Optera Structural Solutions

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Arboricultural method statement to install a root barrier.

Date

October 3, 2023

Services Performed For:

Sedgwick UK

2 The Boulevard, City West One Office Park,
Gelderd Road, Leeds. LS12 6NY

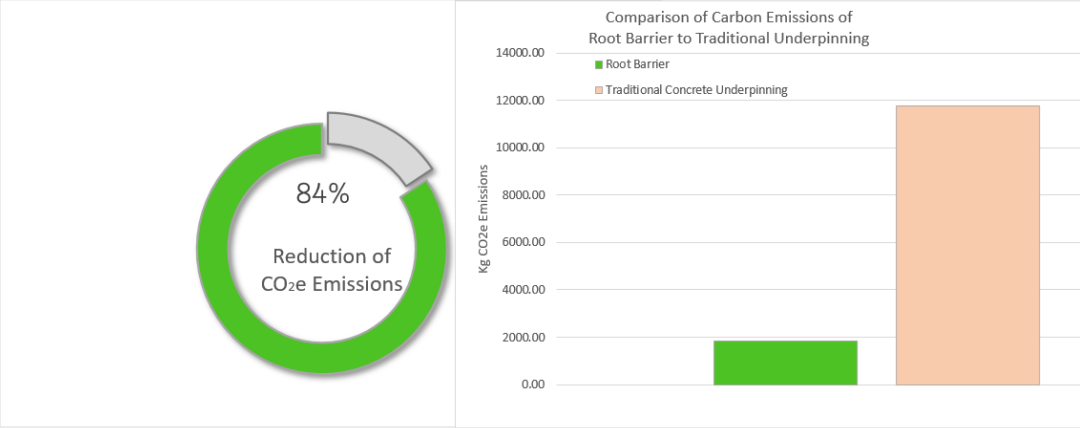
POLICY HOLDER ADDRESS: **21 Freeman Avenue, Henley, Ipswich. IP6 0RZ**

CLIENT REFERENCE: **9255790 / D141112170**

OUR REFERENCE: **7423**

PROJECT MANAGER: **Spencer Caizley**

Specifications of Barrier					
Barrier Type	**Length**	**Max Root Depth from SI**	**Minimum depth to be achieved with barrier**	**Distance between tree / Vegetation and barrier**	**Shortest distance between barrier and foundation**
Copper	**20m**	**1.1m**	**3.5m**	**5m**	**2m**



Aerial plan indicating proposed 20m length and alignment of barrier.

Report

This method statement covers the installation of a root barrier at the above property due to tree root induced subsidence from adjacent trees. The focus of the barrier is to deal with the risks presented today based on nformation available at the time of writing. No allowance has been made for future growth and the potential for future issues which may arise because of any future growth of vegetation.

Property Details

The property is a semi- detached bungalow of brick construction surmounted by a pitched tiled roof, built c1980 and located at the end of a cul-de-sac within a residential estate. The property benefits from an attached single garage located to the rear right of the site. There are various trees along the rear boundary. Some these are within the ownership of the insured and others are third party owned. The lime tree owned by the insured is deemed causal by the arborists.

The claim concerns subsidence damage to the rear left hand corner of the building with downward movement noted about the external left-hand corner and associated stepped cracking in the bed joints. There is notable downward and outward distortion about the rear left hand corner. Internally, various cracks are documented which are felt to be related to the movement.

Front elevation of the property and garage, with the trees shown to the rear.

Site Investigation Results

The site investigation comprised a single trial pit and borehole to the rear left hand corner. This confirmed the property is founded on a 250mm thick ,concrete strip footing, bearing on clay soil with roots. At 1.6m BGL, the soils are noted to change to a moist, stiff brown, sandy, silty CLAY. The soils became more gravelly with depth albeit, CLAY was the dominant feature and the borehole was terminated at 3m BGL.

