Arboricultural Appraisal Report

Subsidence Damage Investigation at:

38 Steele's Road
Hampstead
London
NW3 4RG

CLIENT:	Crawford & Company
CLIENT REF:	SU1605138
MWA REF:	SUB170425-1360
MWA CONSULTANT:	Mark Bisley (BSc Hons)
REPORT DATE:	08-06-2017

SUMMARY

Statutory Controls			Mitigation (current claim)	
TPO	No		Insured	Yes
Cons. Area	Yes		3rd Party	Yes
Trusts schemes	No		Local Authority	No
Planning	No		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 07/06/2017 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.

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, 4 storey house built in 1873.

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 rear projection and was first noticed in October 2016.

At the time of the engineers' inspection (31/01/2017) the structural significance of the damage was found to fall within Category 2 (slight) of Table 1 of BRE Digest 251.

Site investigations

Site investigations were carried out by CET on 10/04/2017 when two trial pits were hand excavated to reveal the foundations, each with a borehole being sunk through the base of the trial pit to determine subsoil conditions.

Foundations:

Ref	Foundation type	Depth at Underside (mm)
TP1	Concrete	1250
TH2	Concrete	1350

Soils:

Ref	Description	Plasticity Index (%)	Volume change potential (NHBC)
TP/BH1	MADE GROUND: Medium compact, mid brown, silty clay with numerous brick rubble to 0.65m. MADE GROUND: Medium compact, mid brown, silty clay with occasional brick fragments to 1.25m. Very Stiff orange-brown silty CLAY to 3.00m. Terminated at 3.00m.	48 - 49	High
TP/BH2	MADE GROUND: Medium compact, mid brown, silty clay with occasional brick fragments to 1.35m. Very Stiff orange-brown silty CLAY to 3.00m. Terminated at 3.00m.	49 - 54	High

Roots:

Ref	Roots Observed to depth of (mm)	Identification	Starch content
TP/BH1	1500	*Acer* spp. *Betula* spp.	Present Present
TP/BH2	1600	*Acer* spp.	Present

Drains: No information available at the time of writing.

Monitoring: Crack 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. A comparison between moisture content and the plastic and liquid limits suggests desiccation in both TP1 and TP2.

Comparison of soil suction values with Table 1 of BRE Digest 412 suggests moderate to severe desiccation in both TP/BH1 and TP/BH2.

There is desiccation at depths beyond normal ambient soil drying processes such as evaporation indicative of the soil drying effects of vegetation.

Shear vane testing of the substrate indicates 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.

Roots were observed to a depth of 1500mm bgl in BH1 and recovered samples have been positively identified (using anatomical analysis) as *Acer* spp. (Maples) and *Betula* spp. (Birches), the origin of which will be T1 and T2 respectively, confirming the influence of these trees on the soils below the foundations.

Roots were also observed to a depth of 1600mm bgl in BH2 and recovered samples have been positively identified (using anatomical analysis) as *Acer* spp., the origin of which will be T1.

Early crack monitoring data shows some recovery of the rear walls in the period Jan – Apr 2017 which would suggest that vegetation is involved in the current damage.

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 and T2 are the principal cause of the current subsidence damage.

No boreholes were located to the right of the rear projection but significant vegetation is present on this side of the building which may be involved due to its size and proximity to the structure. Even though no roots were found from T8 and SG3, it is highly likely that these specimens are also contributing to the current 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 repair solution can be implemented we recommend that T1, T2 and part of SG3 are removed. T8 should be reduced and maintained at this reduced size.

Consideration has been given to pruning 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.

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.

- Roots have been observed underside of foundations and identified samples correspond to vegetation identified on site.

