

Arboricultural Report



SUBSIDENCE INVESTIGATION AT:

**1 Kent Terrace
Church Street
Rochester
Kent
ME3 7LF**

Client:	Crawford and Company Adjusters UK - Subsidence
Reference No:	SU2302421
Enviro Trees UK Ref No:	TM660
Report Date:	25/03/2024

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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 20/03/2024.

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 cracking.
- Leaking pipes can cause clay to swell and soften with a resultant drop in bearing capacity. The leak may also wash away the softened clay or smaller particles in non-cohesive soils leading to a loss of support for foundations.
- 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 wildlife and are 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

The property is a two-storey end terraced house. External walls are of brick, with a pitched tile roof. Built in 1900.

The site notes don't state whether the property occupies a flat or slanted site no adverse topographical features.

Council area

Gravesham Borough Council.

Details of damage

Damage to the front of property.

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

The BGS Geology Viewer suggests that the bedrock geology is likely to be Lambeth Group - Sand, silt and clay. Sedimentary bedrock formed between 59.2 and 47.8 million years ago during the Palaeogene period.

Site Investigations

Site investigations were carried out by Catalyst on 13/10/2023 when trial pits were excavated to reveal the foundations and to determine subsoil conditions. The results are summarised in the plan and tables below.

Drilling Report

Date	13/10/2023
Service Provider	Catalyst
Number of Trial pits (TP)	1
Number of Bore Holes (BH)	1

Foundations

TP/BH Number	Type	Depth at Underside (mm)
TP1	Concrete	600

Roots

TP/BH Number	Roots observed to depth (mm)	Identification	Root Dia. (mm)	Starch
TP1	700	Cupressaceae (x6)	<1 to 1.5	Positive
BH1	700-1200	Cupressaceae (x2)	<1	Positive

Soils

TP/BH Number	Description	Plasticity Index %	Volume Change Potential (NHBC)
BH1	Very stiff dark brown/grey very silty CLAY with chalk nodules.	22-26	Medium

Drains

No information available at time of writing.