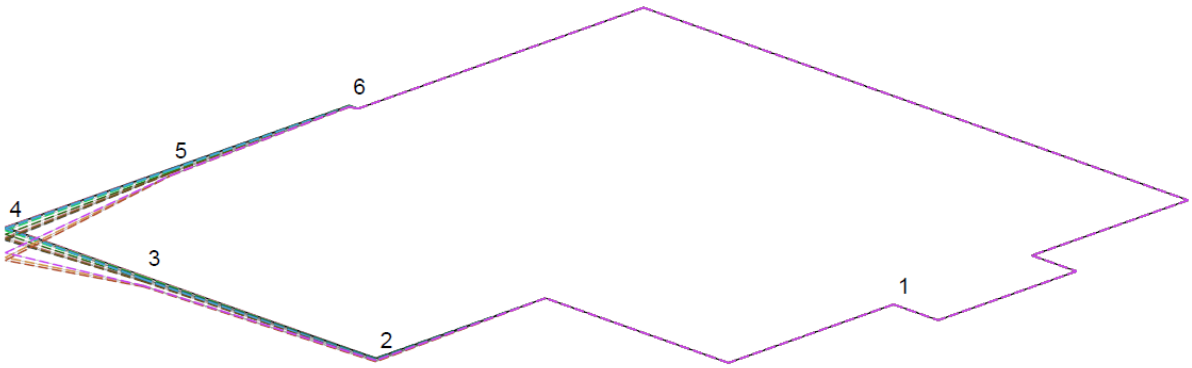
Samples of the clay were retained and sent to the laboratory for testing. This confirmed the clay to be of mixed plasticity. At the upper areas the soils were noted to be intermediate plasticity and dropped to low at 1.6m and increased to high plasticity by 2.6m.

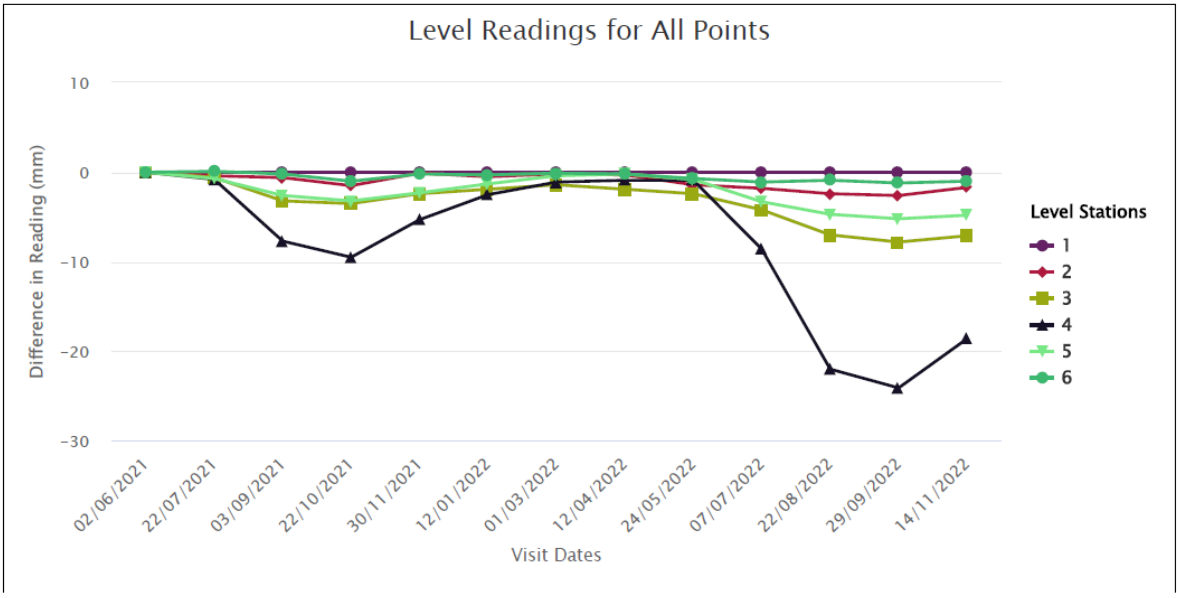
Roots from the soil samples were examined under microscope. This confirmed the origins of the roots to be Lime trees, albeit they were very fine at 1.1mm and some bark which could not be identified.

Level monitoring

Level monitoring has been carried out across the rear and left-hand elevations. A point on the front of the property has been used an assumed stable datum. The results confirm a cyclical pattern of downward movement during the drier, hotter summer months when the trees are in leaf and demanding moisture from the ground. Recovery and upward movement is then noted during the wetter winter months when the weather is more iinclement,and the soils are able to rehydrate and swell and the trees have dropped leaf and therefore no demand of moisture is present.

