

Arboricultural Report



SUBSIDENCE INVESTIGATION AT:

34 Lakewood Road
Eastleigh
Hampshire
SO53 1EW

Client:	Crawford and Company Adjusters - UK
Reference No:	SU2206173
Enviro Trees UK Ref No:	TM65
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Introduction

Enviro Trees UK was instructed by Crawford and Company Adjusters – UK to visit the insured property to:

- identify all trees and shrubs within the potential distance of influencing building structures at the insured property
- provide an opinion on the trees and shrubs being a causal factor in the damage to the insured property
- make recommendations on the immediate and future management of the trees and shrubs

The property was attended and assessed on 17/02/2023.

Shrinkable clay soil

Also known as shrink/swell clay, shrinkable clay soil shrinks as it dries and swells as it rehydrates. The top few metres of soil will tend to dry out in the summer months when the water demands of vegetation and evaporation exceed the replenishment by rainfall. During the winter months when trees have lost their leaves and/or become dormant, heavier rainfall exceeds the water demand of the vegetation and the soil moisture level increases again.

The composition and volume change potential of clay soils can be determined by laboratory analysis of soil samples.

Structures built on clay soil will move up and down as the clay swells and shrinks through the seasons. Problems arise when different parts of a structure move at different rates leading to cracking of walls and foundations. This can be caused by a range of factors:

- Trees and other vegetation abstracting water leading to the drying and shrinking of the soil in one area more than another causing subsidence.
- Leaking pipes: a slow leak can cause the clay to expand resulting in heave whereas a faster leak can wash away soil leading to subsidence.
- Different foundations depths: shallow foundations will be much more susceptible to seasonal volume changes of the clay whilst deep foundations may be founded below the level of seasonal influence. Different parts of a property built on different foundation depths may be subject to differential movement leading to cracking at the join.

This report concerns the first of these factors.

Size and leaf area are important factors in the water demand of vegetation so significant pruning will reduce the amount of water abstracted from the soil, but the effects are often short-lived. Trees and shrubs often respond to pruning with a prolific flush of growth that quickly replaces the lost leaf area. For this reason, removal of the influencing vegetation often offers a more reliable solution to rehydrate the moisture content of clay and stabilise the building. Where there are many trees and shrubs within potential influencing distance it may be appropriate to remove some and prune others. Follow-up monitoring will show whether the property has stabilised or whether further measures are required.

Environmental Impact Assessment (EIA)

The environmental impact assessment (EIA) process evaluates the potential biophysical, social and other effects of a subsidence request to avoid, mitigate or offset significant adverse effects. Its function is to identify problems, recommend solutions and promote and maximise the proposals' positive effects.

Trees are important assets in rural and urban landscapes. Their benefits include:

- Social: trees line our streets forming prominent features in parks and gardens that create aesthetically pleasing and peaceful environments. Trees are landscape features and strengthen landscape character and sense of place. Research has found positive links between trees and human wellbeing, with corresponding reductions in the rates of non-communicable diseases such as cancer.
- Environmental and ecological: trees contribute to improving air quality and their canopies provide shade and help regulate temperature. They support a wide range of wildlife and are an important source of food and habitat, supporting biodiversity and ecological networks.
- Economic: they provide timber, food and fuel.

Trees also have perceived negative attributes, including:

- damage to buildings and structures from root and canopy encroachment
- inconvenience of leaf litter and honey dew
- overshadowing and overbearing effects
- unwanted wildlife such as loafing birds and insects
- risk of harm to people and property.

Arboricultural inputs play an increasingly important role in informing the process, demonstrating that the interrelationship between trees and subsidence impact has been fully considered and a solution is sustainable. For instance, whilst trees absorb carbon dioxide, concrete underpinning may emit more CO₂ than could be absorbed by the trees if they were retained.

Enviro Trees UK considers the carbon absorption for the trees' life span relative to other remedial measures such as root barriers and underpinning in our recommendations.

Limitations

This report assumes that engineers are satisfied that the damage to the insured property is attributable to clay soil shrinkage resulting from moisture abstraction by vegetation.

The report may be subject to review upon receipt of additional site investigation data, monitoring, engineering or other information.

The trees were inspected from ground level. Trees and shrubs that are not recorded are considered to be beyond the range of influence and/or are not significant in the context of the current damage or expected to pose a threat in the foreseeable future. Our assessment was made externally (no entry into the building required).

