Arboricultural Appraisal Report

Subsidence Damage Investigation at:

38-40 Belsize Park Gardens
London
NW3 4NA

CLIENT:	Crawford & Company
CLIENT REF:	SU1401214
MWA REF:	NW210714.01GM
MWA CONSULTANT:	Giles Mercer (B.Sc (Hons))
REPORT DATE:	04 August 2014

SUMMARY

Statutory Controls			Mitigation (current claim)	
TPO	Yes- T3, T4, T6		Insured	Yes
Cons. Area	Yes		3rd Party	No
Trusts schemes	N/A		Local Authority	Yes
Planning	N/A		Other	No
Local Authority: -	London Borough of Camden			

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Introduction

Acting on instructions received from Crawford & Company, the insured property was visited on 24 July 2014 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.

Property Description

The property comprises two large originally detached houses (built circa 1900) now joined with an infill providing access between each floor.

There is a lower ground floor and three floors above, subdivided into about 80 separate rooms that are rented out. Construction is traditional with brick walls surmounted by a pitched tiled roof. To the front are two storey bays each side of the main entrances.

External areas comprise gardens to the front and rear

The site is generally level with no adverse or unusual topographical features.

Damage Description & History

We are advised that the subsidence damage is the front left hand corner.

There is movement due to other causes to the front retaining walls, garden walls and garden paths.

We are advised that concerns have been raised recently that cracks and gaps to the front paths and boundary walls were deteriorating.

We are advised that the insured informed Engineers that the interior and exterior of the main building had been redecorated in 2009, when any cracks would have been repaired.

At the time of the engineers' inspection on the 7th May 2014 the structural significance of the damage was found to fall within Category 2 of Table 1 (slight) of BRE Digest 251.

Site investigations

Site investigations were undertaken by Auger on the 25th June 2014.

Two trial pits (TP1 & TP2) were excavated, TP1 to the front left corner of the main building and TP2 to the left hand corner of the front bay window (Please refer to Site Investigation Report for the exact positioning of the Trial Pits).

The Trial Pits were hand excavated in order to reveal foundation depth and design and once this information was established, boreholes (BH1 & BH2) were sunk through the base of the Trial Pits in order to determine subsoil conditions.

During the visit a CCTV survey of the relevant areas of the drainage system at the property was undertaken.

Foundations:

Ref	Foundation type	Depth at Underside (mm)
TP1	Brick Corbel	600mm
TP2	Brick Corbel	500mm

Soils:

Ref	Description	Plasticity Index (%)	Volume change potential (NHBC)
BH1	Stiff brown silty CLAY	41-65%	High
BH2	Stiff brown silty CLAY	53-58%	High

Roots:

Ref	Roots Observed to depth of (mm)	Identification	Starch test
TP/BH1	0.7m	Acer (Maples, Sycamores)	Positive
BH2	0.6m	Acer (Maples, Sycamores)	Positive

Drains:

A CCTV survey of drainage in the vicinity of damage was carried out at the time of initial site investigations. This revealed the drain runs surveyed to be in a serviceable condition, apart from the run across the front of the left hand bay and the run passing under the left hand path up to the front left corner of the main house. Both these runs were infested with tree roots.

Monitoring:

At the time of writing this report no monitoring data was available.

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.

The CCTV survey of the drainage system did reveal some defects which are being addressed however damaged or defective drains are not considered to be a material cause of the observed damage and soils analysis validates this position.

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.

The foundations are at a depth of 0.5m which is below the level that normal ambient soil drying processes such as evaporation would occur and is indicative of the soil drying effects of vegetation.

The moisture content profile indicates a reduction in moisture content at the underside of the foundations in both trial pits which is indicative of desiccation at this level. This is also co-incident with the depth of root activity.

Oedometer tests indicate severe desiccation in borehole 1 and very severe desiccation in borehole 2.

The desiccation in borehole 2 is coincident with the depth of root activity.

Shear vane readings indicate an increase in shear strength of the clay at the underside of the foundation in borehole 1, and between the underside of the foundation and to a depth of 1.5m in borehole 2, indicating desiccation at these depths.

Roots were observed to 0.7m below ground level in TP/BH1 and to 0.6m below ground level in TP/BH2.

Samples of these roots were recovered and have since been positively identified (using anatomical analysis) as having emanated from Acer sp. (Maples, Sycamores).

Our survey of the site identified the Sycamores T3 and T4 and we believe that these are the source of the recovered roots. A lack of roots from T2 should not be relied upon to discount the causal role of this tree.

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 the Sycamores T3 and T4 are the material cause of the current subsidence damage. However, T2 is also thought to be exerting a secondary influence.

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 the Sycamores T3 and T4 be removed and T2, Lime, be pruned.

We have given consideration to pruning as a means of mitigating the vegetative influence, however in this instance we believe that the trees are too large and close for pruning to represent a viable mitigation option.

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.
- Removal of trees is recommended together with future management of retained vegetation.
- The efficacy of current claim works should be established through monitoring.

Table 1 **Current Claim** - Tree Details & Recommendations

Tree No.	Species	Ht (m)	Dia (cm)	Crown Spread (m)	Dist. to building (m)	Age Classification	Ownership
T3	Sycamore	8.4	265	9.0	5.7	Younger than property	Policy Holder
Management history		No evidence of significant recent management					
Recommendation		Remove (fell to ground level) and treat stump to inhibit regrowth					
T4	Sycamore	17.8	470	13	5.3	Younger than property	Policy Holder
Management history		No evidence of significant recent management					
Recommendation		Remove (fell to ground level) and treat stump to inhibit regrowth					
T2	Lime	16.6	560	7.2	6.2	Younger than property	Local Authority
Management history		Appears to be cyclically pruned					
Recommendation		Re pollard to previous pruning points and repeat every two years. If monitoring does not record full recovery, the future of this tree should be reviewed.					

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
T1	Lime	16.6	510	6	4.6	Younger than property	Local Authority
Management history		Appears to be cyclically pruned					
Recommendation		Do not allow to exceed current dimensions					
T5	Ornamental crab	3.2	190	6.0	3.2	Younger than property	Policyholder
Management history		No evidence of significant recent management					
Recommendation		Do not allow to exceed current dimensions					
T6	Norway Maple	14	500	9.5	5.2	Younger than property	Policyholder
Management history		No evidence of significant recent management					
Recommendation		Remove (fell to ground level) and treat stump to inhibit regrowth					
T7	Japanese Maple	2.3	300	6.0	5.0	Younger than property	Third Party:- 42 Belsize Park Gardens
Management history		No evidence of significant recent management					
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 T3 & T4

View of T6, T5, T4

View of T1 (partial of T2)

View of T3 & T4