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

Tree No.	Species	Ht. (m)	Dia. (mm)	Crown Spread (m)	Dist. to building (m)	Age Classification	Ownership
T1	Sycamore	18	450*	7	3.3	Younger than property	3rd Party:- 39 Steele's Road
Management history		Compact crown due to past reductions and high lift. Due to be removed by owner for reasons unrelated to this claim.					
Recommendation		Fell and remove regrowth as it appears.					
T2	Silver Birch	18	420	8	1.2	Younger than property	Policy Holder
Management history		Lifted and reduced in past. More recently cut back from building. Canopy sparse with dead wood in lower scaffold.					
Recommendation		Fell and remove regrowth as it appears.					
T8	London Plane	27	800*	16	16	Similar age as property	3rd Party:- 37 Steele's Road
Management history		Lifted. Cut back over property and possibly reduced in the past. Ivy on stem and lower scaffold.					
Recommendation		Reduce to 20m in height and reduce laterals to maintain relative proportions. Repeat works every 3 years.					
SG3	Multiple species	4	Ms 150	5 x 7	1.6	Younger than property	Policy Holder
Management history		Includes Rhododendron, Euonymus, Camelia, Laburnum and Helianthus. Large shrub bed formerly maintained but becoming untidy.					
Recommendation		Remove closer elements to provide 5m offset from building.					

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
T3	Laburnum	5	Ms 100*	5	2.8	Younger than property	3rd Party:- 39 Steele's Road
Management history		Lifted and suppressed below other trees.					
Recommendation		Do not allow to exceed current dimensions.					
T4	Plum	7	90*	3	3.3	Younger than property	3rd Party:- 39 Steele's Road
Management history		Lifted and topped at c. 5m in past. Adventitious stems through adjacent leaf cover.					
Recommendation		Remove and treat stump to inhibit regrowth.					
T5	Pear	14	400*	8	7.1	Younger than property	3rd Party:- 39 Steele's Road
Management history		Lifted and reduced. Appears to be regularly maintained.					
Recommendation		Crown reduce and do not allow to exceed 10m in height.					
T6	Apple	8	310	8.5	10.3	Younger than property	Policy Holder
Management history		Lifted and reduced. Appears to be regularly maintained.					
Recommendation		Do not allow to exceed current dimensions.					
T7	Bay Laurel	12	140	4	14.8	Younger than property	Policy Holder
Management history		Lifted over adjacent bench and path. Suppressed by T8. Topped at c. 5m in past.					
Recommendation		Do not allow to exceed current dimensions.					

Tree No.	Species	Ht. (m)	Dia. (mm)	Crown Spread (m)	Dist. to building (m)	Age Classification	Ownership
T9	Maidenhair Tree	6	65	3	1.75	Younger than property	Policy Holder
Management history		Growing through short length of hedge. Lifted.					
Recommendation		Remove.					
T10	Lime	12	350*	8	3.5	Younger than property	3rd Party:- 37 Steele's Road
Management history		Heavy Ivy cover in scaffold. Reduced and lifted in the past.					
Recommendation		Do not allow to exceed current dimensions.					
T11	Holly	9	250*	5	8.1	Younger than property	3rd Party:- 37 Steele's Road
Management history		Leans steeply away from property. Regularly crown reduced.					
Recommendation		Do not allow to exceed current dimensions.					
T12	London Plane	14	1000	6	17	Younger than property	Local Authority
Management history		Recently pollarded.					
Recommendation		Repeat pollarding on 3 year cycle.					
T13	Lime	20	370	8	11.2	Younger than property	Local Authority
Management history		Lifted and reduced.					
Recommendation		Continue existing maintenance on 3 year cycle.					