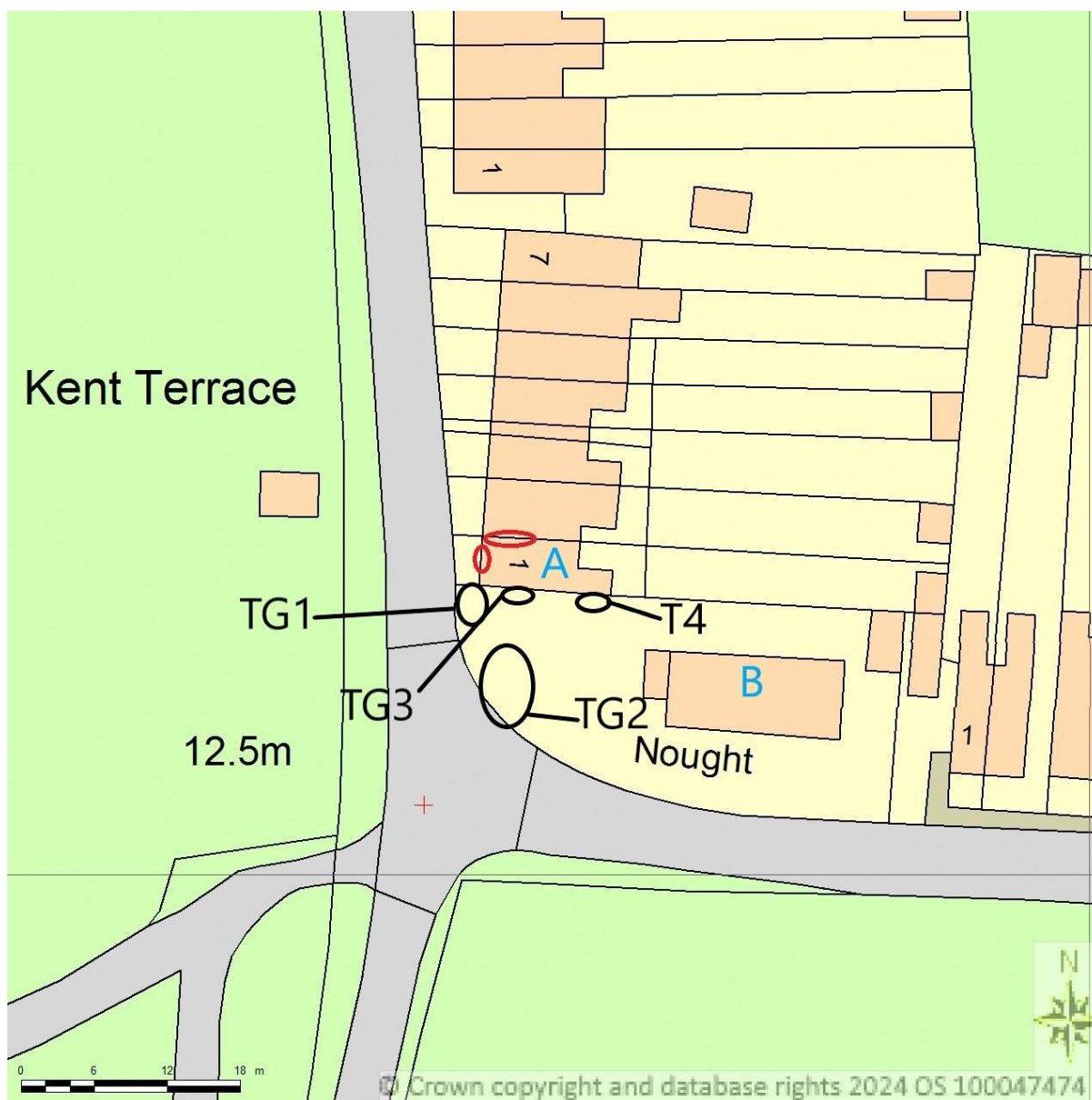
Monitoring

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
TG1	Leyland cypress	8	3	7	Semi-mature	Younger	0.6	Neighbour	Good. Reduced, Target pruned. High-water demand.	CA
TG2	Poplar	12	3.4	23	Mature	Younger	8 #	Neighbour	Good. Pollarded. High-water demand.	CA
TG3	Elder	4.5	2.5	10 #	Young	Younger	1 #	Neighbour	Good. Low-water demand.	CA
T4	Elder	3	1	1 4	Young	Younger	5 #	Neighbour	Fair. Reduced. Low-water demand.	CA

Tree plan



Tree plan showing area of damage with red circle and location of neighbours as detailed below.

Reference	Address
A	1 Kent Terrace, Church Street, Higham, Rochester, ME3 7LF
B	Nought, Bull Lane, Higham, Rochester, ME3 7LT

Analysis

- Leyland 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.
- Poplar (TG2) has a high-water demand and is within the 50% distance for damage in the C&R study.
- Elder (TG3) is within 50% of the radius of influence defined by NHBC.
- Elder (T4) is unlikely to be of influence.

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.

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 & age (relative to property)	Height DBH (m)	Dist. to dmg. (m)	Vitality & previous works	Tree owner/ location	Recommendation	TPO CA
TG1	Leyland cypress Semi-mature (Younger)	8 (0.07)	0.6	Good Reduced, Target pruned	Neighbour (see plan)	Remove close to ground level.	CA
TG2	Poplar Mature (Younger)	12 (0.23)	8 #	Good Pollarded	Neighbour (see plan)	Remove close to ground level and treat stumps with herbicide to inhibit regrowth.	CA
TG3	Elder Young (Younger)	4.5 (0.10)	1 #	Good	Neighbour (see plan)	Remove close to ground level and treat stumps with herbicide to inhibit regrowth.	CA

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.

Photographs



TG1



TG1



TG2



TG2



TG3



TG3



T4



T4