

Arboricultural Appraisal Report

Subsidence Damage Investigation at:

52 Crowlees Road
Mirfield
WF14 9JE



CLIENT:	Crawford & Company
CLIENT REF:	SU1704565
MWA REF:	SUB230831-14081
MWA CONSULTANT:	John Graham B.Sc. Hons PhD
REPORT DATE:	24/10/2023

SUMMARY

Statutory Controls		Mitigation (Current claim tree works)	
TPO current claim	Yes - T7	Policy Holder	No
TPO future risk	Yes - TG1	Domestic 3 rd Party	Yes
Cons. Area	No	Local Authority	No
Trusts schemes	No	Other	No
Local Authority: -	Kirklees Council		

Introduction

Acting on instructions from Crawford & Company, the insured property was visited on 19/09/2023 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 detached bungalow, built circa 1982, with rear 2003 extension and detached garage to the right.

External areas comprise gardens to the rear and drive to the front.

The site slopes slightly from left down to the right.

Damage Description & History

The current damage affects the main house and was first noticed in Summer 2022.

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

There was a previous claim in 2018 when the structural significance of the damage was found to fall within Category 3 (moderate) of Table 1 of BRE Digest 251.

There was also a previous MWA report ref SUB190204-3493 dated 19/02/2019.

Site Investigations

Site investigations were carried out by FASTRACK on 26/04/2023, when 2 trial pits were hand excavated to reveal the foundations, with a borehole sunk through the base of the trial pits to determine subsoil conditions. A drainage survey was also undertaken. Two trial pits were also excavated in 07/03/2018.

Foundations:

Ref	Foundation type	Depth at Underside (mm)
TP/BH1 (07/03/2018)	Concrete	640
TP/BH2 (07/03/2018)	Concrete	690
TP/BH1 (26/04/2023)	Concrete	700
TP/BH2 (26/04/2023)	Concrete	700

Soils:

Ref	Description	Plasticity Index (%)	Volume change potential (NHBC)
TP/BH1 (07/03/2018)	Grey brown silty CLAY containing gravel, claystone and dark brown mottle	11 - 18	Low
TP/BH2 (07/03/2018)	Grey brown silty CLAY with light grey, yellow & dark brown mottle, claystone and gravel	19 - 23	Low - Medium
TP/BH1 (26/04/2023)	Brown silty CLAY containing grey and orange mottle and gravel	25 - 29	Medium
TP/BH2 (26/04/2023)	Brown sandy CLAY containing gravel	-	-

Roots:

Ref	Roots Observed to depth of (mm)	Identification	Starch content
TP/BH1 (07/03/2018)	No Roots Observed	-	-
TP/BH2 (07/03/2018)	No Roots Observed	-	-
TP/BH2 (26/04/2023)	1000	<i>Acer</i> spp.	N/A
TP/BH2 (26/04/2023)	1000	<i>Lonicera</i> spp.	Present

Acer spp. are maples, including sycamore, Norway maple, and Japanese maples.

Lonicera spp. are honeysuckles, related species include *Symphoricarpos* spp. (snowberry).

Drains: The drains were surveyed in 07/03/2018 and 26/04/2023 no significant defects were identified.

Monitoring: Level monitoring is in progress.

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 carried out on 26/04/2023 and soil test results have confirmed a plastic clay subsoil susceptible to undergoing volumetric change in relation to changes in soil moisture. While a comparison of soil samples, from site investigations carried out on 07/03/2018, between moisture content and the plastic and liquid limits suggests suggested moisture depletion at the time of sampling in TP/BH1 was at depths beyond normal ambient soil drying processes such as evaporation indicative of the soil drying effects of vegetation.