The report does not include a detailed assessment of tree condition or safety. The health, condition and safety of trees should be checked on a regular basis – best practice recommends that trees are inspected every 18 months when they are alternately in and out of leaf and following extreme weather events. Third-party owners are advised to seek their own advice on tree health, structural integrity and risk. Conclusions and recommendations are valid for a period of one year and validity may be reduced in the case of any change in conditions in proximity to the trees/shrubs or built structures.

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Property details

Two story detached house of traditional construction with part rendered brick walls surmounted by a hipped, tiled roof. Date of construction c.1960's.

There is a single-story extension at the rear left which was present on purchase and a conservatory on the rear right which was rebuilt around 2 years ago on new deeper footings. The site is generally level with no adverse topographical features.

Council area

Eastleigh Borough Council

Details of damage

The cracking was first noticed in summer 2022. The area of damage is the rear left corner of the house (Northeast corner) at four internal locations and two externals. The pattern and nature of the cracks is indicative of an episode of subsidence. The cause of movement has been diagnosed to be clay shrinkage.

Recorded information

The following details were recorded for each tree or shrub and tabulated in the schedule of findings:

- Species
- Height in metres
- The radius of the canopy spread in metres
- Trunk diameter measured 1.5m above ground level (diameter at breast height – DBH) and number of stems (# denotes estimated measurement where trunk is inaccessible)
- The life stage
 - Young: establishing, usually with good vitality but as yet of limited significance in the landscape.
 - Semi-mature: established, normally vigorous, increasing in height and of increasing landscape significance.
 - Early-mature: established; approaching mature height with crown spreading.
 - Mature: fully established trees around the middle of their typical life expectancy; generally retaining good vitality and achieving full height but their crowns still spreading.
 - Over-mature: fully established trees toward the end of their typical life expectancy with declining vitality.
- Age relative to property
- Distance from property in metres (# denotes estimated distance)
- Tree owner/location
- Vitality, condition and previous works
- Statutory protection (Tree Preservation Order or Conservation Area)

Data for subsidence risk

Arboricultural assessment considered the Crawford Subsidence Site Note Pack.

Underlying geology

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

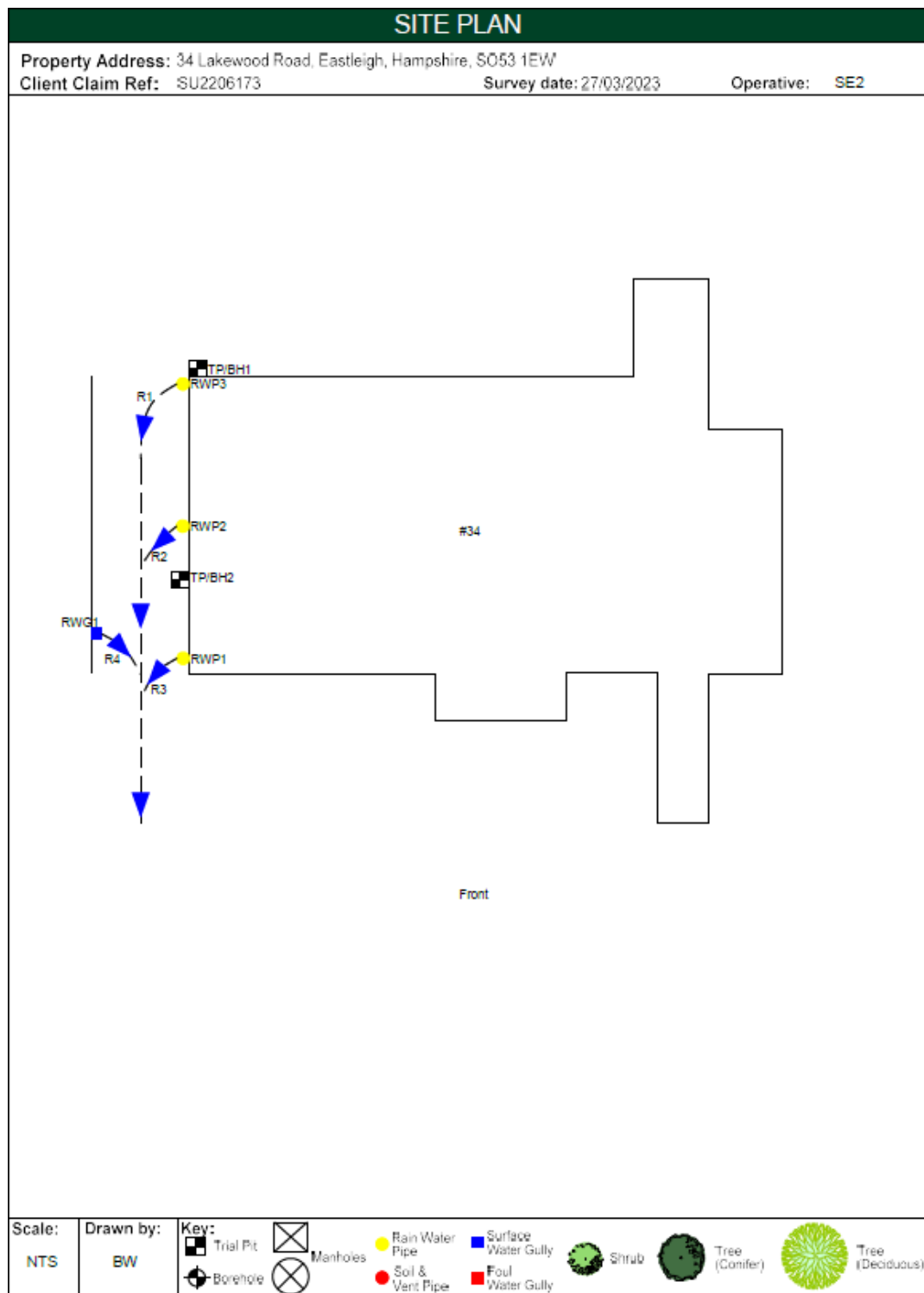
London Clays are marine deposits characterised by their silty, sandy composition. They are typically stiff, dark or bluish grey, weathered dark to mid-brown superficially with fine particle size (less than 0.002mm). Tomlinson¹ describes it as a 'fat' clay with high loadbearing characteristics due to preconsolidation 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