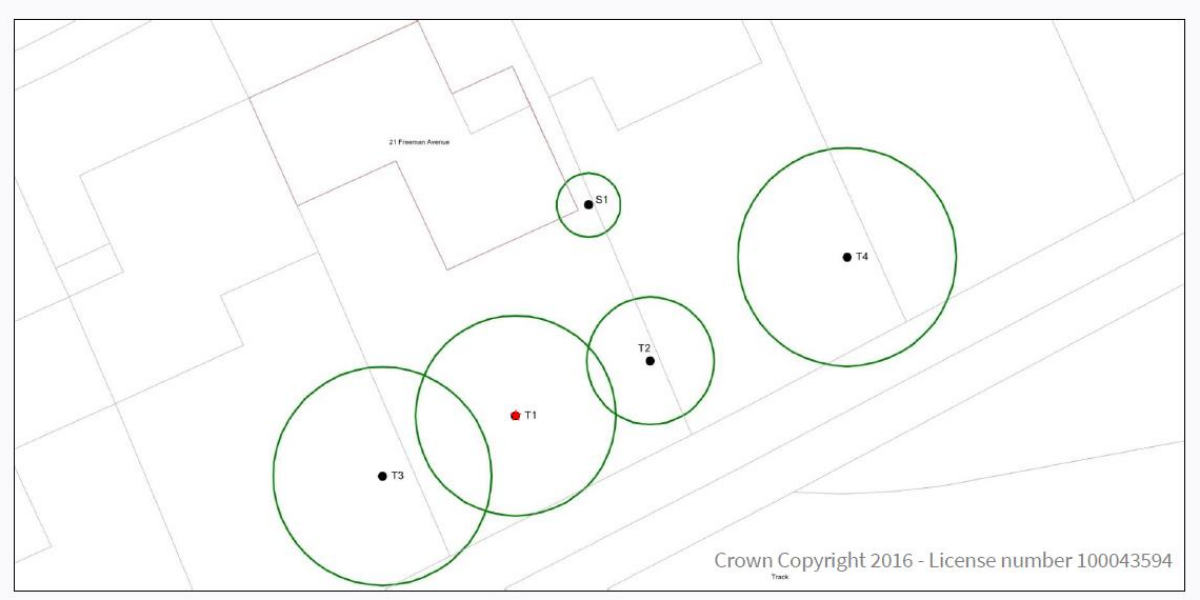
The most movement is noted about the rear left hand corner where point four shows nearly 24mm of downward movement during late summer 2022 which is acknowledged as an event year where the intensity and longevity of the heatwave caused droughts and moisture deficit across the south and east of the country.





Arboricultural Recommendations

The arborist report from 2022 recommended the removal T1 Lime which is in the policyholder's garden but is subject to a tree preservation order. We suspect this is in part to lime tree roots being detected below the foundation in this are and it is undeniable that it will be having an influence. The barrier needs to extend into the left-hand neighbours garden to defend against T4 .



Tree Root barriers Explained in Brief

The current issues arise from the presence of tree roots which have grown into the clay soils directly below the foundations of the property. To abate the nuisance, it is prudent to either fell the tree in question or sever the roots between the tree and the property and provide protection against further growth.

The location of the barrier is targeted at the roots between the Lime tree and the foundations, and the act of excavation will sever them, causing the roots under the foundation to wither and die. The absence of water demand from the clay below the footings will allow the clay to rehydrate and recover. Whilst a period of recovery is anticipated, repairs can be typically undertaken shortly after the installation is complete.

To be effective, we believe the barrier needs to be extended across the rear of both the risk address and the neighbouring property, number 20. The tree is large and seemingly located to the right-hand side of the risk address. If it isn't extended beyond the right-hand boundary, there is a risk it could be outgrown, and the property compromised. It is assumed for the purpose of the quote, that the neighbour will allow removal of S1 lilac which will we will grub out with the excavator as part of the works. Having reviewed the site, we believe the barrier needs to be extended into the garden of number 20 and will provide protection about the rear left hand corner, which is visually, the focus of the damage and this is confirmed with level monitoring.

Access to the garden will be required for the 5-ton excavator. The insured built an extension to the rear right hand corner previously and has gained access via the rear lane. He is going to approach his neighbour who owns the lane to confirm the same for this exercise.

