Arboricultural Appraisal Report

Subsidence Damage Investigation at:

2 Acer Way
Cleckheaton
West Yorkshire
BD19 6JQ

CLIENT:	Crawford & Company
CLIENT REF:	SU2205242
MWA REF:	SUB221130-11505
MWA CONSULTANT:	John Graham B.Sc. Hons PhD
REPORT DATE:	05/03/2023

SUMMARY

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

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Introduction

Acting on instructions from Crawford & Company, the insured property was visited on 20/12/2022 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 detached 2 storey house, built in 1985, with a porch to the front, garage to the left and extension 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 current damage affects the main house and was first noticed in July 2022. For a more detailed synopsis of the damage please refer to the building surveyor's technical report.

At the time of the building surveyor's inspection (11/11/2022) the structural significance of the damage was found to fall within Category 1 (very slight) 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 20/12/2022, when 2 trial pits were hand 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	Stone	1,100
TP/BH2	Concrete	1,000

Soils:

Ref	Description	Plasticity Index (%)	Volume change potential (NHBC)
TP/BH1	Brown fine to medium gravelly silty CLAY	50 - 53	High
TP/BH2	Brown fine to medium gravelly silty CLAY	40 - 52	High

Roots:

Ref	Roots Observed to depth of (mm)	Identification	Starch content
TP/BH1	1,600	Fraxinus spp.	Positive
TP/BH2	1,000	Cupressaceae spp.	Positive
TP/BH2	1,500	Fraxinus spp.	Negative

Fraxinus spp. include common ash.
Cupressaceae spp. include Lawson cypress, western red cedar, Monterey cypress, Leyland cypress and junipers

Drains: No information available at the time of writing.

Monitoring: No information available at the time of writing.

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 suggests moisture depletion at the time of sampling in TP/BH1 and 2 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 1,600mm and 1,500mm bgl in TP/BH1 and TP/BH2, respectively, and recovered samples have been positively identified (using anatomical analysis) as ash, the origin of which will be T2 and/or T4 confirming their influence on the soils below the foundations. Cypress roots were also recovered from TP/BH2 at 1,000mm bgl, and will originate from H1 – however this is regarded as at most a secondary factor due to its well-maintained state. Irrespective of the identification of recovered root samples, the roots of T3 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 T2, T3 and T4 are the principal cause of or are materially contributing to the current subsidence damage.

If an arboricultural solution is to be implemented to mitigate the influence of the implicated trees/vegetation we recommend that T2, T3 and T4 are removed. 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.
- 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
T2	Ash	13	360	12	5	Older than extension(s)	Third Party Minton Homes Limited of 1st Floor, Blayd's Mews, LS1 4AD
Management history		No significant recent management noted.					
Recommendation		Remove (fell) to near ground level and treat stump to inhibit regrowth.					
T3	Horse Chestnut	14	470	9	6	Older than extension(s)	Third Party Minton Homes Limited of 1st Floor, Blayd's Mews, LS1 4AD
Management history		No significant recent management noted.					
Recommendation		Remove (fell) to near ground level and treat stump to inhibit regrowth.					
T4	Ash	14	430	14	8	Older than extension(s)	Third Party Minton Homes Limited of 1st Floor, Blayd's Mews, LS1 4AD
Management history		No significant recent management noted.					
Recommendation		Remove (fell) to near ground level and treat stump 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	Maple (Japanese)	1.8	80	1.5	4	Younger than Property	Policy Holder
Management history		Subject to past management/pruning.					
Recommendation		Maintain broadly at no more than current dimensions by periodic pruning.					
H1	Cypress with ivy	2	50	0.5	1.5	Younger than Property	Policy Holder
Management history		Pruned on a regular basis.					
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 trees to the right.

View of T3 and T4.

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.