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# Subsidence Report

# On

# 22 Oakmont Drive
# Waterlooville
# Hampshire
# PO8 8TH



HAVANT BOROUGH COUNCIL
09 MAY 2011
RECEIVED

**Date: 2nd August 2010**

**Our ref: NA100336RL/EPL**

# PRELIMINARY REPORT

## Introduction:

This report has been prepared under the instructions of Nationwide Insurance, for their sole use in connection with the notification of a claim under the subsidence section of their policy.

Our following comments are limited observations upon the nature and suspected cause of the damage notified, and we have not widened our brief to consider other structural matters. We have been asked to comment on the cause of the damage and the scope of any repairs that may ultimately be required.

Our report does not consider questions of timber or damp, services installations or the general condition of the property. We have not inspected woodwork or other parts of the structure which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect.

Our comments on causation of the damage are based only on the investigations, which, have been carried out at this stage and would be subject to review in the light of further investigations.

This report has been prepared on behalf of Riley Larkin Ltd 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.

## Discovery of Damage:

Mr and Mrs Pouralli have owned the property for six years. They purchased the property without a survey report.

They noted cracking to the rear right corner of the property earlier this year, which appeared to progress rapidly in recent weeks and therefore they notified their Insurers of a claim.

## Description of Property:

| | |
|---|---|
| Date : | 1970 |
| Accommodation : | The property is a four bedroom, two-storey detached house with a double attached garage and side extensions. |
| Construction : | The property is of traditional construction with brick walls, part-solid / part-suspended floors and a pitched, tiled roof. |
| Basement : | None |
| Extension : | There is a single-storey extension to the rear of the garage at the left hand sided. |
| Garage : | 2 No. integral. |
| Other comments : | None |

## History:

| | |
|---|---|
| Date of Construction | 1970 |
| Purchased | 2004 |
| Policy Inception Date | 1st Mach 2009 |
| Damage First Noticed | March 2010 |
| Claim Notified to Insurers | 13th July 2010 |
| Date of Inspection | 26th July 2010 |

## Geology of Site:

Reference to the 1:50,000 scale British Geological Survey Map ref 316 Fareham, (solid and drift edition) suggests the underlying geology to be London clay.

## Terrain:

The property is located on a relatively flat site which backs on to a main road.

## Vegetation of Interest:

See sketch plan for locations. The following vegetation is of particular interest:

| Species | Height (m) | Distance (m) | Ownership |
|---|---|---|---|
| Oak | 25 | 8.5 | Insured |

Roots from trees and other vegetation can be troublesome in cohesive (clay) soils because they can induce volumetric change. They are rarely troublesome in non-cohesive soils (sands and gravel etc.) other than when they enter drains, in which case blockages can ensue.

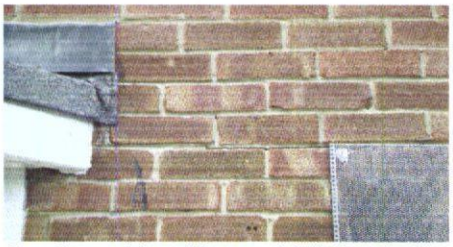
Oak trees (Quercus) are deciduous and native to Europe. They can reach heights in excess of 35m, but more typically grow to between 18 - 25m, depending on health, environment and soil conditions. They have a medium growth rate of around 250mm per year and strong root activity[1].

Maximum tree-to-damage distance recorded in the Kew survey was 30mtrs, with 50% of all cases occurring within 9.5mtrs[2]. Life expectancy > 100 years, although they are vulnerable to insect and fungal attack. Old and young trees are tolerant of quite heavy pruning and crown reduction, although re-growth can be an ongoing problem.

## Description of Damage:

We give, below, a brief description of the damage with photographs.
The damage is restricted to the rear right corner of the property.

Externally, there is cracking around the rear right hand bay and the right hand corner of the property at high and low level, with cracks up to 5mm. The damage is indicative of a downward movement to the rear right corner of the property.



Crack to side of bay at high level



Crack below bay

[1] Richardson & Gale (1994) *"Tree Recognition"* Richardson's Botanical Identifications
[2] Cutler & Richardson (1991) *"Tree Roots & Buildings"* Longman Scientific



Crack on left hand flank, below window



Crack at rear right hand corner

Internally at first floor level, the damage is restricted to the rear right hand bedroom where there is cracking to the rear right corner, in particular above and below the rear window.



