

Arboricultural Appraisal Report

Subsidence Damage Investigation at:

9 Rosslyn Hill
London
NW3 5UL



CLIENT:	Crawford & Company
CLIENT REF:	SU1300377
MWA REF:	NW160413.03
MWA CONSULTANT:	David Mahon B.Sc. (Hons) MICFor MArborA
REPORT DATE:	19 May 2015

SUMMARY

Statutory Controls		Mitigation (current claim)	
TPO	Yes – T1, T2, T3	Insured	No
Cons. Area	Yes	3 rd Party	Yes
Trusts schemes	No	Local Authority	No
Planning	No	Other	No
Local Authority: -	London Borough of Camden		

Introduction

Acting on instructions received from Crawford & Company, the insured property was first visited on 19 April 2013 for the purpose of assessing 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.

Recommendations are given 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.

This is a revision of previous reports following receipt of additional information resulting from recent site investigations.

Property Description

The property comprises a two storey end-terrace house of traditional construction (built circa 1957) with brick walls surmounted by a ridged tiled roof. The flat roofed, brick built garage to the rear of the property is the focal point of this claim.

The property occupies a site which slopes upwards from front to rear.

Damage Description & History

The property was previously tenanted however the insured was downsizing and therefore the tenants moved out in March 2012 and the insured moved back in September 2012.

The movement to the garage was noted in March 2012 by the insured. Some mastic repairs are evident which were undertaken by the tenant as the insured was not aware of the movement prior to the discovery.

The insured instructed an Engineer to inspect in July 2012 who concluded that the third party trees were the cause of the movement.

The damage presents as various stepped tapering and horizontal cracks were noted to the left hand flank ranging up to 10mm in width; mastic repairs were evident to some of the cracks, 10mm vertical tapering crack to the rear wall at midpoint with mastic repair evident, 12mm gap evident between the concrete floor slab and right hand party wall.

At the time of the Engineers' inspection, in structural terms the damage falls into Category 3 of Table 1, Building Research Establishment Digest 251 (1995), which describes it as moderate affecting building serviceability.

Site investigations

Site investigations were originally undertaken by CET Property Assurance on the 24th July 2013. A single trial pit (TP1) was excavated at the front left hand corner of the detached garages. The Trial Pit was hand excavated in order to reveal foundation depth and design and once this information was established, a borehole (BH1) was sunk through the base of the Trial Pit in order to determine subsoil conditions.

Foundations:

Ref	Foundation type	Depth at Underside (mm)
TP/BH1	Concrete	770 mm

Soils:

Ref	Description	Plasticity Index (%)	Volume change potential (NHBC)
B/H1 770mm	MADE GROUND: very compact, dark brown, gravelly, silty sand with brick and concrete fragments and clinker Roots of live appearance to 50mmØ	n/a	n/a
B/H1 1,000mm	MADE GROUND: medium compact mid brown grey veined silty clay with partings of orange silt & fine sand, brick fragments carbon deposits & occasional gravel	46%	High
B/H1 2,000mm	Firm mid brown grey veined silty CLAY with partings of orange silt & fine sand & carbon flecks	59%	High
B/H1 3,00mm	Stiff mid brown grey veined silty CLAY with partings of orange silt & fine sand & carbon flecks	58%	High

Roots:

Ref	Roots observed at / between	Identification	Starch content
TP/BH1	2200mm	<i>Fraxinus</i> spp. (Ash)	Present

Site investigations

Further site investigations were carried out by CET Property Assurance on the 21st April 2015 when two trial pits were hand excavated through the floor slab of the garage to reveal the foundations, with a borehole being sunk through the base of the trial pit to determine subsoil conditions.

Foundations:

Ref	Foundation type	Depth at Underside (mm)
TH2	Concrete	900
TH3	Concrete	750

Soils:

Ref	Description	Plasticity Index (%)	Volume change potential (NHBC)
BH2	Stiff, mid brown, grey veined, silty CLAY	45 - 53	High
BH3	Stiff, mid brown, grey veined, silty CLAY	46 - 56	High

Roots:

Ref	Roots Observed to depth of (mm)	Identification	Starch content
BH2	3000	Acer; Fraxinus;	Present
BH3	3000	Tilia; Acer	Present

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

Fraxinus spp. include common ash.