Roots were observed (26/04/2023) to a depth of 1000mm bgl in TP/BH2 and recovered samples have been positively identified (using anatomical analysis) as Maple and Lonicera, the origin of which will be T6 and SG2 confirming the influence of T6 on the soils below the foundations. The vegetation within SG2 is not considered significant to the current damage. In the previous MWA report; ref SUB190204-3493 dated 19/02/2019 recommendations to remove T2, T3, T4, T5, T6, T7, H2 and SG1 and manage H1 were made. Following our recent survey we noted that the following recommendations had not been carried out in respect of the removal of T6, T7, H2 and SG1.

Irrespective of the recent root identification, the roots of T7, H2 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.

Level monitoring (initiated on 20/11/2019 with 11 subsequent readings) has suggested some cyclical patterns of movement that are indicative of the influence of vegetation on soils beneath foundation level.

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 T6, T7, H2 and SG1 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 T6, T7, H2 and SG1 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
T6	Maple (variegated)	6	130 Ms	4	2 *	Younger than Property	Third Party 37 Pinfold Lane WF14 9HZ
Management history		Subject to past management/pruning. Previously recommended for removal.					
Recommendation		Remove (fell) to near ground level and treat stump to inhibit regrowth.					
T7	Oak	15 *	650 Ms *	14	11	Older than Property	Third Party 37 Pinfold Lane WF14 9HZ
Management history		No significant recent management noted. Previously recommended for removal.					
Recommendation		Remove (fell) to near ground level and treat stump to inhibit regrowth.					
SG1	Pyracantha	2 *	Ms	2 *	1.7	Younger than Property	Joint Third Party 35 Pinfold Lane and/or 37 Pinfold Lane WF14 9HZ
Management history		Recently reduced/pruned. Previously recommended for removal.					
Recommendation		Remove (fell) to near ground level and treat stump to inhibit regrowth.					
H2	Leyland Cypress with Honeysuckle and Ivy	2 *	Ms	1.5 *	1.2	Younger than Property	Third Party 35 Pinfold Lane WF14 9HZ
Management history		Recently reduced/pruned. Previously recommended for removal.					
Recommendation		Remove (fell) to near ground level.					

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	Whitebeam	0	0	0	12	Similar Age to Property	Policy Holder
Management history		Recently removed.					
Recommendation		No works.					
T2	Whitebeam	0	0	0	7 *	Similar Age to Property	Policy Holder
Management history		Recently removed.					
Recommendation		No works.					
T3	Apple	0	0	0	3.8 *	Similar Age to Property	Policy Holder
Management history		Recently removed.					
Recommendation		No works.					
T4	Birch	0	0	0	8.6 *	Similar Age to Property	Policy Holder
Management history		Recently removed.					
Recommendation		No works.					
T5	Robinia	0	0	0	2 *	Similar Age to Property	Third Party 37 Pinfold Lane WF14 9HZ
Management history		Recently removed.					
Recommendation		No works.					

