

Arboricultural Appraisal Report

Subsidence Damage Investigation at:

4B Hampstead Hill Gardens
 Hampstead
 London
 NW3 2PL



CLIENT: Crawford & Company
 CLIENT REF: SU1404491
 MWA REF: NW200315.01REV1
 MWA CONSULTANT: David Mahon (B.Sc Hons MICFor MArborA)
 REPORT DATE: 19.06.2015

SUMMARY

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

Introduction

Acting on instructions received from Crawford & Company, the insured property was visited on 01 April 2015 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 our original report following receipt of level monitoring and further engineering opinion.

Property Description

The property comprises a semi-detached 2 storey house built in 1966. External areas comprise a concrete parking area to the front and garden to the rear.

The site is generally level with no adverse topographical features.

Damage Description & History

“The property was subject of a previous subsidence claim in 2005. Three nearby TPO trees were identified as the cause of subsidence movement. These were reduced and the property stabilised. The trees have since been annually maintained however in August (2014) the Insured noticed cracking throughout the property and notified Insurers”. From Crawford and Company Technical report 18 December 2014.

Crawford and Company have recorded internal cracks throughout the building and external cracks to the front, rear and right hand elevations. The current damage was first noticed in August 2014.

At the time of the engineers’ inspection (15/12/2014) the structural significance of the damage was found to fall within Category 2 of Table 1 (slight) of BRE Digest 251.

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Site investigations

Site investigations were carried out on 13.02.2015 when 2 trial pits were hand excavated 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)
TH1	Concrete	350
TH2	Concrete	980

Soils:

Ref	Description	Plasticity Index (%)	Volume change potential (NHBC)
BH1	Firm to Very Stiff, silty CLAY	22 - 50	Medium High
BH2	Firm to Stiff, silty CLAY	47 - 49	High

Roots:

Ref	Roots Observed to depth of (mm)	Identification	Starch content
BH1	2000	Carpinus spp.	Present
BH2	2600	Carpinus spp. Leguminosae spp.	Present

Carpinus spp. are hornbeams.

Leguminosae spp. include laburnum, Robinia (false acacia or locust), broom, the pagoda tree and the climber wisteria.

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

Monitoring: Monitoring is in progress.

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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 medium to high volume change potential (NHBC Classification) susceptible to undergoing volumetric change in relation to changes in soil moisture. Based on a comparison between moisture content and the plastic and liquid limits there is evidence of desiccation in BH1. Suction values indicate very severe desiccation in BH1 and severe desiccation in BH2.

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 2000mm bgl and 2600mm in BH1 & BH2 respectively and recovered samples have been positively identified (using anatomical analysis) as *Carpinus* spp (hornbeam) and *Leguminosae* spp the origin of which will be T1 and T2 and the wisteria in G1 confirming the influence of this vegetation on the soils below the foundations.

We understand 3 trees were identified as the cause of damage in the previous claim which we assume included T1 and T2 and possibly the beech T3. The hornbeams have been subject to regular management with T1 being reduced in the very recent past however, this has clearly prevented them from causing further damage following the earlier damage claim in 2005.

The beech T3 is a large tree and has also been reduced in the recent past although its dimensions prior to the pruning is unknown. The property falls within the anticipated zone of influence of this tree although there is no positive root identification which directly implicates the tree in the damage.

The mixed species group G1 comprises relatively small plants however their collective impact on soil moisture will be significant.

Level monitoring from 16.01.2015 to 19.05.2015 shows significant uplift of the building consistent with hydration and volume recovery of the clay subsoil from a root induced desiccated state. The greatest amplitude of recovery is at pins 2 & 3 located towards the left hand end of the front elevation and is consistent with the soil drying effects of the hornbeam T1.

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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 T1 is the principal cause of damage with T2 and G1 being contributory but secondary factors.

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 repair solution can be implemented we recommend that T1, T2, the wisteria and other elements of G1 within 3.0m of the left hand flank wall are removed.

The beech T3 may also be involved however in our view the removal of the hornbeams and sections of G1 will be sufficient to restore stability. If movement persists following current claim the role of T2 may need to be reviewed.

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

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.
- If stability is not restored, the removal of T3 may need to be considered.

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	Hornbeam (<i>Carpinus</i>)	10.0	43	8.0	2.5	Younger than property	Policy Holder
Management history		Subject to periodic management and recently reduced.					
Recommendation		Remove and treat stump to inhibit regrowth					
T2	Hornbeam (<i>Carpinus</i>)	11.0	*55	*9.0	3.5	Younger than property	3 rd Party:- 6 Hampstead Hill Gardens
Management history		Subject to periodic management.					
Recommendation		Remove and treat stump to inhibit regrowth					
G1	Mixed species shrubs and small trees. Wisteria climber.	*5.0 Max.	ms	*10.0	0.0 min	Younger than property	3 rd Party:- 6 Hampstead Hill Gardens
Recommendation		Remove wisteria and all other vegetation within 3.0m of the left hand flank wall.					

