



4 North Court, South Park Business Village, Maidstone, ME15 6JZ  
01622 608810

Policyholder:



Subject Property Address:

3 Buttsmead  
NORTHWOOD  
Middlesex  
HA6 2TL

**INSURANCE CLAIM**

**CONCERNING SUBSIDENCE DAMAGE**

**ENGINEERING APPRAISAL REPORT**

This report is prepared on behalf of [REDACTED] 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: 04/04/2022

Our Ref: 6865297

**INTRODUCTION**

This report has been prepared by our Chartered Builder, Gavin Catheline MCIOB, and is being investigated in accordance with our Project Managed Service.

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 constructed in approximately 1970, in a mature residential area and on a plot that is generally level.

The claim concerns damage to the main house, primarily towards the front and front right corner and also towards the rear left corner.

**CIRCUMSTANCES OF DISCOVERY OF DAMAGE**

The policyholder and homeowner, [REDACTED] first discovered the damage in June 2018.

There was a sudden discovery of cracking throughout the house and progressive deterioration was observed over the summer and autumn months in 2018.

**NATURE AND EXTENT OF DAMAGE****Description and Mechanism**

The principal damage takes the form of vertical and diagonal tapered cracking, sloping floors and sloping door frames.

The indicated mechanism of movement is downward towards the front and front right corner of the main house and downward towards the rear left corner of the main house.

**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**

[REDACTED] have advised that damage first commenced in summer 2018.

We consider that the crack damage has occurred recently, but that distortions are historic.

Monitoring has shown the movement to be of a cyclical nature with the cracks opening in the summer and closing in the winter.

## SITE INVESTIGATIONS

Site investigations were undertaken by CET Property Assurance Ltd on 3<sup>rd</sup> December 2018 and comprised the excavation of 4 trial pits extended by hand augured boreholes.

Trial pit / borehole 01 was excavated adjacent to the front elevation of the main house, to the right-hand side of the main front door and this revealed a concrete foundation with an overall founding depth of 1.4m below ground level. The founding subsoil is described as stiff, orange/brown, silty CLAY which was seen to contain numerous roots up to 4mm in diameter. The clay subsoil became naturally stiffer with depth and the material changed to medium dense sand at 4.5m below ground level. The borehole ended at 5m and a datum was installed at the base of the borehole as a stable reference point for level monitoring. Further roots were observed within the clay subsoil samples taken to a depth of 3m below ground level.

Trial pit / borehole 02 was excavated adjacent to the rear left corner of the main house and this revealed a concrete foundation with an overall founding depth in excess of 1.4m below ground level. The underside of the foundation was not determined due to the depth of the excavation. The subsoil at foundation level is described as stiff, orange/brown, silty CLAY with gravel. The clay subsoil with gravel extended throughout the borehole to a depth of 3.7m below ground level where the borehole ended due to dense gravel. Numerous roots were observed within the borehole to a depth of 2m below ground level.

Trial pit / borehole 03 was excavated adjacent to the front right corner of the house/garage and this revealed a concrete clinker ash foundation with an overall founding depth of 1.5m below ground level. The founding subsoil is described as stiff, brown, silty CLAY which was seen to contain numerous roots up to 2mm in diameter. The clay subsoil extended throughout the borehole to a depth of 2.3m below ground level where the borehole ended due to ground becoming too hard / dense to penetrate by hand auger. Further roots were observed within the borehole to a depth of 2.2m below ground level.

Trial pit / borehole 04 was excavated adjacent to the rear elevation of the rear two storey extension and this revealed a concrete foundation with an overall founding depth in excess of 1.3m below ground level. The underside of the foundation was not determined due to the depth of the excavation and the width of the top of the concrete foundation. Due to the presence of the mass concrete foundation at the base of the trial pit the borehole was put down to the rear of the excavation. This revealed the same stiff, orange/brown, silty CLAY with gravel as found in trial pit / borehole 02. The clay subsoil extended throughout the borehole to a depth of 3.2m below ground level where the borehole ended due to the ground becoming too hard / dense to penetrate by hand auger. Numerous roots were observed within the borehole to a depth of 2.3m below ground level.

