

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 Gully		Rain Water Pipe
	Waste Water Manhole		Waste Water Gully		Toilet Pipe
	Rain Water Drain		Waste Water Drain		Electricity Cable

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INTRODUCTION

We have been asked by [REDACTED] 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 2007. 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.

Investigations have been carried out in accordance with the requirements of The Institution of Structural Engineers¹.

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

TECHNICAL CIRCUMSTANCES

The damage was first noticed by the tenant, [REDACTED], in the month of August and developed rapidly over a few days.

PROPERTY

The property comprises a single storey church hall now converted into a residential home, of traditional construction with brick walls surmounted by a curved roof of unknown construction.

HISTORY & TIMESCALE

We have appointed Arboricultural consultants to provide recommendations on the extent of tree works, which can be undertaken

Date of Construction	Circa 1800
Purchased	Not established
Policy Inception Date	18/02/2014
Damage First Noticed	August 2014
Claim Notified to Insurer.....	15/09/2014
Date of our Inspection.....	10/10/2014
Issue of Report	17/10/2014
Anticipated Completion of Claim	January 2016

TOPOGRAPHY

The property occupies a site sloping from the rear down to the front and sloping from the left down to the right.

¹ Institution of Structural Engineers (1994) "Subsidence of Low Rise Buildings"

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.

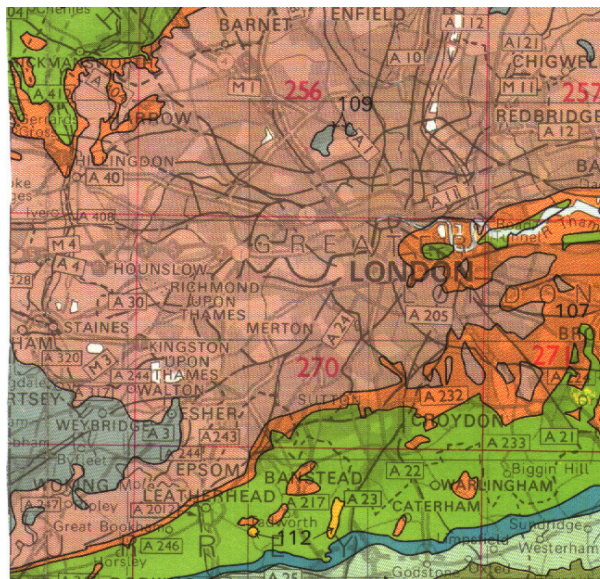
London Clays are marine deposits characterised by their silty, sandy composition. They are typically stiff, dark or bluish grey, weathered dark to mid-brown superficially with fine particle size (less than 0.002mm). Tomlinson² describes it as a ‘fat’ clay with high loadbearing characteristics due to 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^{3,4} and can be troublesome in the presence of vegetation.

The superficial deposits are thought to be Clay Soils.

Clay soil superficial deposits are a cohesive soil characterised by their fine particle size and are usually derived from weathering of an underlying “solid geology” clay soil such as London Clay or Oxford Clay.

Like the solid geology sub-soil from which they are derived they shrink when dry, and swell when wet and can be troublesome when there is vegetation⁵ nearby and Gypsum and selenite crystals can be encountered (particularly in the south east). Protection using Class II Sulphate Resisting cement is therefore recommended for buried concrete.



Geology. Reproduced with consent of The British Geological Survey at Keyworth.
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² Tomlinson M.J. (1991) *Foundations Design & Construction* Longman Scientific Publishing.

³ B.S. 5930 (1981) *Site Investigations*

⁴ Driscoll R. (1983) *Influence of Vegetation on Clays* Geotechnique. Vol 33.

⁵ Table 1, Chapter 4.2, Para. 2.3 of N.H.B.C. Standards, 1986.

⁶ Driscoll R. (1983) *Influence of Vegetation on Clays* Geotechnique. Vol 33.

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VEGETATION

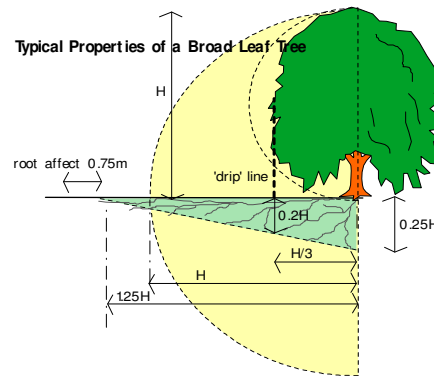
There are several trees and shrubs nearby, some with roots that may extend beneath the house foundations. The following are of particular interest:-

Type	Height	Distance	Ownership
Ash sapling	5 m	1 m	No 14 Downshire Hill
Bay	2 m	0.2m	No 14 Downshire Hill
Hawthorn	5 m	5 m	No 14 Downshire Hill

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.