At ground floor level, the damage is again to the rear right corner of the property in the dining room, where there is cracking on the rear elevation wall of the bay and on the right hand flank, particularly towards the corner



Crack at window, right hand flank wall

## Category of Damage:

It is common practice to categorise the structural significance of the damage in accordance with the classification given in Table 1 of Digest 251 produced by the Building Research Establishment. In this instance, the damage falls into Category 2 ("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 |

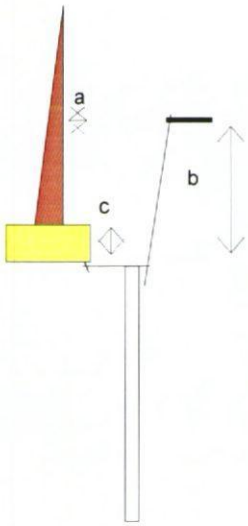
**Classification of damage based on crack widths.**

## Investigations:

The following investigations were undertaken to identify the cause of movement.

**Trial Holes**

A trial hole was excavated to expose the foundations. The trial hole revealed a concrete foundation at a depth of 1.1metres.




Foundation Details
a = 200mm, b = 1100mm, c = 300mm

**Augered Boreholes**

A borehole by hand auger was sunk to a depth of 4.0metres below ground level. The borehole revealed a stiff, dry, grey-veined, brown clay containing numerous roots which continued to 2.5metres. Between 2.5 and 4.0metres, the substrata was firm and dry, although no roots were noted.

**Soil Samples**

Soil samples were retrieved from the bore, wrapped in clingfilm before being bagged and deposited with a testing laboratory.

**Roots**

Roots have been submitted for identification. The results are attached. The roots have been identified as Oak.

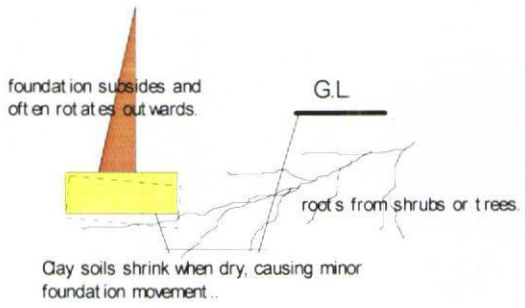
**Drains**

The drains are not in the area of damage and were not inspected. Whilst there is a rainwater gulley at the rear right corner of the building, there was no indication that any water is leaking from this.

## Cause of Damage:

Properties in clay areas typically suffer from subsidence as a result of dry weather conditions compounded by moisture extraction from vegetation. During these conditions, clay will loose its moisture through evaporation. As the clay dries it shrinks. The degree of shrinkage from dry weather is generally not sufficient to cause structural damage unless the foundations are particularly shallow. Usually subsidence damage is the result of vegetation, especially trees, extracting even more moisture from deep within the ground within its' zone of influence.

*Cont/...*




There is a direct correlation between the moisture uptake of vegetation and its leaf canopy. Reducing the leaf canopy will reduce the water demand of the vegetation. If the vegetation is removed entirely, so the water demand is removed.

When removing vegetation, particularly established broad leaf trees, consideration must be given to heave. Heave occurs where the clay soil expands as the moisture returns. Structural damage can occur as the property suffers from extreme upward movement.

The most common way to adequately establish if movement has been arrested is to monitor the situation for a period of time. Typically this is conducted over twelve months to cover the four seasons. However, each case must be considered on its own merits.

In the majority of cases vegetation works will be sufficient to allow superstructure repairs alone. However, in exceptional cases this may not be sufficient and underpinning may have to be used in order to arrest the movement.

Subsidence can also occur to properties founded on a clay soil due to leaking drains. In such cases the liquid egress will cause over-softening of the clay and therefore a reduction in the clays bearing capacity. Once the leak has been repaired the damage is monitored and provided there is no deterioration superstructure repairs can be implemented.

Similarly, problems with leaking drains also can occur to properties founded on a more granular material such as sand or gravel. Liquid egress will cause the finer particles of the material to migrate downwards. This will result in a change in volume of the material. Again, reinstating the drains will allow the situation to stabilise.

## Discussion:

The timing of the damage, together with the locality of the Oak tree, the presence of a highly shrinkage London clay and roots below the foundations confirm the cause to be subsidence due to desiccation of the clay substrata caused by moisture extraction by roots from the Oak tree.

In the circumstances, we consider that a significant reduction to the Oak tree should be undertaken and to that end, we have requested a quotation for these works. It is understood that there is a Tree Preservation Order on this tree, in which case the consent of the Council would be required prior to any works being undertaken. Insurers have agreed to meet the reasonable costs of this work.

Following tree works, we will need to monitor the property to establish whether this results in stability and to that end monitors have been attached and initial readings taken. We also consider it would be appropriate to provide levels around the property and compare the levels with a datum towards the front of the property in order to assess any further movement, in particular during the next dry spell of Summer 2011.