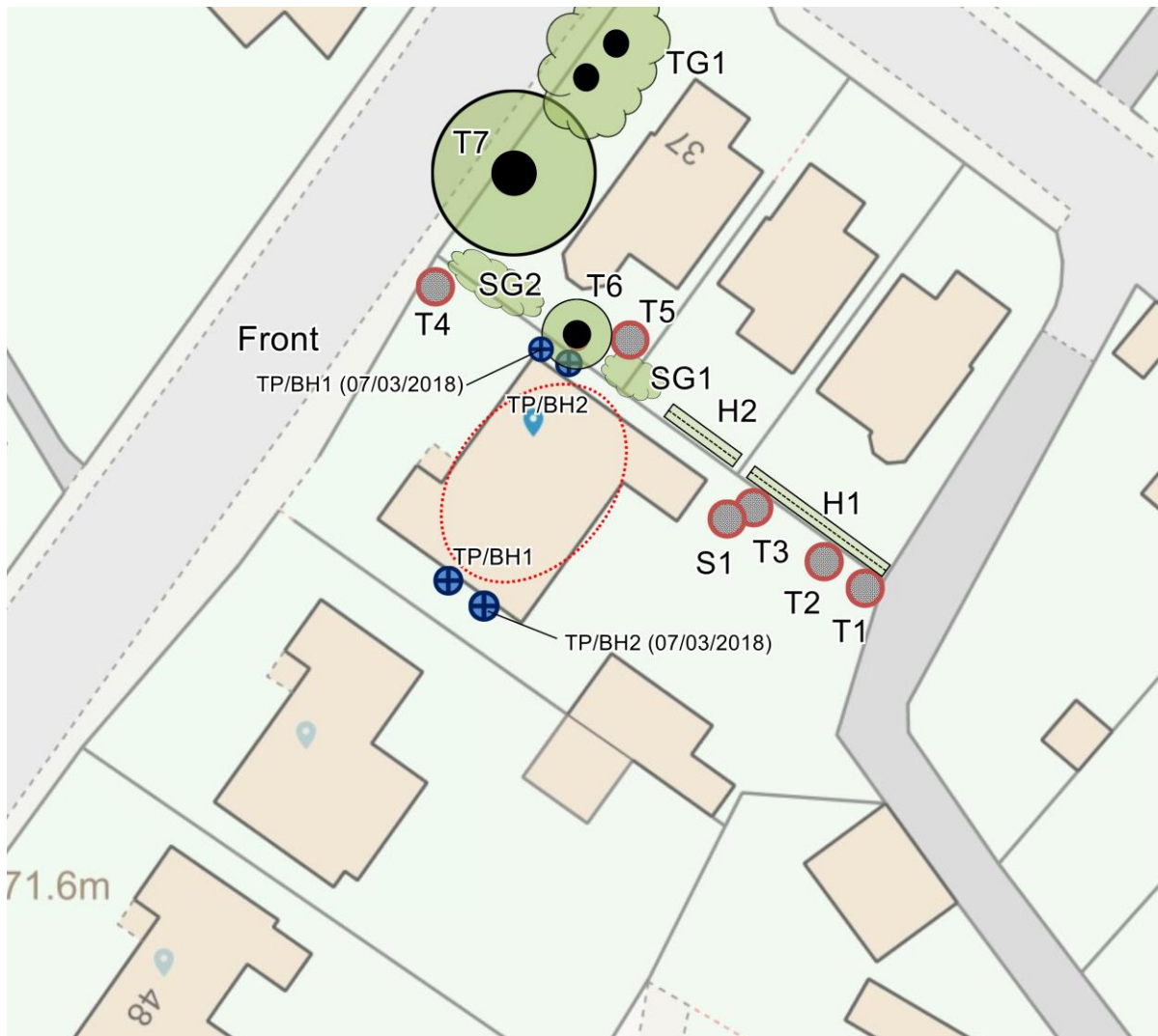
Ms: multi-stemmed * Estimated value

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
TG1	Sycamore	15 *	350 *	10 *	16.5	Younger than Property	Third Party 37 Pinfold Lane WF14 9HZ
Management history		Subject to past management/pruning.					
Recommendation		Maintain broadly at no more than current dimensions by periodic pruning.					
S1	Cotoneaster	0	0	0	2 *	Similar Age to Property	Policy Holder
Management history		Recently removed.					
Recommendation		No works.					
SG2	Cotoneaster, Lonicera, Aucuba	2 *	Ms	2 *	2	Younger than Property	Third Party 37 Pinfold Lane WF14 9HZ
Management history		Recently reduced/pruned.					
Recommendation		Maintain broadly at no more than current dimensions by periodic pruning.					
H1	Leyland Cypress	2 *	Ms	1.5	3	Younger than Property	Third Party 33 Pinfold Lane WF14 9HZ
Management history		Recently reduced/pruned.					
Recommendation		Maintain broadly at no more than current dimensions by periodic pruning.					

Ms: multi-stemmed * Estimated value

Site Plan



Plan not to scale – indicative only

 Approximate areas of damage

Images



View of T7 and TG1



View of the front left



View of the left



View of H1 and the approx. locations of removed vegetation

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.