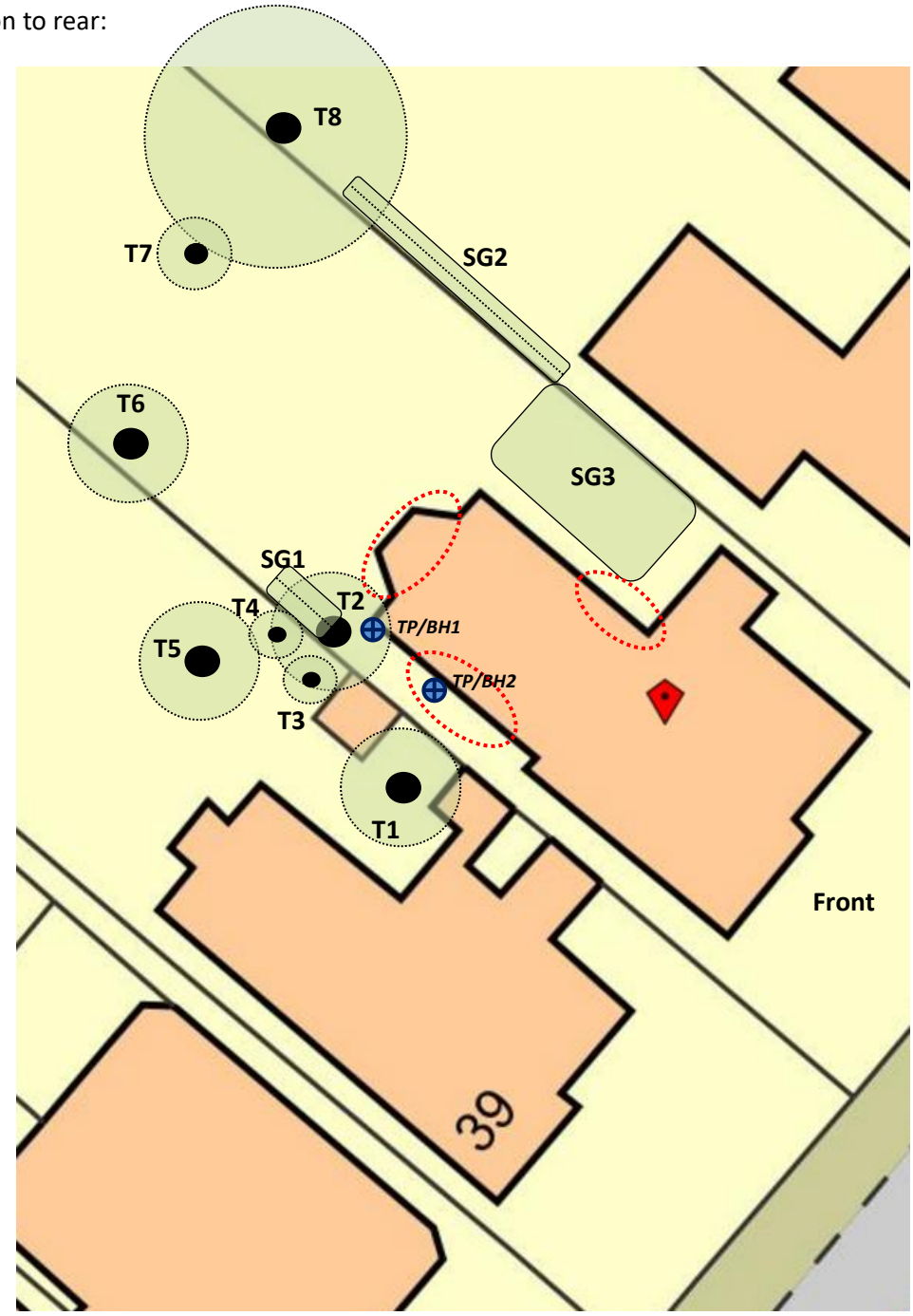
Tree No.	Species	Ht. (m)	Dia. (mm)	Crown Spread (m)	Dist. to building (m)	Age Classification	Ownership
T14	Griselinia	6	Ms 180	4.5	7.5	Younger than property	Policy Holder
Management history		Lifted and cut back to boundary to 2m.					
Recommendation		Do not allow to exceed current dimensions.					
T15	Oak	5	145	4.5	8.5	Younger than property	Policy Holder
Management history		Lifted and reduced in line with adjacent shrubs.					
Recommendation		Do not allow to exceed current dimensions.					
T16	Lime	20	375*	7	8.1	Younger than property	3rd Party:- 39 Steele's Road
Management history		Very high lifted and small crown. Regularly maintained.					
Recommendation		Continue existing management on a 3 year cycle.					
T17	Silver Birch	20	350*	10	8.3	Younger than property	3rd Party:- 39 Steele's Road
Management history		Very high lifted and small crown. Regularly maintained.					
Recommendation		Continue existing management on a 3 year cycle.					
T18	Willow	20	275*	6	10	Younger than property	3rd Party:- 39 Steele's Road
Management history		Very high lifted and small crown. Regularly maintained.					
Recommendation		Continue existing management on a 3 year cycle.					