Ash (*Fraxinus*) is deciduous and can reach heights between 20-30m depending on health, environment and soil conditions. They have a fast growth rate of around 500mm per year, medium root activity⁶ and medium water demand.

It is naturally vigorous and large growing, preferring light, fertile soils, but will grow on heavy clay. The maximum tree-to-damage distance recorded in the Kew survey was 21mtrs, and 50% of recorded cases occurred within 6mtrs⁷.



Typical proportions of an Ash. Note the potential root zone.

Young and old trees are tolerant of quite heavy pruning and crown reduction, but the timber is not particularly decay resistant and re-growth will need periodic cutting to keep weight and wind resistance down. Life expectancy > 100years. Root pruning can leave tree vulnerable to disease.

The Bay (*Laurus*) is an evergreen that can reach heights of between 10 – 14mtrs. It's a slow growing tree (150mm p.a.) with weak root activity.

Hawthorn (*Crataegus monogyna*) are deciduous and can reach heights up to 14m depending on health, environment and soil conditions. On shrinkable clays they rarely achieve a height greater than 10mtrs. They have a slow growth rate of around 200mm per year and medium root activity⁸, although they can be deep rooted.

In the Kew Garden Survey 50% of all cases of damage occurred when the tree was within 5mtrs of the property. The maximum-recorded distance was 11.5mtrs. Interestingly they accounted for 4.6%

⁶ Richardson & Gale (1994) "Tree Recognition" Richardson's Botanical Identifications

⁷ Cutler & Richardson (1991) "Tree Roots & Buildings" Longman Scientific

⁸ Richardson & Gale (1994) "Tree Recognition" Richardson's Botanical Identifications

of the total sample, and 3.5% of the tree population. In cases where the Hawthorn was implicated there was a 99% coincidence of shrinkable clays.

They were involved in 1.6% of all cases involving damage to drains.

Hawthorn's are tolerant of quite heavy pruning and crown thinning although suckering can be a problem.

Unfortunately the roots are similar to those of the apple, pear and *Sorbus*, all belonging to the family *Pomoideae*.

They have a life expectancy of less than 50 years.

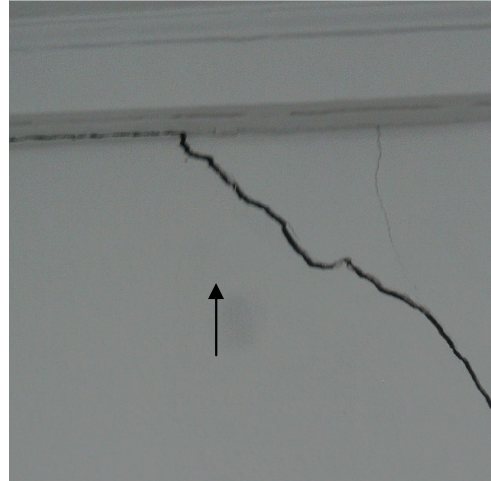
OBSERVATIONS

The damage is to the front wall.

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

INTERNAL

Cracking to front of main room



Close up of primary crack

Main living room/kitchen:

12mm diagonal crack to the main left wall (and to the right of the entrance) extends up the ceiling, and half way around the curved wall/ceiling junction of the front wall.

2mm parallel diagonal crack to the crack described above.

Series of 2mm vertical cracks to the front springing point of the arch

6mm vertical crack in the front left corner

2mm vertical crack at the mid-length of the left flank wall

2mm short parallel cracks to the ceiling

Historic floor slope into the front left corner

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EXTERNAL



Historic lean to left corner.



Damage to front garden wall

There is no external cracking to the building.

Front elevation;

Historic lean of the front left corner of the main structure, by up to 75mm

Front garden wall:

10mm cracks to front wall with 15mm lateral displacement of short return wall by gate, due to failure as a retaining wall, and unrelated to subsidence

CATEGORY

In structural terms the damage falls into Category 3 of Table 1, Building Research Establishment⁹ Digest 251, which describes it as “moderate”.

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.

⁹ Building Research Establishment, Garston, Watford. Tel: 01923.674040

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

The cause of the movement needs to be dealt with first. We have completed a soil risk analysis (VISCAT Assessment) and we are satisfied that your neighbour's ash and bay can be removed. Our Mitigation Unit will liaise with your neighbour in this respect.

Following completion of the tree management works, we will undertake a suitable period of monitoring to confirm stability has been achieved before undertaking repairs to the property.

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13 October 2014

Photographs



Ash sapling arrowed



Bay hedge on left hand boundary



Upper front elevation



Front projecting bay



Vegetation to the right hand side



Vegetation photographed from no 14

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Cracking over arch springing point



Interior of main room looking towards the front entrance