The subsoil and root samples were sent to a laboratory for testing. This has revealed that the clay subsoil is of high plasticity index, meaning that the material is very susceptible to movement due to shrinkage and swelling with variations in moisture content. This is to say that if moisture is withdrawn from the subsoil, for example by the action of roots, then shrinkage i.e. a volumetric reduction will follow. Analysis of the subsoil moisture content profile and in-situ shear strength readings indicates that there is a moisture deficit from approximately 1.5m below ground level where roots are present.

The roots have been analysed and have been identified as follows:

Trial pit / borehole 01 – *Quercus* – Oak

Borehole 02 – roots too small for identification

Trial pit / borehole 03 – *Quercus* – Oak and *Cupressaceae* – which are Cypress or Leylandi

Trial pit / borehole 04 - *Quercus* – Oak

**MONITORING**

Crack width and precise level monitoring has been undertaken at the property since December 2018 and the updated readings are attached.

In summary, the level monitoring readings indicate significant downward movement towards the front of the house during the summer months of up to approximately 30mm and a similar level of recovery during the wetter winter months.

To the rear of the house downward movement in the summer has been recorded of up to 15mm with the most amount of recent movement having been noted at the rear left corner.

The movement captured between December 2018 and the most recent readings taken on 14th December 2021 is clearly cyclical and consistent with the operation of a clay shrinkage and swelling mechanism.

This level of ongoing movement evidenced by the programme of monitoring is very significant and is such that any attempted repair to the superstructure would highly likely be unsuccessful without completion of the recommended mitigation measures described in the attached Arboricultural Report from PRI UK Ltd.

**CAUSE OF DAMAGE**

Taking an overview of all the site investigation and monitoring results referred to above, it is our opinion that the cause of damage results from clay shrinkage subsidence brought about by the action of roots from the Oak trees located to the front and rear of the property as identified in the attached Arboricultural Report from PRI UK Ltd.

We 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 very susceptible to movement as a result of changes in volume of the clay with variations in moisture content and analysis of the site investigation results indicates that the soil has been affected by shrinkage. Quercus (Oak) tree roots are present in the clay subsoil beneath the foundations to the front and rear of the property. In this case, we are satisfied that the damage has therefore been caused by clay shrinkage subsidence following moisture extraction by the Oak trees identified in the attached Arboricultural Report.

**RECOMMENDATIONS**

It is recommended that the owners Oak tree T6 in the risk address front garden, closest to the area of damage is removed to mitigate against further movement.

We would then propose a further period of level monitoring over the summer 2022 to determine the success of removal of this tree, before any further consideration is given to the other trees identified for management works in the Arboricultural Report.

**HEAVE ASSESSMENT**

We have assessed whether significant heave will occur should the vegetation as referred to above be removed.

The site investigation has been undertaken during the early winter months with desiccation suggested by the shear vane and moisture content readings at a depth of 1.5m below ground level. The amount of desiccation is minor and, in our opinion, represents purely seasonal desiccation rather than a persistent soil moisture deficit. We have carried out a heave assessment in accordance with BRE Digest 412, and calculate the heave potential of the site to be in the order of 19mm. We believe this to equate to ground recovery of the subsidence that has taken place during the summers, rather than being true heave, and consequently we are not of the opinion that long term heave will result should the trees be removed.

In summary, based on the site investigation results, the timing of the investigation and the nature and extent of damage within the property, we have concluded that significant heave will not occur should the vegetation management described above be undertaken.

**REPAIR COSTS**

If the recommended tree management work as outlined in the attached Arboricultural Report is undertaken, then we consider that works including structural crack repair and redecoration at an approximate cost of £75,000.00 will be appropriate in order to repair the damage in this case.

If we are not able to remove the main influencing Oak tree T6 in the risk address front garden, then it will be necessary to consider underpinning of the foundations of the property in the areas of damage, in addition to structural crack repair and redecoration needed to repair the damage.

Based on the level of movement and damage currently being seen at the property, a complex scheme of underpinning will be required if the Oak tree T6 remains. The total cost of this option is estimated at £600,000.00. There will also be significant additional costs involved including design costs, alternative accommodation costs and removal and storage of household contents costs.

Insurers and their appointed solicitors will wish to pursue a recovery of the underpinning and all additional costs associated with not being able to mitigate the damage due to a continued refusal of a TPO application, which we consider provides all mandatory evidence to support removal of the policyholder's Oak tree T6.

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