



Subject Property Address:

Rennie House
Torriano Mews
LONDON
NW5 2RZ

INSURANCE CLAIM

CONCERNING SUBSIDENCE DAMAGE

ENGINEERING APPRAISAL REPORT

This report is prepared on behalf of _____ for the purpose of investigating a claim for subsidence. It is not intended to cover any other aspect of structural inadequacy or building defect that may otherwise have been in existence at the time of inspection.

Date: 26/02/2021





INTRODUCTION

This report has been prepared by our Chartered Engineer Robert Loxham BSc (Hons) PGCE CEng MICE Dip CII (Claims) and is being investigated in accordance with our Project Managed Services.

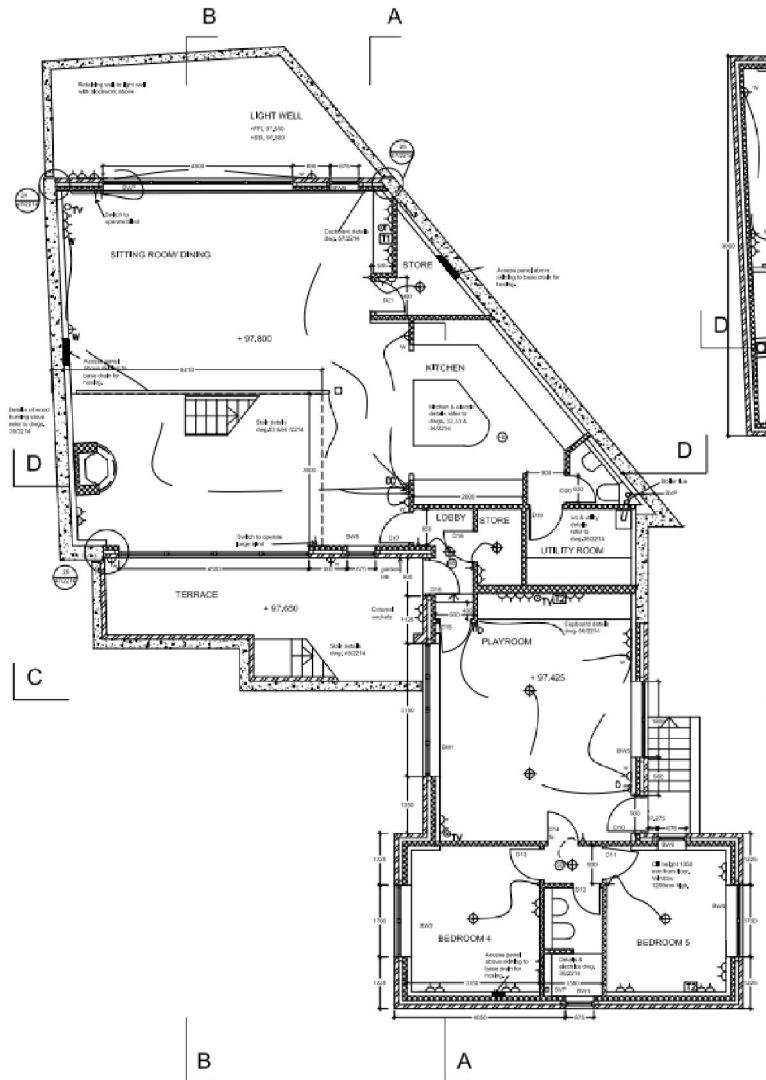
Unless stated otherwise all directions are referred to as looking towards the front door from the outside the property.

