



TECHNICAL REPORT ON A SUBSIDENCE CLAIM



**Flat 2, 34 Frognall
London
NW3 6AG**

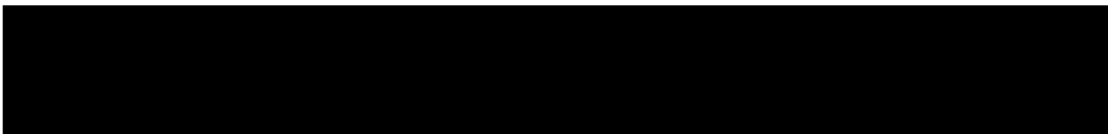


Prepared for

RSA - Commercial

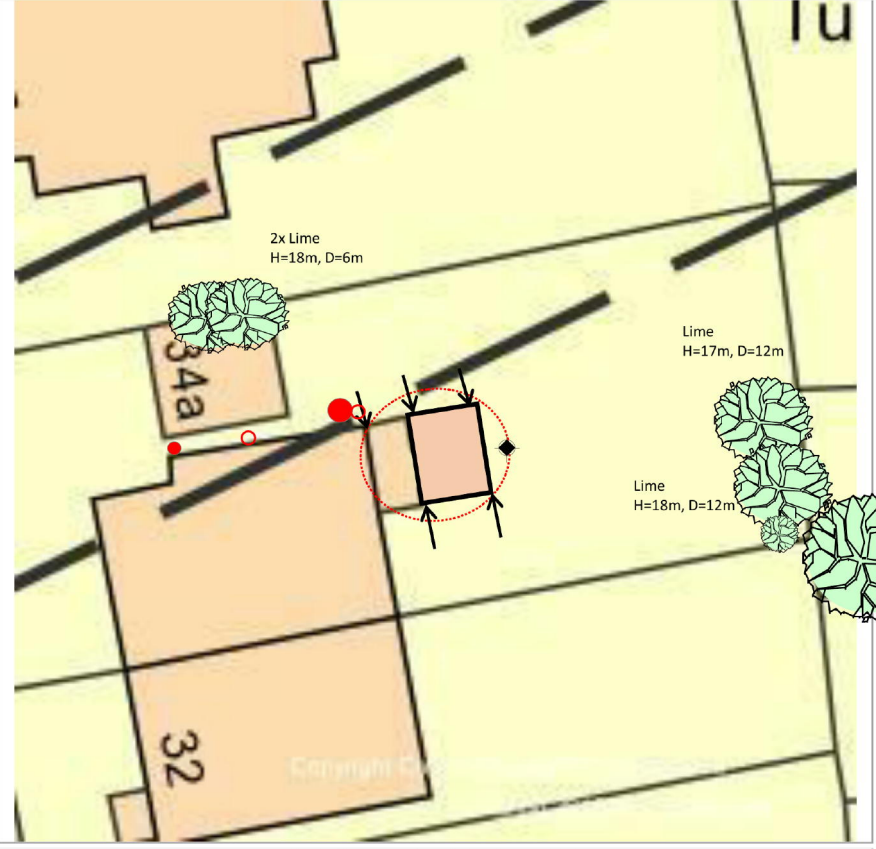
SUBSIDENCE CLAIM

22nd November 2019



Site Plan **This plan is Not to Scale**

This plan is diagrammatic only and has been prepared to illustrate the general position of the property and its relationship to nearby trees etc. The boundaries are not accurate, and do not infer or confer any rights of ownership or right of way. Position of utilities is only indicative and contractors must satisfy themselves regarding actual location before commencing works.



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Key:

	Tree: Deciduous		Tree: Conifer		Shrub
	Hedge		Area of Damage		Bore Hole
	Trial Hole		Trial & Bore Hole		Level Monitoring
	Rain Water Manhole		Rain Water Gulley		Rain Water Pipe
	Waste Water Manhole		Waste Water Gulley		Toilet Pipe
	Rain Water Drain		Waste Water Drain		Electricity Cable
	Water Supply Pipe		Gas Supply Pipe		Incoming Gas Pipe



INTRODUCTION

We have been asked by RSA - Commercial to comment on movement that has taken place to the above property. We are required to briefly describe the damage, establish a likely cause and list any remedial measures that may be needed.

Our report should not be used in the same way as a pre-purchase survey. It has been prepared specifically in connection with the present insurance claim and should not be relied on as a statement of structural adequacy. It does not deal with the general condition of the building, decorations, timber rot or infestation etc.

The report is made on behalf of Crawford & Company and by receiving the report and acting on it, the client - or any third party relying on it - accepts that no individual is personally liable in contract, tort or breach of Statutory duty. Where works address repairs **that are not covered** by the insurance policy we recommend that you seek professional advice on the repair methodology and whether the works will involve the Construction (Design & Management) Regulations 2015. Compliance with these Regulations is compulsory; failure to do so may result in prosecution. We have not taken account of the regulations and you must take appropriate advice.