Site Investigations

Site investigations were carried out by Fastrack 27/03/23 when trial pits were excavated to reveal the foundations, with a borehole sunk through the base of each trial pit to determine subsoil conditions. The results are summarised in the plan and tables below.

Site investigation plan showing location of boreholes



Drilling Report

Date	27/03/2023
Service Provider	Fastrack
Number of Trial pits (TP)	2
Number of Bore Holes (BH)	2

Foundations

TP/BH Number	Type	Depth at Underside (mm)
TP1	Concrete	750
TP2	Concrete	1200
BH1	Concrete	750
BH2	Concrete	1200

Roots

TP/BH Number	Roots observed to depth (mm)	Identification	Starch
BH1	750	Cupressaceae spp	Low
BH1	750	Quercus spp. or Castanea spp.	Absent
BH1	1500	Cupressaceae spp.	Abundant
BH2	1200	Prunus spp	Abundant
BH2	1500	Quercus spp. or Castanea spp	Absent
BH2	2000	Quercus spp. or Castanea spp	Absent

Soils

TP/BH Number	Description	Plasticity Index %	Volume Change Potential (NHBC)
BH1	Brown silty CLAY containing grey and orange mottle	24-37	Medium
BH2	Brown silty, sandy CLAY containing grey and orange mottle	30-40	Medium

Drains

Condition grade A: Structurally sound with no leakage evident. Slight crack/defects permitted.

