Arboricultural Appraisal Report

Subsidence Damage Investigation at:

10 Bewley Crescent
Lacock
Chippenham
SN15 2PL



CLIENT:	Crawford & Company
CLIENT REF:	SU2204978
MWA REF:	SUB221104-11114
MWA CONSULTANT:	David Williams (N.D.Arb MArborA)
REPORT DATE:	05/05/2023

SUMMARY

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

MWA Arboriculture Ltd
Bloxham Mill Business Centre
Barford Rd, Bloxham
Banbury
OX15 4FF

Tel: 0191 432 9560
Email: office@mwaarboriculture.co.uk

Introduction

Acting on instructions from Crawford & Company, the insured property was visited on 23/11/2022 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 semi-detached dwelling dating back to c.1930. A single storey extension was added to the right-hand side in 2015.

External areas comprise gardens to the front and rear.

The site slopes downhill towards the right-hand side and rear.

Damage Description & History

The current damage affects the single storey right-hand kitchen extension where external cracking was noted during our survey. Damage was first noted during September 2022.

For a more detailed synopsis of the damage please refer to the building surveyor's site survey notes.

At the time of the building surveyor's inspection on 24/10/2022 the structural significance of the damage was found to fall within Category 3 (moderate) of Table 1 of BRE Digest 251.

We have not been made aware of any previous claims.

Site Investigations

Site investigations were carried out by Auger on 27/01/2023 when two trial pits were excavated to reveal the foundations, with a borehole sunk through the base of the trial pit to determine subsoil conditions. A control borehole was sunk to the rear. A drainage survey was also undertaken.

Foundations:

Ref	Foundation type	Depth at Underside (mm)
TP1	Concrete	1050
TP2	-	-

Soils:

Ref	Description	Plasticity Index (%)	Volume change potential (NHBC)
TP/BH1	Very dry hard brown medium gravelly CLAY	21 - 36	Medium
BH2	Dry very stiff brown silty CLAY	28 - 44	Medium - High

Roots:

Ref	Roots Observed to depth of (mm)	Identification	Starch content
TP/BH1	1050	*Quercus or Castanea spp.*	Absent
TP/BH1	1550	Oleaceae fm.	Present
BH2	500	*Quercus or Castanea spp.*	Present

Quercus spp. are oaks (both deciduous and evergreen).
Castanea spp. include sweet chestnut and are related to oaks
Oleaceae spp. includes Lilac, Privet, Forsythia, Olive, Jasmine, Osmanthus, Phillyrea and Forestiera.

Drains: The drains have been surveyed and no significant defects identified.

Monitoring: No information available at the time of writing

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 residual moisture depletion at the time of sampling at depths beyond normal ambient soil drying processes such as evaporation indicative of the soil drying effects of vegetation.

Roots originating from T1 has been recovered from BH1 and BH2 confirming the presence of roots and drying action of this tree below the area of damage. Root activity from C1 was also detected although this feature does not have the soil drying capacity to be materially significant in respect of the current damage.

Irrespective of the identification of recovered root samples, the roots of T2 and SG1 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 drying action of T1 is the principal cause of the current subsidence damage. The causal role of T2 cannot be ruled out based on its size, species and proximity. The removal of closest elements from SG1 is precautionary as their influence is secondary to that of T1 and possibly T2.