DESCRIPTION OF BUILDING

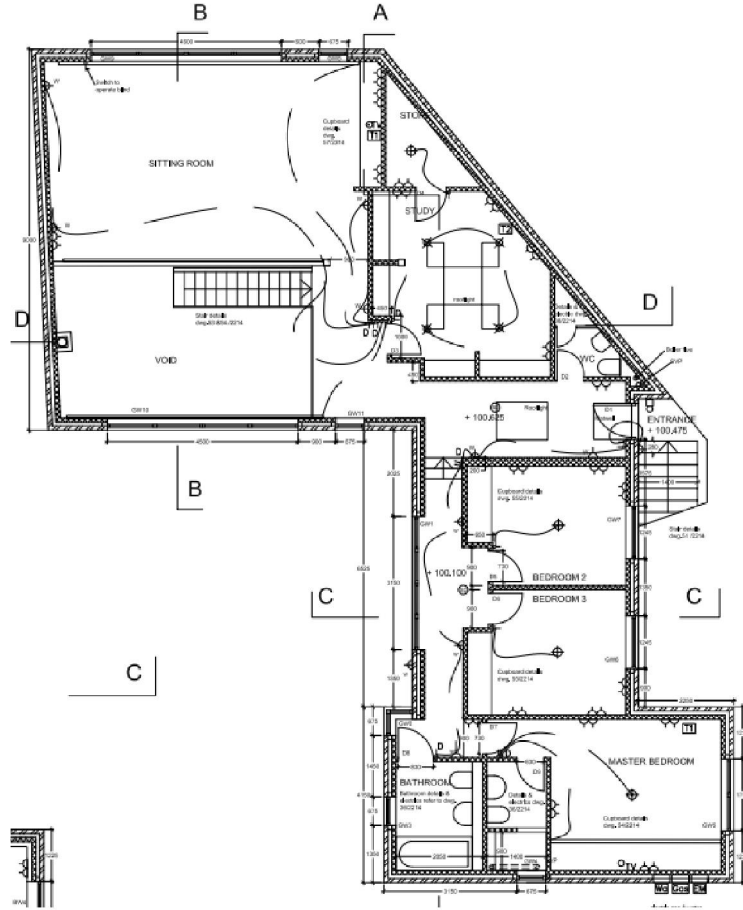
The subject property is a detached house built in 2005 and divided into two distinct legs of an L-shaped plan with slightly different levels. The property sits on a plot bordering the gardens of neighbouring properties. The overall layout is recorded on our site plan.

The lower ground floors of the property are constructed below external ground level with reinforced concrete retaining walls and with a reinforced concrete floor slab. Underfloor heating and insulation is incorporated within the floor construction.

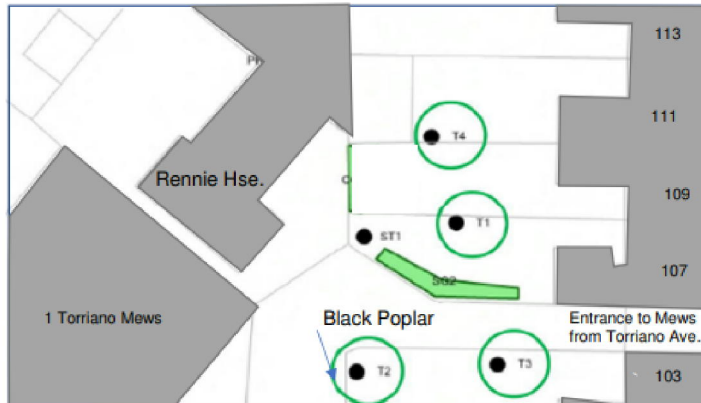
The general layout of the property is shown in the extracts below:



LOWER GROUND FLOOR



There are trees within influencing distance of the property. In particularly there is a 10m tall Poplar tree (height recorded in September 2019) within 8.5m of the front left corner of the property.