Tilia spp. are limes.

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

Monitoring: Crack monitoring is in progress. 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 of high volume change potential (NHBC Classification) susceptible to undergoing volumetric change in relation to changes in soil moisture. Suction values for soil samples recovered during the April 2015 investigation indicate severe to very severe desiccation (BRE Digest 412). The desiccation is at depths beyond normal ambient soil drying processes such as evaporation and is indicative of the soil drying effects of vegetation.

Roots were observed to 3.0m bgl in both BH2 & BH3 and recovered samples have been positively identified (using anatomical analysis) as ash, sycamore and lime the origin of which will be trees T6, T1 and T3 respectively confirming the influence of these trees on the soils below the foundations. Whilst no roots from the birch T2 have been formally identified given the proximity of the tree to the garage it is inconceivable that roots from this tree are not present and as such it is considered to be exerting an influence on soil moisture and volumes.

No survey of the drains at the property was undertaken however, damaged or leaking drains are not considered to be a material cause of the current subsidence damage since the property drains appear to be remote from the focal point of the damage and the results of laboratory soils testing are not consistent with defective drainage as a causal factor.

Whilst foundations bear onto made ground Shear vane testing of the substrate (in combination with the absence of Mackintosh Probe test results (as the substrate was too compact)) indicate that it is sufficiently consolidated to bear the imposed load and as such the damage cannot be attributed to consolidation settlement. This is borne out by the relative age of the building and the recent appearance of damage.

Since submission of our original report an S211 notification was submitted to the council in January 2015 for the removal of T1, T2, T3, T5 and T6. Tree T5 has been removed. The council had no objection to the removal of T6 as this tree was implicated in the damage by the recovery of ash roots in the original investigations. Despite the proximity of the trees to the garage, a TPO was placed on trees T1, T2 and T3 (Ref C1135 2015).

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 available information, it is our opinion that trees T1, T2, T3 and T6 are the material cause of the current subsidence damage. If an arboricultural solution is to be implemented to mitigate the current damage and allow the soils beneath the property to recover to a position such that an effective engineering repair solution can be implemented we recommend that all of the above trees are removed.

We have given consideration to pruning as a means of mitigating the vegetative influence, however given the proximity of the trees to the garage this is not a viable alternative solution.

Replacement planting may be considered subject to species choice and planting location.

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.
- Removal of trees is recommended together with future management of retained vegetation.

Table 1 Current Claim - Tree Details & Recommendations

Tree No.	Species	Ht (m)	Dia (cm)	Crown Spread (m)	Dist. to building (m)	Age Classification	Ownership
T1	Sycamore	15	25* 25*	9	1.05	Younger than property	3 rd Party:- 7 Rosslyn Hill
Recommendation		Remove and treat stump to inhibit regrowth					
T2	Birch	15	25* 30*	14	4.70	Younger than property	3 rd Party:- 7 Rosslyn Hill
Recommendation		Remove and treat stump to inhibit regrowth					
T6	Ash	18	500*	12	15.8	Younger than property	3 rd Party:- 7 Rosslyn Hill
Recommendation		Remove and treat stump to inhibit regrowth					
T3	Lime	15	370*	12	4.0*	Younger than property	3 rd Party:- 7 Rosslyn Hill
Recommendation		Remove and treat stump to inhibit regrowth					
T5	Laburnum	7	22	5	1.0*	Younger than property	3 rd Party:- 2 Belsize Lane
Recommendation		Tree has been removed (September 2013)					