Ms: multi-stemmed * Estimated value

Table 2 Future Risk - Tree Details & Recommendations

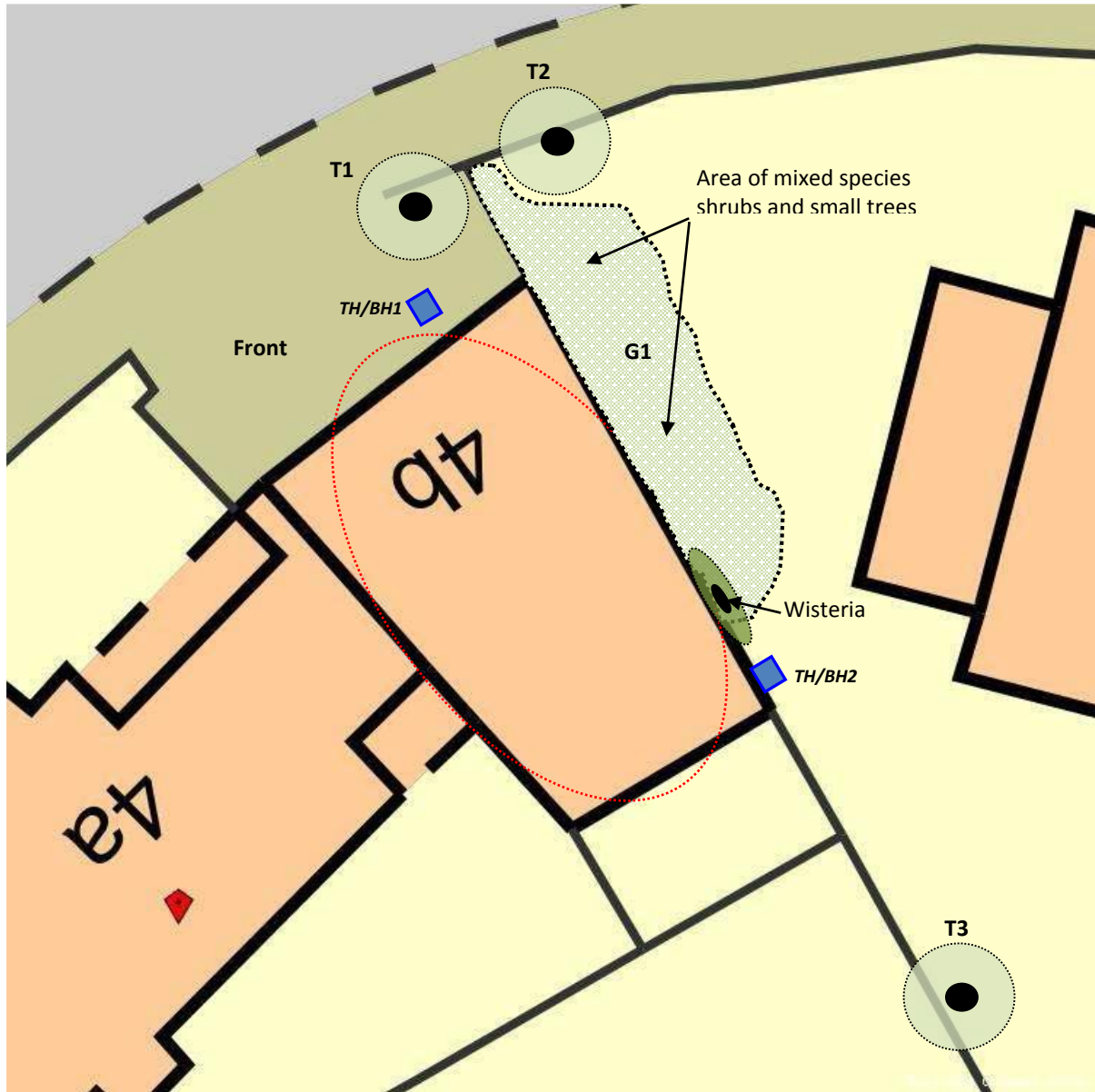
Tree No.	Species	Ht (m)	Dia (cm)	Crown Spread (m)	Dist. to building (m)	Age Classification	Ownership
T3	Beech	*20.0	*70	*10.0	10.5	Older than property	3 rd Party:- 6 Hampstead Hill Gardens
Recommendation		Do not allow to exceed current dimensions					

Ms: multi-stemmed * Estimated value


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SITE PLAN



Plan not to scale – indicative only

 Approximate areas of damage

Images



View of T1 and T2



View of T3

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View of G1



View of wisteria