Optera install a copper impregnated geotextile barrier. This is typically installed with an excavator measuring no more than 2m in width. A trench is formed with the excavator and the arisings stored to one side of the trench. The barrier is typically formed in 5m lengths. Once the first 5m of the trench is excavated, we will bund the leading edge with sheet piles and line the trench with the copper impregnated bio-barrier, before backfilling with excavated arisings. The backfilled spoil will be placed in layers and consolidated with a compactor attachment on the excavator. The process is then repeated until all the designated barrier is installed. The spoil will be filled to the surface as a temporary measure to allow consolidation and until permanent reinstatement is completed at some later date. Any excess spoil will be cleared from site along with the plant, welfare, and protections. The area will be left tidy on completion.

Access is assumed from the rear, via The Drift which the property back on to. We have assumed that we will need to remove a fence panel in order to access the rear garden and a fence panel between the gardens of 21 and 23 for access between the two.

Barrier Design

Based on the site investigation and the size of the tree, Optera have recommended a minimum depth of 3.5m for the root barrier if site conditions allow. To install a barrier up to 3.5m in depth, will require an 5-ton excavator, and requires a minimum 1.95m wide access route.

It is believed that the distance between the Lime tree and bungalows is 7mm and to prevent damaging the tree, the barrier should be located as near to the properties as possible, so not to sever all the main roots of the tree. We envisage that the barrier will be around 2.0m from the bungalow and 5m from the lime tree. The barrier would be approximately 20m in length and positioned within soft landscaping. In order to carry out these works, a tree root severance application will be necessary, and this will be submitted to the local authority on authorisation. We have assumed that Sedgwick and the insured will liaise with the neighbour to obtain access and permission to install the barrier in 20 and access via the Drift should also be confirmed prior to start. We have provided the insured with our contact details if any further explanation or detail is required.

View of the rear of the house with the stepped cracking about the rear left hand corner.

View over the fence at number 20 with the Lilac tree stump size. This is only 1.4m from the area of damage.

View of The Drift to the rear, which is privately owned by neighbours. This will be required for access.

View of the insureds Lime tree with a smaller tree, T2, on the boundary fence

Method Statement

The method statement includes reinstatement of the excavated trench in soft landscaping only. We have included to take down and reinstate the boundary fence at the rear and to the boundary between 20 and 21 but no allowance has been made for replacement should this be necessary.

The proposed works will comprise the following:

- Set up site, including compound area agreed with the customer. This area will be boarded, protected and secured with site fencing.
- The barrier will be marked out on the ground and the area CAT scanned prior to mechanical excavation.
- Any detected services within 1.0m are to be hand excavated and exposed prior to machine excavation.
- An open trench, 300mm wide will be formed to a depth of 3.5m which is 2m past the last detected root in the information we have been supplied. Excavation within the top metre of soil will be under supervision and any significant roots (with diameter > 25mm) will be cut with a clean, sharp saw on the side of the trench closest to the tree.
- Once the first 5m of trench has been formed, we will bund the leading edge of the excavation with sheet piles and line the trench with the copper impregnated bio-barrier.
- The trench will be filled with as dug arisings in layers and compacted with a vibrating plate compactor attached on the excavator.
- The next section of trench will be formed, and the process repeated, until all of the barrier has been excavated and installed.
- Once the barrier is installed and complete, we will top up any excavations with Topsoil to the surface in order that the site is left temporarily with trip hazards and the area left tidy.
- The insureds fences will be reinstated and secured to existing posts.
- All protective fencing, welfare and plant will be off hired and cleared from site and the area left tidy on completion.

Proposed Plan of Works for 7423

START DATE: Within 4-6 weeks of approval.
COMPLETION DATE: Within 2 weeks of starting the works.

Notes and Assumptions

- It is assumed that the excavations will be undertaken in virginal ground with no allowance for trench support or additional protections.
- No allowance has been made for the temporary disconnection or relocation of services or drainage.
- No allowance has been made for any hard landscaping and access and compound area are assumed to the rear on The Drift in the insureds garden.

Completion Criteria

Contractor shall have fulfilled its obligations when:

- Contractor accomplishes the Contractor activities described within this method statement.
- The Policy Holder agrees that works have been carried out as per the agreed specification to an acceptable standard.
- Agreement that works have been carried out as per the agreed specification to an acceptable standard by the appropriate Engineer.
- Site has been vacated and all plant and materials removed.