The following extra from the report by PRI following an inspection in September 2019 shows all the vegetation in proximity to the property:

Tree No	Common Name	Age Class	Condition	Height (m)	Crown Spread (m)	Stem diam. (mm)	Dirt to biop. (m)	Roots implicated	Pruning history	Recommendation	Tree work constraints	Notes	Owner address	Owner
T1	Cotoneaster	Mature	Fair	4.5*	5.0	110*	13*	N	Subject to past management	No work required			107 Torriano Avenue London NWS 2RX	P3P
T2	Poplar	Mature	Fair	10*	6*	800*	16.5	N	Subject to recent management. Reduced	Fell and eco plug stump		Distance to front right corner. 8.5m to front left corner	103 Torriano Avenue London NWS 2RX	P3P
T3	Laurel (Bay)	Mature	Fair	5*	5.0	170*	17.5	N	Subject to past management	No work required			103 Torriano Avenue London NWS 2RX	P3P
T4	Cherry	Semi-Mature	Fair	4.5	2	65*	5.5	N	No significant recent management	No work required			111 Torriano Avenue London NWS 2RX	P3P
T5	Ash	Mature	Fair	16*	7.50*	350*	20*	N	Subject to past management	No work required		No rear access during survey and limited visibility on tree. Figures and placement approximate	24 Leighton Grove London NWS 2QP	P3P
CG1	Jasmine	Early Mature	Fair	2.2	0.50	25	2*	N	Subject to past management	No work required		Approx. 5m in length	109 Torriano Avenue London NWS 2RX	P3P
SG1	Mixed species group	Semi-Mature	Fair	1.7*	1.0	25*	3.5*	N	No significant recent management	No work required		Includes Fatsia, Bamboo, Olive	109 Torriano Avenue London NWS 2RX	P3P

Continuation / 6

The T2 Poplar is by far the most significant tree within influencing distance of the property. T5 Ash (not shown on the plan above) is taller but is known to have a lower water demand and is situated at the rear of the property and away from the zone of damage. A Lime tree was removed to a stump (ST1) around December 2018.

The drainage system is a separate/combined system.

CIRCUMSTANCES OF DISCOVERY OF DAMAGE

The policyholder and homeowner, first discovered the damage in autumn 2017 following a hot summer. Damage has been seen to worsen over the 3 and a half years since that time with cracks closing and opening during the seasons.

The policyholder then contacted insurers.

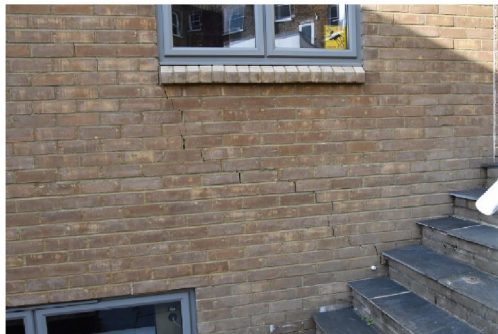
NATURE AND EXTENT OF DAMAGE

Photographs showing the most significant damage are attached.

Description and Mechanism

The principal external damage takes the form of stepped diagonal and vertical cracking.

On the front elevation there is a 4mm wide stepped crack below the window to the ground floor bedroom. See the plan above to note the location at the front indicating downwards movement to the left.



There is a further damage at the vertical expansion joints between the two parts of the building which has disturbed the seals and shows 10mm movement. See the plan above to note the location indicating downwards movement to the left.



The damage continues to the roof where cracking has affected the verge.

Internal damage takes the form of cracking up to 10mm in width to internal plastered walls in the areas of the ground floor entrance hall and wc, the front right bedroom and the corridor to the bedrooms. The wood floor has also been disturbed causing gaps to appear between the planks. See the plan above to note the location of the hall.



There is also a very severe crack to a boundary wall and this wall has rotated forwards and is in a dangerous condition. The external block paving has also been lifted in areas.

The indicated mechanism of movement is downwards to the front left corner of the property, i.e. towards the Poplar tree.

Significance



The level of damage is moderate and is classified as category 3 in accordance with BRE Digest 251 - Assessment of damage in low-rise buildings.

Onset and Progression

We consider that the damage is recent and cyclical in nature. Damage will only worsen with the tree remaining.