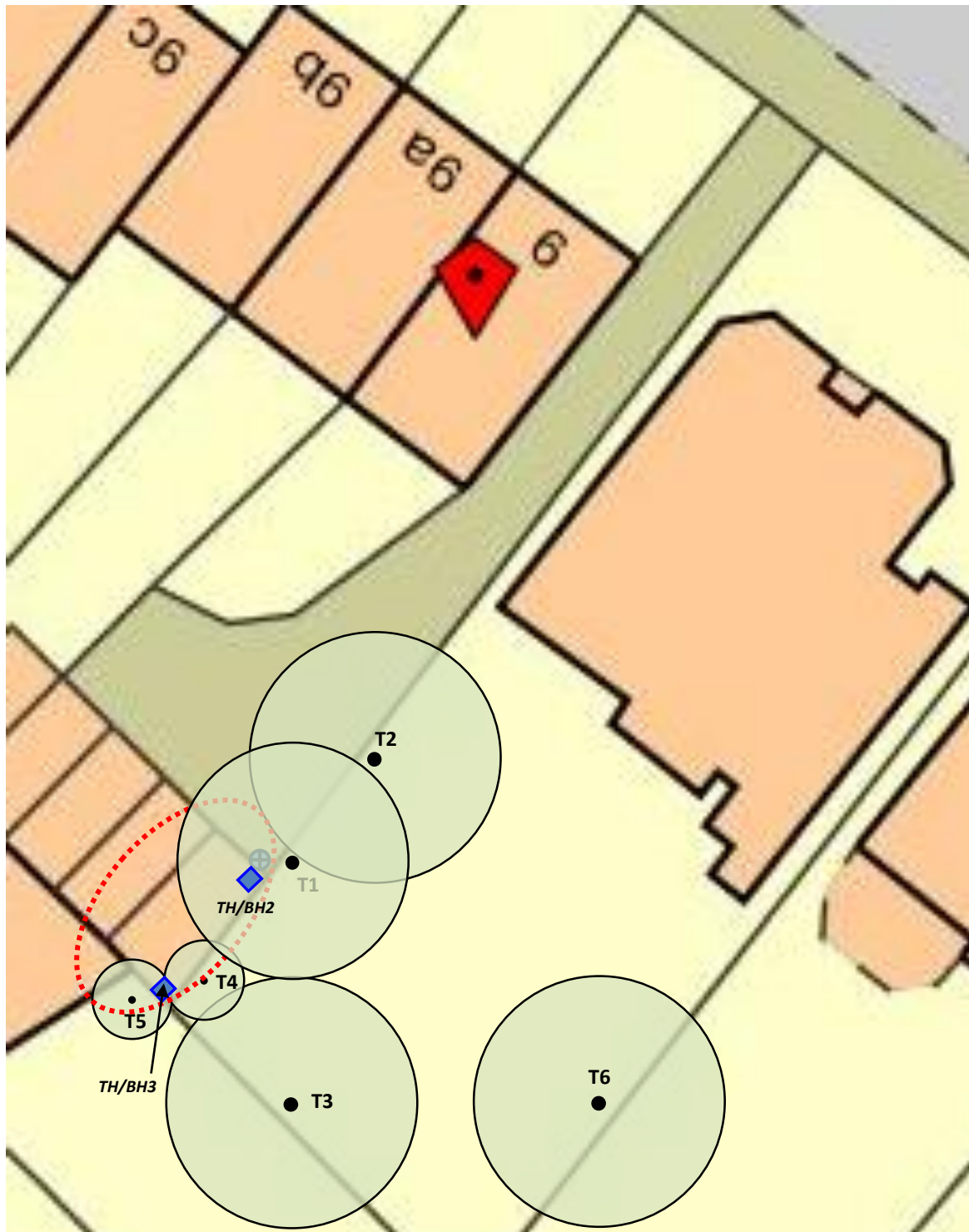
Ms: multi-stemmed * Estimated value

Table 2 Future Risk - Tree Details & Recommendations


Tree No.	Species	Ht (m)	Dia (cm)	Crown Spread (m)	Dist. to building (m)	Age Classification	Ownership
T4	Cypress	4	12	2	1.0	Younger than property	3 rd Party:- 7 Rosslyn Hill
Recommendation		Remove and treat stump to inhibit regrowth					

Ms: multi-stemmed * Estimated value

SITE PLAN



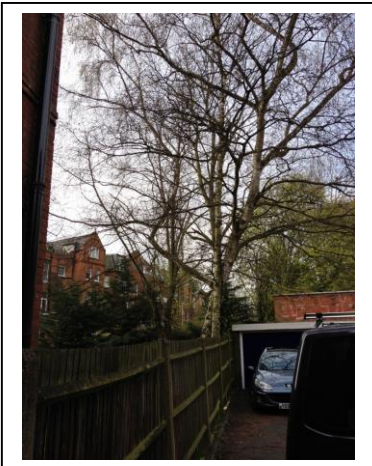
Plan not to scale – indicative only

 Approximate areas of damage

Images



View of T2 & T4



View of T1 & T2



View of T6



View of Garage