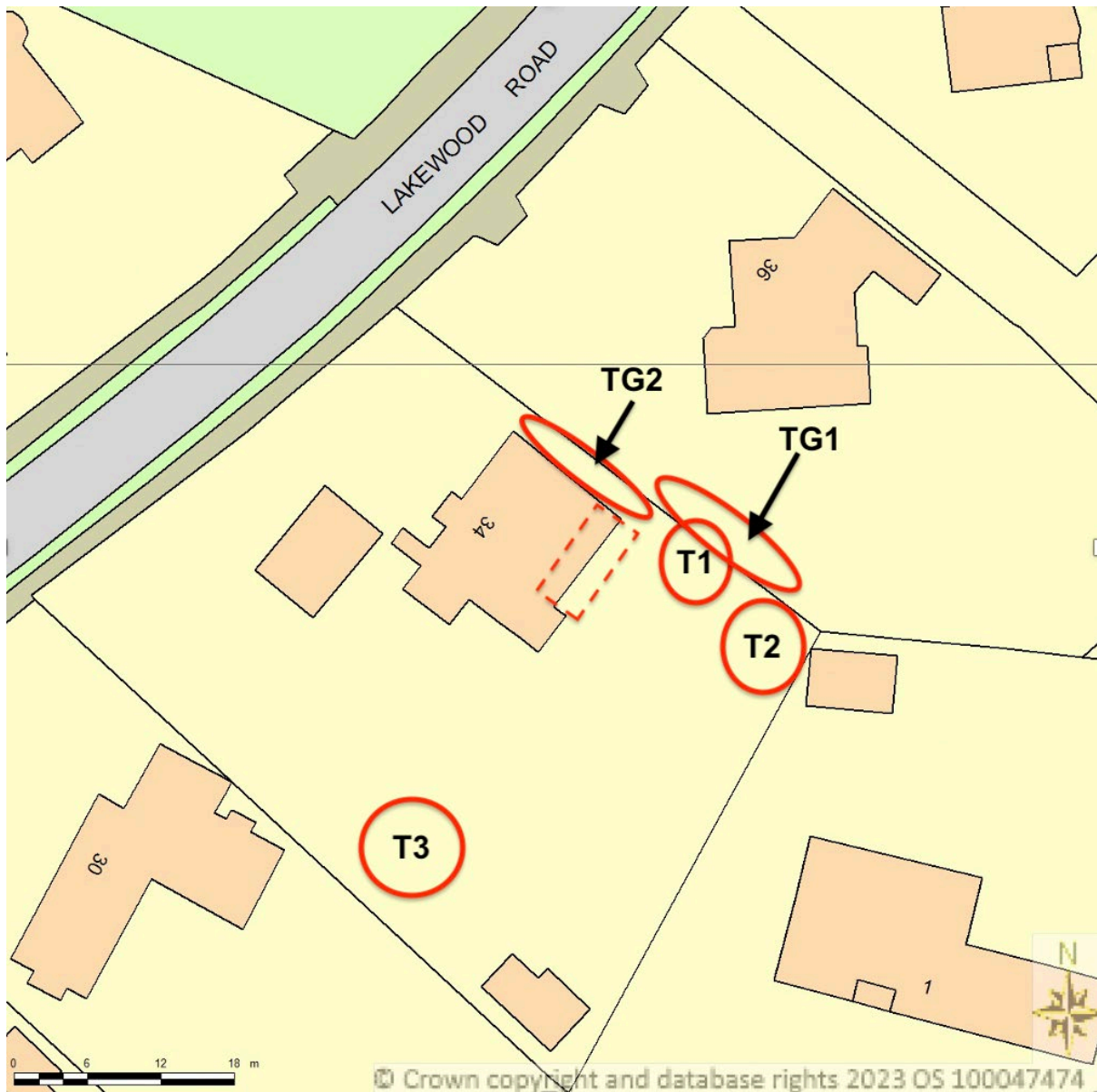
Monitoring

No information available at time of writing.

Schedule of findings

Ref.	Species	Height (m)	Canopy radius (m)	DBH (cm) No. of stems	Life stage	Age relative to property	Distance to property (m)	Tree owner/ location	Vitality, previous works, comments	TPO/ CA
T1	Oak, (Quercus)	20	6	420 1	Mature	Older	5	Insured	Good. Previously crown lifted & dead wooded	CA
T2	Red Cedar	22	4	610	Mature	Older	15	Insured	Good. Previous stem failure at trunk	CA
T3	Oak, (Quercus)	30	9	700	Mature	Older	26.5	Insured	Good. Previous crown lift & lower limb reduction	CA
TG1	Conifers	3 - 6	2 - 3	100-180	Semi Mature	Younger	1.5 - 3	Neighbour (36 Lakewood Road)	Good. Topped to 3m	CA
TG2	Laurel & Yew	1 – 2	1 – 2	30 – 50	Mature/ Juvenile	Younger	1 - 5	Insured	Good. Heavy pruning on Laurel & light trim Yew	CA

Tree plan



Tree plan showing area of damage with dashed red line.