*Cont/...*

Monitoring is a useful diagnostic tool. Cracks that open and close are indicative of clay shrinkage problems, whilst cracks that open, without closing, are usually indicative of either excessive water (due to leaking drains, water services etc.) or poor ground.

Monitoring is carried out in accordance with the requirements of the Building Research Establishment.

Readings will be taken at two monthly intervals.

## Recommendations/Action Plan:

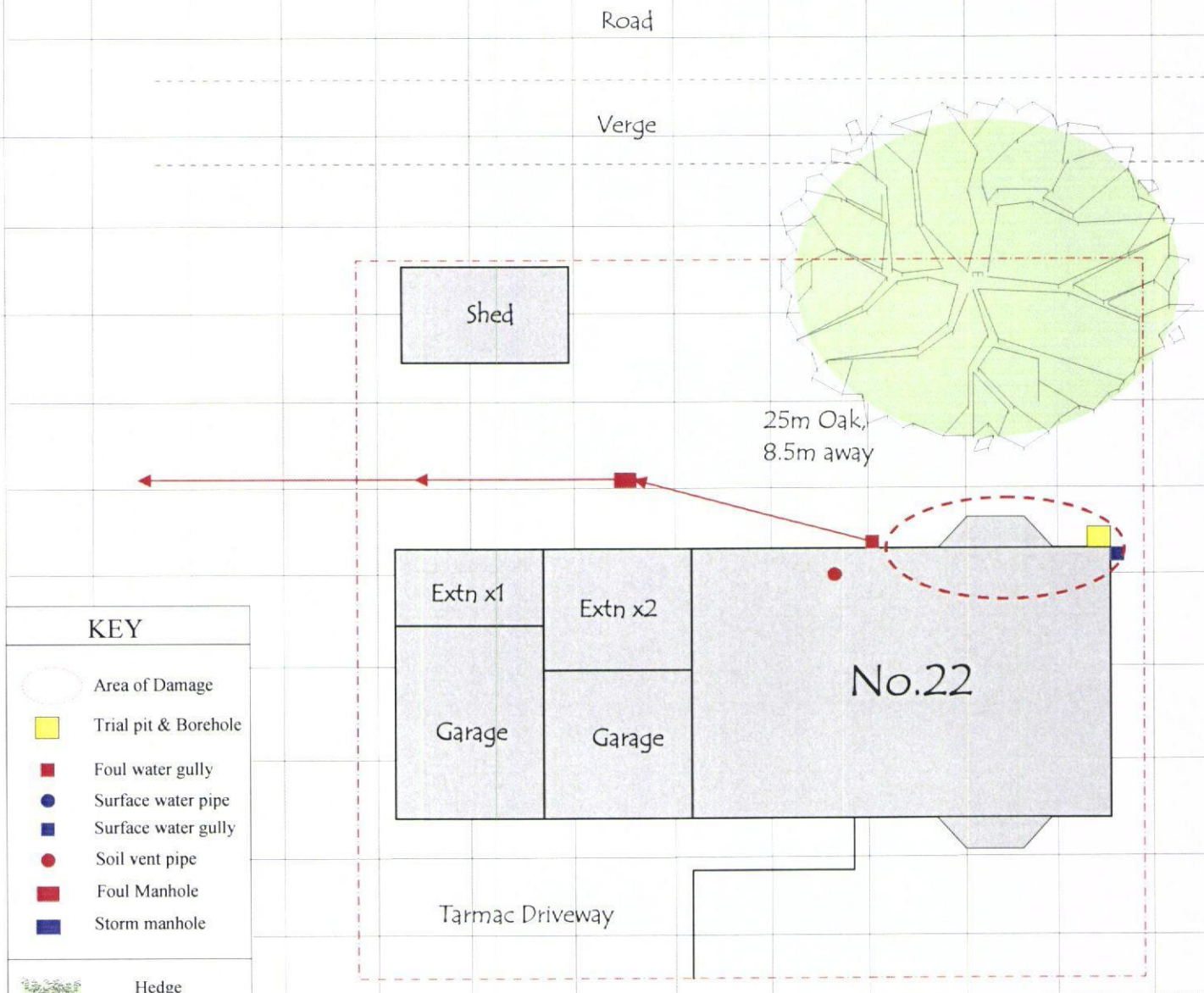
We will make an application to have the Oak tree reduced, following which it will be necessary to crack and level monitor the property to confirm whether this results in stability in the longer term.

**Eamon P. Larkin** BSc CEng MICE
**Riley Larkin Limited**

# Site Plan

**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 drains and trees etc. Tree heights and distances are approximate and tree species are not authenticated The boundaries are not accurate, and do not infer or confer any rights of ownership or right-of-way.




OAKMONT DRIVE

The site layout plan. Diagrammatic and not to scale.