SITE INVESTIGATIONS

Reference to the solid and drift geological survey map shows the anticipated subsoil as London Clay Formation – highly shrinkable clay.

A site investigation was undertaken by Auger on 4th October 2019 comprising of an exploratory excavation at the front left corner of the property.

The results revealed that the property is built off 400mm concrete foundations, extending down to an overall depth of 1.8m below ground level onto a clay subsoil. The soil was described as moist very stiff brown fine to medium gravelly silty clay.

Roots were present below the footings at a depth of 1.8m and samples extracted from site were sent away to be analysed and the results revealed the following:

Root ID

The sample you sent in relation to the above has been examined. The structure was referable as follows:

TH1, 1.8m		
1 no.	Examined root: the family SALICACEAE (Salix (Willows) and Populus (Poplars)). This was a very IMMATURE sample.	Dead* (note this 'dead' result can be unreliable with such thin samples).

Click here for more information: [SALICACEAE](#)

I trust this is of help. Please call us if you have any queries; our Invoice is enclosed.

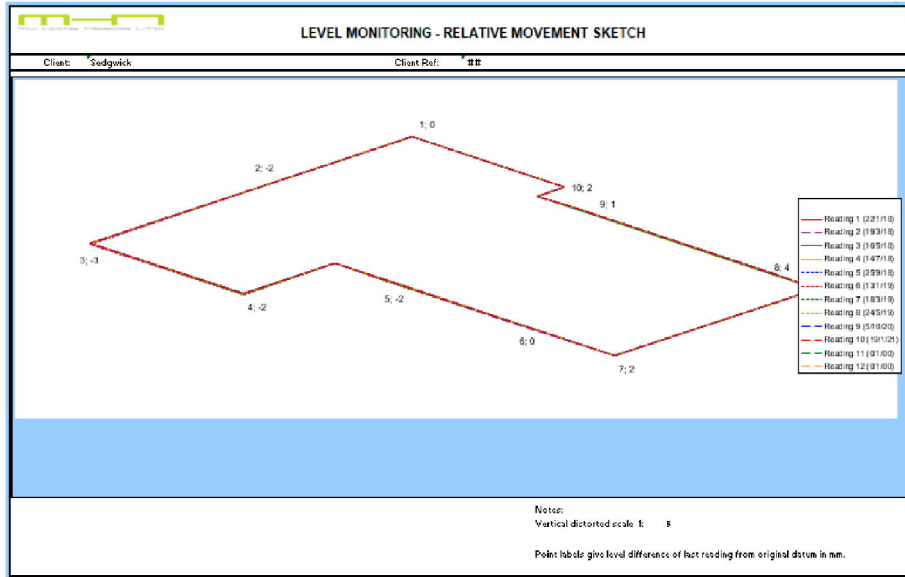
It should be noted that no Lime roots were recovered.

Soil samples were analysed and the clay was found to be of a high volume change potential with the plasticity index recorded as 57 and 62 in the two samples obtained.

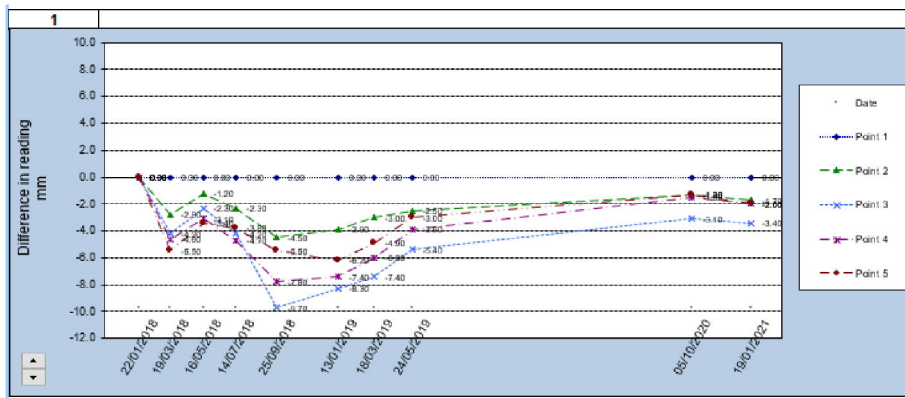
No drainage Investigations have been undertaken. The monitoring described below shows cyclical movement which is not symptomatic of a drainage leak.