Tree No.	Species	Ht. (m)	Dia. (mm)	Crown Spread (m)	Dist. to building (m)	Age Classification	Ownership
S1	Cotoneaster	6	Ms 100	4	8.5	Younger than property	Policy Holder
Management history		Lifted and reduced in past.					
Recommendation		Do not allow to exceed current dimensions.					
SG1	Multiple species	2	Ms 50	2.5	1.75	Younger than property	Policy Holder
Management history		Low level shrubs which appear to have recently fallen out of maintenance.					
Recommendation		Reduce and do not allow to exceed 1.75m in height.					
SG2	Cotoneaster, Laburnum	5	Ms 120*	4	7.4	Younger than property	3rd Party:- 37 Steele's Road
Management history		Low level shrubs which appear to have recently fallen out of maintenance.					
Recommendation		Reduce and do not allow to exceed 1.75m in height.					

Ms: multi-stemmed * Estimated value

SITE PLANS

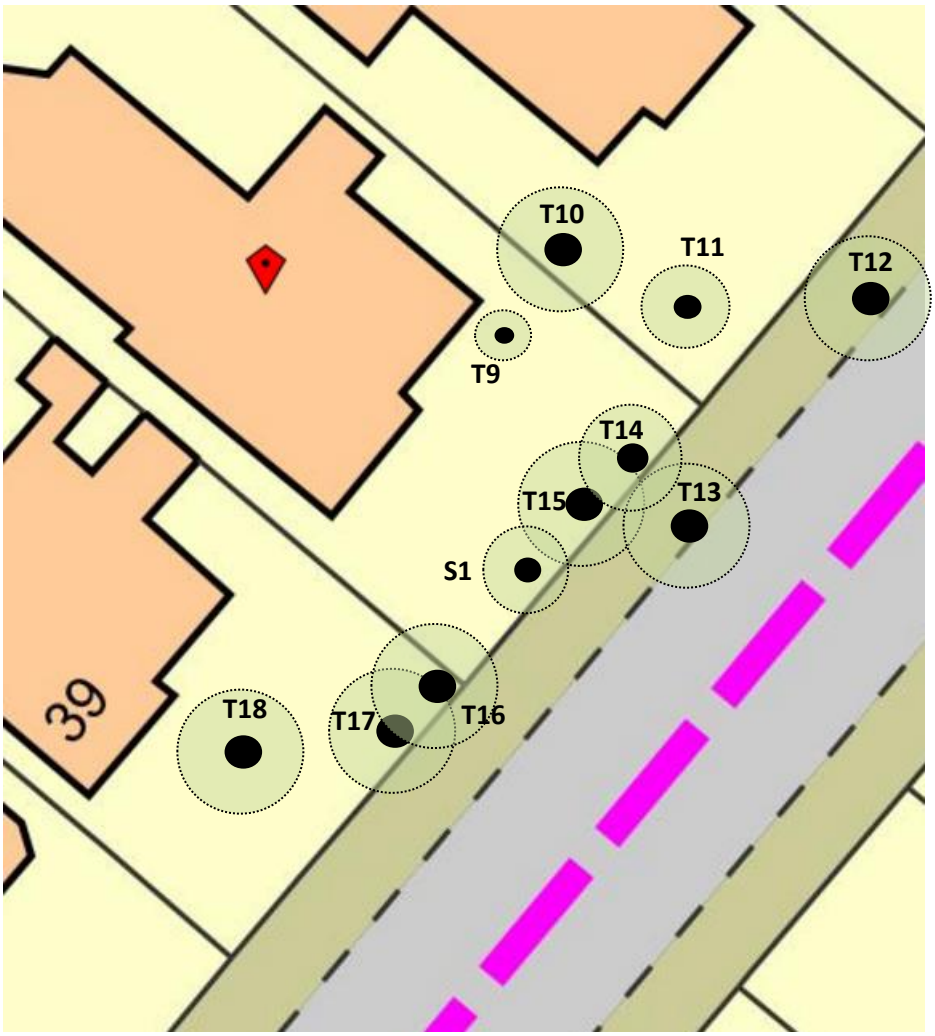
Vegetation to rear:



Plan not to scale – indicative only

Approximate areas of damage

Vegetation to front:



Plan not to scale – indicative only

Images

View of rear left corner of property

View of rear left boundary

View of rear garden

View of rear elevation

View of front boundary from right

View of front boundary of No. 37 Steele's Road

View of front boundary

View of front boundary of No. 39 Steele's Road

View of T9