Photographs



T1



T1



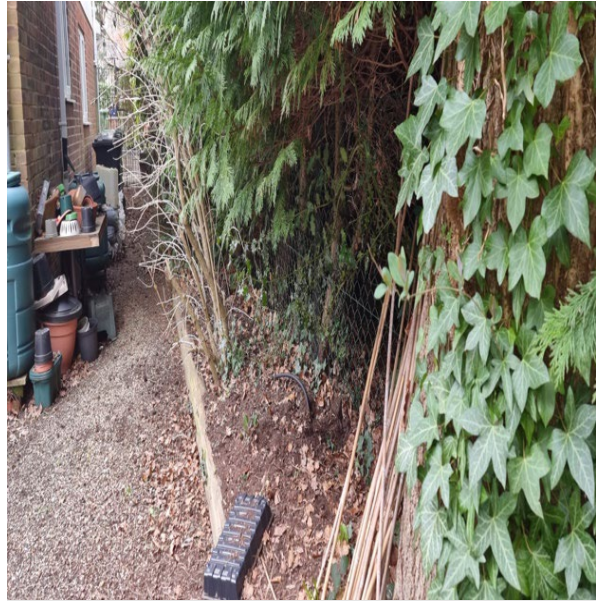
TG1



TG1



TG2



T1 & TG1



T2



T3

Analysis

- Oak (T1) has a high-water demand and is within the 50% distance for damage in the C&R study. Laboratory analysis of the roots found below foundation depth during the site investigation identified them as *Quercus* spp.
- Western red cedar (T2) has a high-water demand and is within the maximum distance for damage in the C&R study. Laboratory analysis of the roots found below foundation depth during the site investigation identified them as *Cupressus* spp.
- Oak (T3) has a high-water demand and is toward the outer limit of the zone of influence defined by NHBC. Laboratory analysis of the roots found below foundation depth during the site investigation identified them as *Quercus* spp.
- Lawson cypress (TG1) has a high-water demand and is within the 50% distance for damage in the C&R study. Laboratory analysis of the roots found below foundation depth during the site investigation identified them as *Cupressus* spp.
- Bay laurel, yew (TG2) is within 50% of the radius of influence defined by NHBC. Laboratory analysis of the roots found below foundation depth during the site investigation identified them as

Conclusions

- Reference to the British Geological Society Geological Viewer indicates that the underlying soils are likely to include shrinkable clay.
- The site investigations have shown the presence of shrinkable clay soil.
- This survey has identified woody vegetation within influencing distance of the property.
- The site investigations have found roots below the foundations which have been matched to the vegetation identified in the schedule of trees and shrubs in this report.
- Engineers are satisfied that the damage to the insured property is attributable to clay soil shrinkage resulting from moisture abstraction by vegetation.

Recommendations - Current claim

Consideration has been given for pruning alone as a means of mitigating the vegetation impact. However, in this case this is not considered a viable long-term solution.

Ref.	Species	Tree owner/ location	Dist. to dmg. (m)	C&R 50%	C&R 75%	C&R Max.	NHBC	Recommendation
T1	Oak	Insured	5	10	13	30		Remove close to ground level and treat stump with herbicide to inhibit regrowth.
TG1	Lawson cypress	Neighbour (36 Lakewood Road)	1.5	3	4	20		Remove stems within 5m of property
TG2	Bay laurel, yew	Insured	1				2	Remove close to ground level, and treat stump with systemic herbicide to inhibit regrowth

Note: the radius of the zone of influence is taken from “*Tree Roots & Buildings*” Cutler, D.F. and I.B.K. Richardson, (1989) or determined in accordance with NHBC Standards Chapter 4 2021.

Recommendations - Future risk

Ref.	Species	Tree owner/ location	Dist. to dmg. (m)	C&R 50%	C&R 75%	C&R Max.	NHBC	Recommendation
T2	Western red cedar	Insured	15	3	4	20		Maintain the current management regime of periodic pruning to maintain the tree within $\pm 10\%$ of its current size.
T3	Oak	Insured	31.5	10	13	30		Maintain the current management regime of periodic pruning to maintain the tree within $\pm 10\%$ of its current size.
TG1	Lawson cypress	Neighbour (36 Lakewood Road)	1.5	3	4	20		Maintain remaining section at no more than current size through regular maintenance

Statutory protection

The presence of Tree Preservation Orders (TPO) or Conservation Area status should be confirmed prior to any tree works being implemented. Failure to do so can result in fines in excess of £20,000.

Trees and wildlife

Trees are hosts to nesting birds and mammals. Under the Wildlife and Countryside Act it is an offence to disturb any nesting bird or bat. Before carrying out any works it is important to ensure that there are no birds or bats in residence.

Implementation of tree works

Tree work is skilled and potentially dangerous. Work should be carried out by trained and certificated contractors working to BS 3998: 2010 *Recommendations for Tree work*.

Replacement planting

Replacement planting may be possible but would require careful choice of species and position to avoid a recurrence of the current claim.