Project Variation Procedure

The following process will be followed if a change to this method statement is required:

- A project variation request will be submitted to the handling adjustor. The variation must describe the change, the rationale for the change, and the effect the change will have on the project.
- The designated Technical Manager for OPTERA will review the proposed change and determine whether to submit the project arboriculturists.
- If variation works are agreed, works will be booked in at the request of the handling Adjustor/Engineer and OPTERA will seek formal approval via the adjusting company.

Intervention Explained

How do Copper Root Barriers work?

In the UK the shrinkage and swelling of clay soils, particularly when influenced by trees, is the single most common cause of foundation movement that damages domestic buildings.

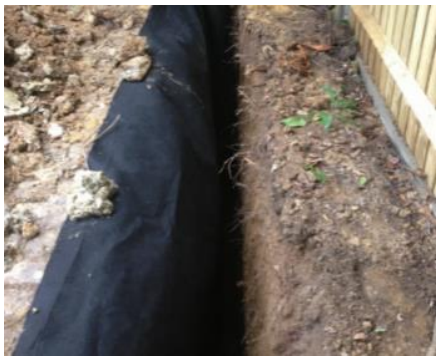
Trees are known to cause clay soils to shrink by drawing water through their roots, predominantly during spring and summer. This shrinkage results in both vertical and horizontal ground movements that, when transmitted to a building's foundations, cause damage to the building structure. The amount of shrinkage depends on the type of clay soil, the type and size of vegetation, and on climate. Trees growing under grass cover are forced to compete for their water and to extract water from greater depths than they might otherwise do, as is the case in this instance.

The water content of a shrinkable clay soil will vary with depth, remote from and near to a large tree. Near the ground surface there can be relatively large changes in soil water content between summer and winter as a result of evaporation from the ground surface and transpiration by the grass. Such variations are normally confined to the top 1-1.5m of the ground, possibly less adjacent to buildings. Where mature trees grow at the same location, then the water-content profiles will vary and the seasonal fluctuations in soil water content are both larger and extend to a greater depth. Soil volume changes and hence ground movements will be greater.

A crack due to differential foundation movement occurring after a tree has reached maturity, there being no cracks up to that time, means it is probable that an exceptionally long dry spell has also had an influence. But cracks will recover when ground moisture contents recover and will not recur to any greater width in future. BRE Cracking in Buildings. The intention of the Bio-root shield is to mitigate against this periodically damaging effect. The solution adopted in this case seeks to decrease water uptake by the trees thereby lessening subsidence risk by conserving soil moisture and reducing clay subsoil shrinkage. This aim is to achieve an impairment to root growth by the focused introduction of a proprietary Bio-root-shield that offers all the benefits of being both flexible and permeable. In addition, it works as a biological repellent.

The Copper signal barrier details a cooper foil securely bonded between porous geotextile, releasing copper ions and forming copper carbonate (verdigris) that signals an adverse reaction to roots deflecting them away from the barrier. The presence of copper does not constitute an eco-system burden or impact on groundwater

This solution is multipurpose and ideally suited to the current application. Traditional impervious barriers divert rather stop roots and may block moisture movement. Also, roots getting under such barriers can grow back to the surface. Therefore, the use of this permeable barrier stops roots either by engaging and constricting them or by chemically inhibiting them.



The benefits of such a shield are its dual protection both physical and biological. The multi layered sheets can be welded together whilst retaining its flexible qualities, i.e. can be cut and effectively resealed to fit round services and foundations, inert with a 60 year service life expectancy. Equally the solution inhibits root growth on the barrier face which is often problematic with conventional barriers where increased moisture levels can cause root growth to become more prolific on the face of a traditional barrier. Research has shown that the use of the recommended style of copper based screening has greatly reduced the effects of root growth when compared to other traditional physical barrier installations

Following the installation of the shield the trench will be backfilled and compacted mechanically with 20mm single sized stone. Alternatively, dependent upon site conditions backfill using lean mix concrete will utilised on the structure side of the shield. On occasions some natural settlement is anticipated following completion. In all instances the project envisages a return visit to the property to affect any required maintenance of the surface of the reinstatement routinely programmed within 6 months following completion of the installation.