We have not commented on any part of the building that is covered or inaccessible.

TECHNICAL CIRCUMSTANCES

We met the Leaseholder of Flat 2 who bought in April 2016. He advised that a small crack was first noticed in the conservatory on the right flank wall mid-point towards the end of 2016. The crack closed over early 2017 but then opened again in the Summer. This repeated in 2018 but the crack worsened over that summer. During Summer 2019 further cracks appeared at the junction of the conservatory with the main part of the house and the rear door became difficult to open. He managed to trace the original Structural Engineers for the conservatory, SD Structures, and they provided a report with the original structural drawings and calculations. They recommended further investigations but suggested that the damage was due to settlement caused by the additional load and settling/heaving of the foundations (subsidence/heave). They carry on to suggest underpinning or compaction grouting as a solution.

PROPERTY

Five storey large semi-detached house of traditional construction with brick walls converted into 5 flats. Flat 2 is on the ground floor with Flat 1 beneath being lower ground. Flat 2 has an original rear projection on supporting columns which was then extended out by the former owner to provide a projecting contemporary conservatory extension with steps at the rear leading down to the garden. The conservatory is supported on a steel framework supported on steel columns which are set into 900x900 concrete pads, mentioned by the previous owner to be at a depth of 2.5-3m below ground level.

HISTORY & TIMESCALE

Site investigations and level monitoring arranged.

Date of Construction.....	c.1840
Purchased.....	April
Damage First Noticed	2017
Claim Notified to Insurer.....	04/10/2019
Date of our Inspection	12/11/2019
Issue of Report	22/11/2019

TOPOGRAPHY

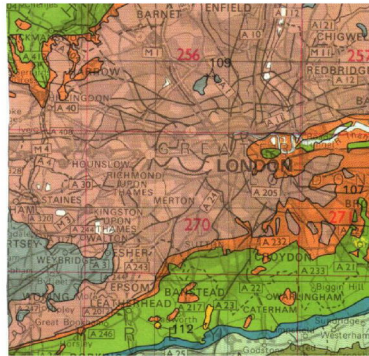
The property occupies a reasonably level site. It is noted there is a Underground railway line running beneath the northern part of the property, depth unknown.

GEOLOGY

Reference to the 1:625,000 scale British Geological Survey Map (solid edition) OS Tile number TQNW suggests the underlying geology to be London Clay.

London Clays are marine deposits characterised by their silty, sandy composition. They are typically stiff, dark or bluish grey, weathered dark to mid-brown superficially with fine particle size (less than 0.002mm). Tomlinson¹ describes it as a ‘fat’ clay with high loadbearing characteristics due to pre-consolidation pressures in its geological history. The upper horizon is often encountered at shallow depth, sometimes just below ground level. They have high shrink/swell potentials^{2,3} and can be troublesome in the presence of vegetation.

The solid geology appears to outcrop in this location, although we cannot rule out the presence of superficial deposits at shallow depth.



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¹ Tomlinson M.J. (1991) *“Foundations Design & Construction”* Longman Scientific Publishing.
² B.S. 5930 (1981) *“Site Investigations”*
³ Driscoll R. (1983) *“Influence of Vegetation on Clays”* Geotechnique. Vol 33.
³ Table 1, Chapter 4.2, Para. 2.3 of N.H.B.C. Standards, 1986.



VEGETATION

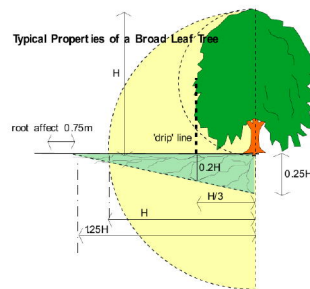
There are several trees and shrubs nearby, some with roots that may extend beneath the house foundations. The following are of particular interest:-

Type	Height	Distance	Ownership
Lime	17 m	12 m	Owners
Lime	18 m	12 m	Owners
Plane	20 m	15 m	Neighbour to rear

See sketch. Tree roots can be troublesome in cohesive (clay) soils because they can induce volumetric change. They are rarely troublesome in non-cohesive soils (sands and gravels etc.) other than when they enter drains, in which case blockages can ensue.

Limes (*Tilia*) are deciduous and can reach heights between 25-30m depending on health, environment and soil conditions.

They have a medium growth rate of around 300mm per year and medium root activity⁴. Maximum tree-to-damage distance recorded in the Kew survey was 20mtrs, with 50% of all cases occurring within 6mtrs⁵.



Typical proportions of a Lime tree, showing the potential root zone.

