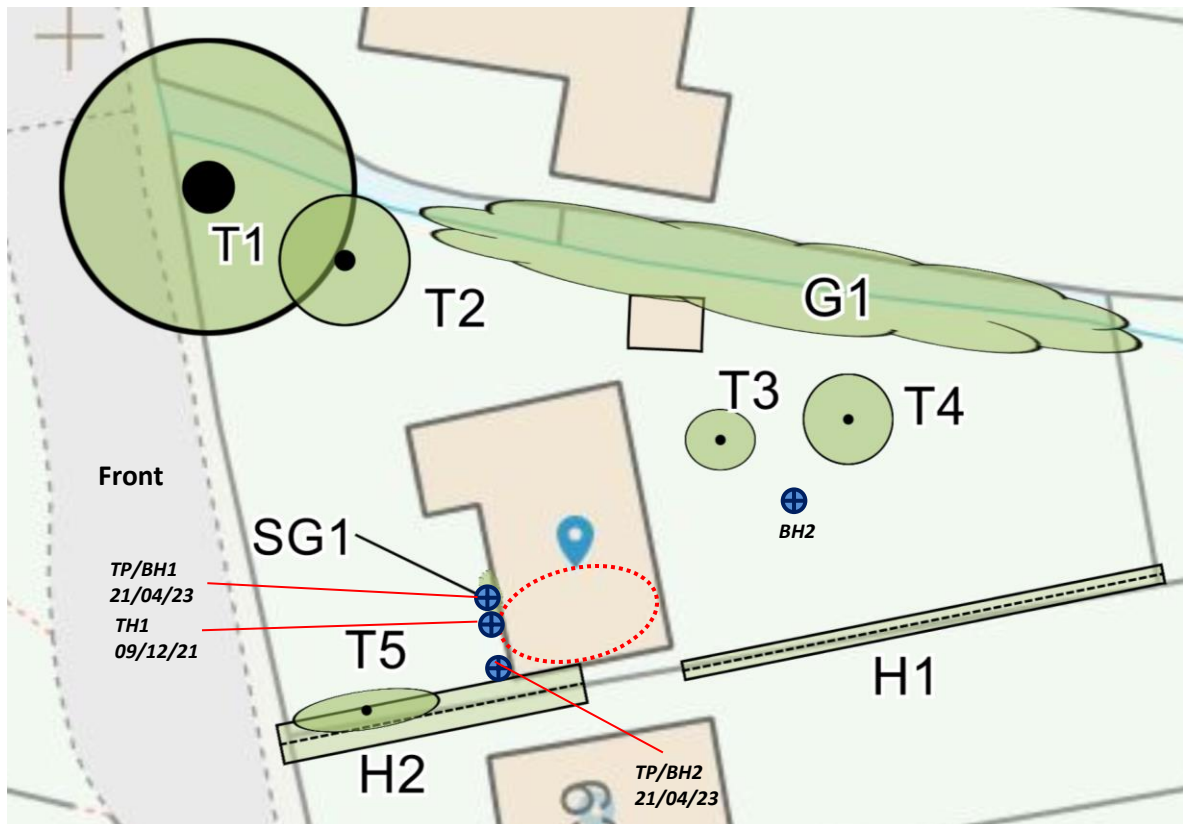
* Estimated value

Table 2 **Future Risk - Tree Details & Recommendations Cont'd**

Tree No.	Species	Ht. (m)	Dia. (mm)	Crown Spread (m)	Dist. to building (m)	Age Classification	Ownership
H1	Includes Honeysuckle, Ivy, Ash	2.5	10 Ms *	0.5 *	1	Younger than Property	Joint Policy Holder & 63 Lodge Lane BN6 8LX
Management history		Subject to past management/pruning - appears regularly trimmed.					
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

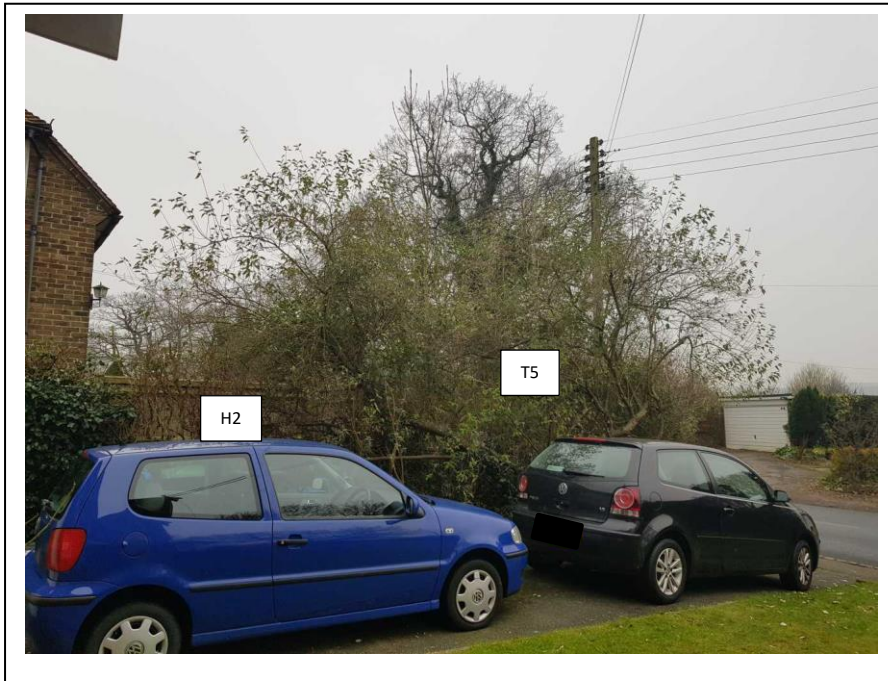
Images



View of T1 from front right



View of vegetation to front right



View of T5 and H2



View of H1

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.