MONITORING

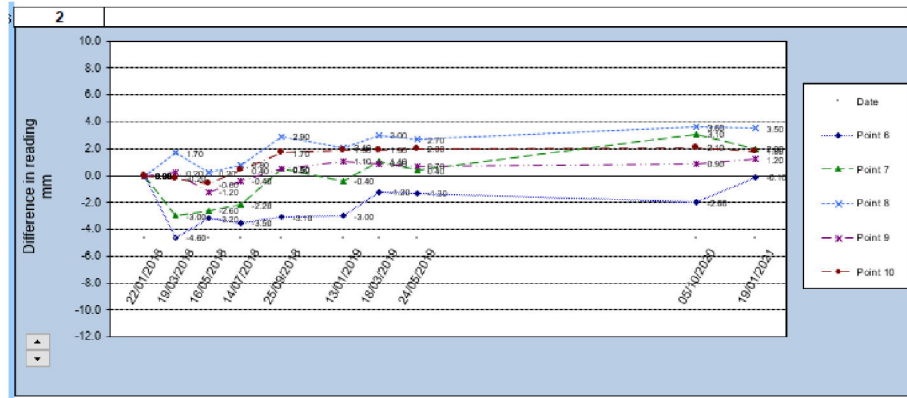
Level monitoring has been undertaken.



Level monitoring started in January 2018 and measured the movement on the left-hand leg of the building. Point 3 represents the front left corner of the property, the point closest to the Poplar.



The chart above shows the movement recorded at points 1 to 5, which are on the left-hand side of the leg, the points closest to the Poplar. Downwards movement of approximately 10mm was recorded at point 3 to September 2018 followed by a recovery of over 4mm to May 2019. It can be seen that downwards movement started soon after the stations were established in January 2018. The pattern demonstrates cyclical movement over the summer of 2018 which in our opinion has been caused by the Poplar. No further readings were taken until October 2020 at which point the front left corner closest to the Poplar showed 3mm downwards movement, which was maintained through to January 2021. This shows that the building had not fully recovered to its January 2018 position which confirms the continuing influence of the Poplar.

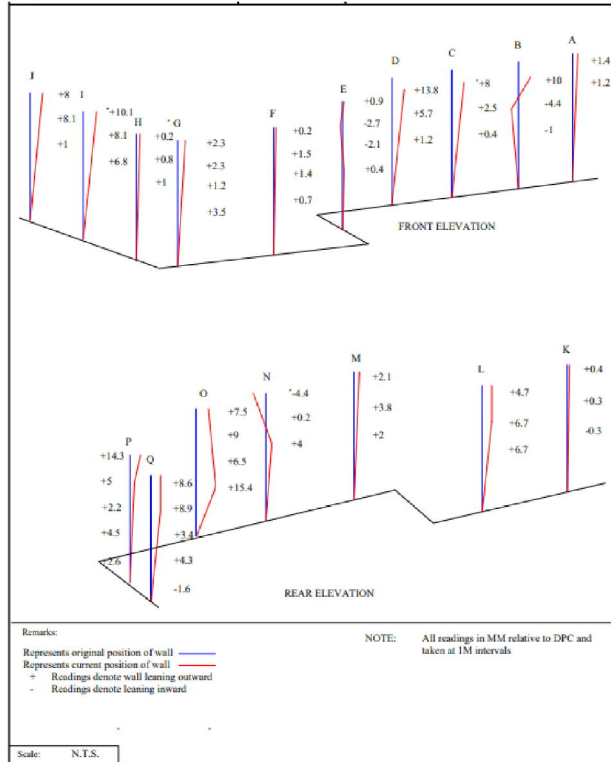


The chart above shows the movement recorded at points 6 to 10, which are on the right-hand side of the leg, the points furthest from the Poplar but closest to the Lime. Points 6 and 7 are at the front of the building and suffered downwards movement of approximately 5mm and 3mm respectively to March 2018 followed by a general overall recovery which has continued to date. We consider that if the Lime tree was the cause of the movement then downwards movement to this section of the building would also have continued to September 2018 because the Lime is closer to this part. However, this was not the case.