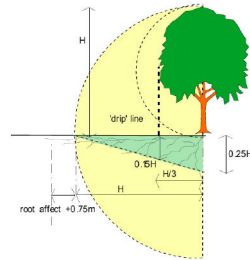
Lime roots can be moderately deep on clay soils. They have a life expectancy > 100 years and both old and young trees withstand quite heavy pruning and crown thinning.

Older trees frequently develop shoots around the base of the trunk. They are vulnerable to aphid attack that produces sticky exudates of honeydew.

Planes (*Platanus*) are deciduous and can reach heights in excess of 30m depending on health, environment and soil conditions. They have a medium growth rate of around 300mm per year and medium root activity⁶.

Maximum tree-to-damage distance recorded in the Kew survey was 15mtrs, with 50% of all cases occurring within 5.5mtrs⁷. Planes are moderately deep rooted, and are predominantly street trees.

⁴ Richardson & Gale (1994) "Tree Recognition" Richardson's Botanical Identifications
⁵ Cutler & Richardson (1991) "Tree Roots & Buildings" Longman Scientific
⁶ Richardson & Gale (1994) "Tree Recognition" Richardson's Botanical Identifications
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Typical proportions of a Plane tree, showing the potential root zone.

Life expectancy > 100 years and both young and old trees tolerant of pruning and crown thinning. Urban trees are prone to infection by anthracnose, a fungal foliage disease, which can be disfiguring, if not lethal. There is also concern about canker stain disease, which can also be lethal, spreading from Europe into Britain.

OBSERVATIONS

The area of damage is the rear conservatory/extension of Flat 2.

The following is an abbreviated description. Photographs accompanying this report illustrate the nature and extent of the problem.

INTERNAL



Right junction

Left junction

Rear Lounge Extension (Conservatory)

Tapering vertical crack at left junction with rear wall of main house, extending into roof light area.

Tapering vertical crack at right junction. Additional fine hairline vertical crack.

Tapering vertical crack on right wall at mid-point.

Slight displacement/pulling of window units in roof light at junction with rear wall of main house.

Rear door frame slightly out of square rendering door catching.



EXTERNAL



Right junction

View from rear

Left Elevation

Tapering vertical crack at junction of original projection with rear wall of house, extending partly as a stress crack on the rear of the original house.

Diagonal and vertical crack on left flank wall above door to kitchen on lower ground floor flat.

Right Elevation

Slight displacement between conservatory structure and rear wall of house.

CATEGORY

In structural terms the damage falls into Category 2 of Table 1, Building Research Establishment⁸ Digest 251, which describes it as "slight".

Category 0	"negligible"	< 0.1mm
Category 1	"very slight"	0.1 - 1mm
Category 2	"slight"	>1 but < 5mm
Category 3	"moderate"	>5 but < 15mm
Category 4	"severe"	>15 but < 25mm
Category 5	"very severe"	>25 mm

Extract from Table 1, B.R.E. Digest 251
Classification of damage based on crack widths.

⁸ Building Research Establishment

DISCUSSION

The pattern and nature of the cracks is indicative of an episode of subsidence. The cause of movement appears to be clay shrinkage.

The timing of the event, the presence of shrinkable clay beneath the foundations and the proximity of vegetation where there is damage indicates the shrinkage to be root induced. This is a commonly encountered problem and probably accounts for around 70% of subsidence claims notified to insurers.

Fortunately, the cause of the problem (dehydration) is reversible. Clay soils will re-hydrate in the winter months, causing the clays to swell and the cracks to close. Provided the cause of movement is dealt with (in this case, vegetation) there should not be a recurrence of movement.

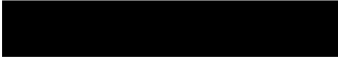
RECOMMENDATIONS

Although the cause of the movement needs to be dealt with, we note the vegetation is subject to a Preservation Order. Unfortunately, current legislation requires certain investigations to be carried out to support an application for the tree works.

Typically, these investigations would involve trial pit(s) to determine the depth and type of footings, boreholes to determine the nature of the subsoil/influence of any roots and monitoring to establish the rate and pattern of movement. The monitoring data provided must be sufficient to show a pattern of movement consistent with the influence of the vegetation and therefore it may be necessary to carry out the monitoring for up to a 12 month period.

It will also be necessary to obtain a specialist Arboricultural Report.

Neil Crawford CEng BEng (Hons) MICE
Subsidence Division



PHOTOGRAPHS



Right mid-point



Steel supports, reportedly on pad footings
2.5m-3m deep



Supporting columns to original projection



Supporting column to original projection
and diagonal crack on lower ground flat
wall





Lower ground falt - cracking above door at rear junction



Cracking at junction on left flank wall



Protected Lime trees at rear



Lime trees to side, behind neighbouring property built on original drive for house