Consideration has been given to pruning (T1) 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.
- 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
T1	Oak	14.0	550*	18.0*	11.7	Older than extension	Third Party 9 Bewley Crescent SN15 2PL
Management history		No significant recent management noted. Telecom and coated LV wires through crown.					
Recommendation		Remove and treat stump to inhibit regrowth.					
T2	Weeping willow	10.0*	400*	13.0*	16.8	Older than extension	Third Party The National Trust Of Heelis Kemble Drive SN2 2NA
Management history		No recent management noted.					
Recommendation		Reduce to 5.0m in height and 6.0m spread removing regrowth triennially. May be subject to review should movement persist.					
SG1	Hazel, Laburnum, Magnolia	2.5-3.6*	M/S <100	5.0	1.0*	Similar age to extension	Third Party 9 Bewley Crescent SN15 2PL
Management history		Subject to past reduction/pruning.					
Recommendation		Remove elements closest to kitchen extension to achieve a minimum clearance of 3.0m. Treat / grub-out 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
T3	Norway maple	4.0	M/S 200*	3.0	12.0*	Younger than property	Third Party 9 Bewley Crescent SN15 2PL
Management history		Subject to recent crown reduction.					
Recommendation		Maintain broadly at no more than current dimensions by periodic pruning.					
T4	Apple	2.8	M/S 200	3.2	1.8	Younger than property	Policy Holder
Management history		Subject to past reduction/pruning.					
Recommendation		Do not allow to exceed current dimensions.					
S1	Viburnum	2.1	M/S	2.5	3.2	Younger than property	Policy Holder
Management history		Subject to past reduction/pruning.					
Recommendation		Do not allow to exceed current dimensions.					
H1	Cypress	1.9	M/S	20.0+	7.9	Younger than property	Policy Holder
Management history		Managed hedge.					
Recommendation		Do not allow to exceed current dimensions.					
H2	Cypress	3.5	M/S 160*	20.0	0.6	Younger than property	Policy Holder
Management history		Managed hedge.					
Recommendation		Reduce to 2.5m in height and manage at reduced dimensions through annual pruning.					

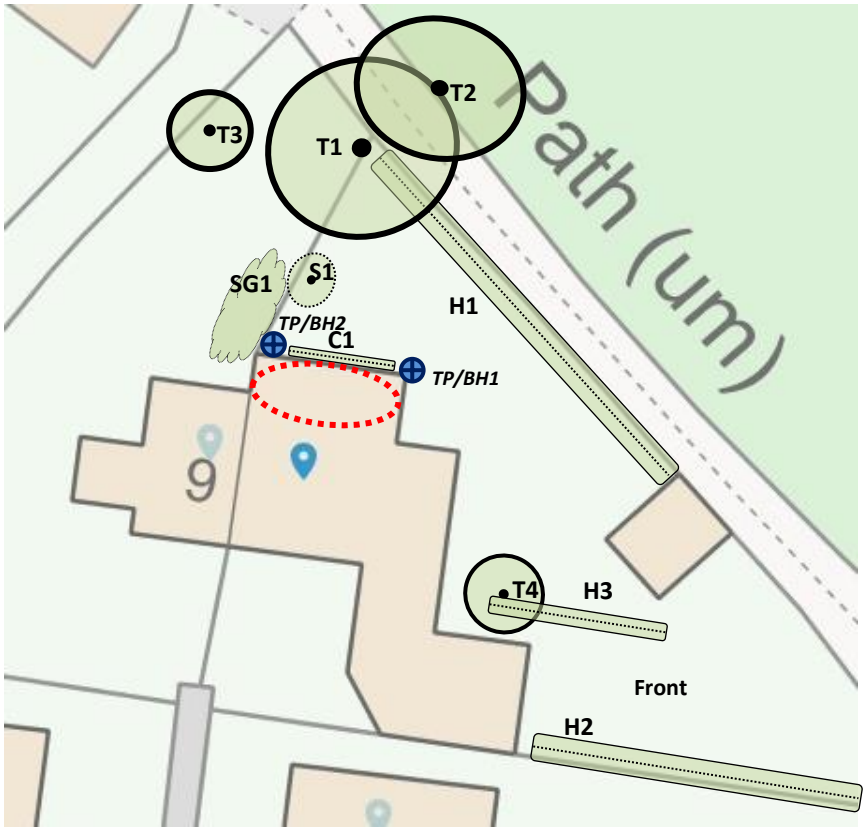
Ms: multi-stemmed * Estimated value

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
H3	Beech	2.0	M/S	10.0	1.6	Younger than property	Policy Holder
Management history		Managed hedge.					
Recommendation		Do not allow to exceed current dimensions.					
C1	Jasmine	1.2	M/S	5.5	0.0	Younger than property	Policy Holder
Management history		Low-level climber.					
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 extension, T1, T2 and H1



View of kitchen extension and S1



View of damaged extension



View of T1 and T2 with H1 (hedge) in foreground



View of T1 and T2



View of basal area of T1 just beyond rear steps

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.