Furthermore, the readings taken in January 2021 show a full recovery of this part of the building with the levels higher than the January 2018 readings. This is in clear contrast with the left-hand side which doesn't show full recovery. Also comparing this with the left-hand side shows that there is ongoing differential movement across the front of the property as discussed below.

Considering points 3 and 7 at the front left and front right of the leg. In September 2018 when downwards movement was at its maximum, there was 9.7mm of downwards movement at point 3 and 0.3mm upwards at point 7, i.e. a differential with point 3 being 10mm lower. In January 2021 with recovery close to its maximum the readings were 3.4mm downwards and 2mm upwards respectively and hence with point 3 being 5.4mm lower than point 7. If the readings were considered similarly at each date then differential movement between points 3 and 7 would be confirmed.

A verticality survey was undertaken in October 2020.



The chart above shows a tilt towards the front, i.e. towards the Poplar of 9.3mm at the front left corner over the full height of the wall.

In summary, the results of the level monitoring show cyclical movement and a tilt to the front caused by the Poplar. Although no monitoring readings were obtained over the summer of 2019 or 2020 the previous readings clearly demonstrate the influence of the Poplar. Furthermore, the readings on the right-hand side do not show summer downwards movement which would be expected if the Lime was a significant factor. Also at January 2021 full recovery had occurred on the right hand side but not the left showing the continued influence of the Poplar.

CAUSE OF DAMAGE

Taking an overview of all the site investigation and monitoring results referred to above, it is my opinion that the cause of damage results from clay shrinkage subsidence brought about by the action of roots from the Poplar tree located at the rear of 103a Torriano Avenue.

I base this view on the fact that the foundations of the property in the area of damage have been built bearing onto shrinkable clay subsoil. The soil is susceptible to movement as a result of changes in volume of the clay with variations in moisture content when trees are growing. Poplar tree roots are present in the clay subsoil beneath the foundations. In this case, I am satisfied that the damage has therefore been caused by clay shrinkage subsidence following moisture extraction by the Poplar tree.

I have also considered whether there could be any other influencing factors such as the Lime tree but am of the view that the evidence shows that this was not a factor especially after its removal when ongoing differential movement has occurred.

I am satisfied that there is no factor, other than the Poplar, that is causing the damage.

RECOMMENDATIONS

It is recommended that the Poplar tree located in the rear garden of No 103a Torriano Avenue and close to the property is removed to mitigate against further movement. A detailed scope of repairs will be finalised upon conclusion of the mitigation.

HEAVE ASSESSMENT

I have assessed whether significant heave/ground recovery will occur should the vegetation as referred to above be removed.

Based on the site investigation results, the timing of the investigation and the nature and extent of damage within the property, I have concluded that significant heave and/or ground recovery will not occur should the vegetation management described above be undertaken.

REPAIRS

If the tree is removed, then I consider that works including structural crack repair and redecoration at an approximate cost of £20,000 will be appropriate in order to repair the damage in this case.

If the tree is not removed then it may be necessary to consider underpinning of the foundations of the property in the area of damage, in addition to structural crack repair and redecoration needed to repair the damage. Given the construction details of the property, i.e. a reinforced concrete floor with underfloor heating and insulation, and reinforced concrete retaining walls this operation would be technically challenging and very expensive. The total cost of this option is estimated at in excess of £100,000.

For Sedgwick

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