

Optera Structural Solutions

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SOW 7343 Desktop quote for the provision of a tree root barrier

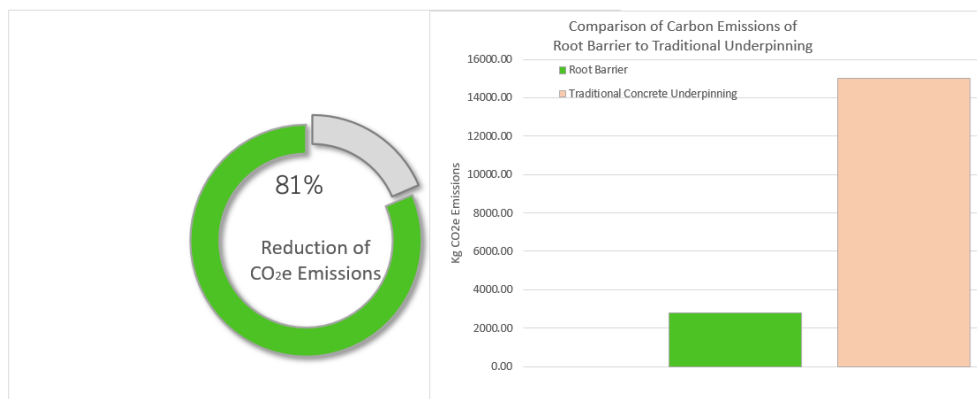
Date

April 28, 2023

Services Performed For:

POLICY HOLDER: TBA
POLICY HOLDER ADDRESS: 61 Chalk Hill, Southampton. Hampshire. SO18 3BY
CLIENT REFERENCE: 0654214204
OUR REFERENCE: 7343
PROJECT MANAGER: Spencer Caizley
ROOT BARRIER PROJECT FEE:

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	15m	2.0m	3.5m	5m	1m





Aerial plan indicating proposed 15m length and alignment of barrier.

This scheme quotation is strictly confidential and for the sole benefit of Optera's client, shown above. This document must not be passed in full or in part to another person, party, or organisation without the express written agreement of Optera, other than the Policyholder and insurance company responsible for the respective claim.

Report

Optera have been asked to provide a desktop quote for the installation of a root barrier at the above property due to tree root induced subsidence from adjacent Oak trees. No site visit has been carried out and this estimate is based on general assumptions and the information provided to us from the client. Full enabling and reinstatement costs are based on the soft landscaping described in this report and a revised costs can be provided if there are any changes and following a site visit. The focus of the barrier is to deal with the risks presented today and from the information supplied to us by our client. No allowance has been made for future growth and the potential for future issues which may arise because of any future growth of vegetation.

To facilitate the desktop assessment, we have been provided with the following information:

Level Monitoring by Fastrack Ref 21520
Arboricultural Report by MWA Ref UB210929-9491Rev01
Site Investigation Report Fastrack Ref 25021

Dated March 2023
Dated August 2022
Dated October 2022

Property Details

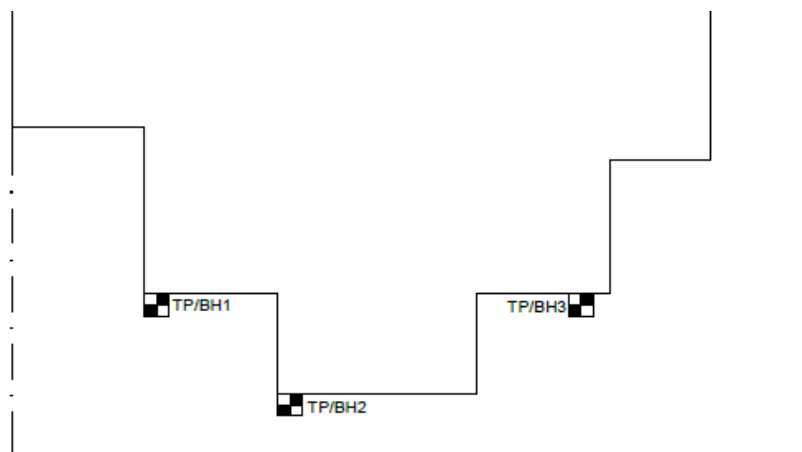
The property is a detached house of brick construction surmounted by a hipped tiled roof, built c1930 and located in a semi urban location on the outskirts of Southampton. The site slopes gently down from right to left and there is vegetation all around the property. Most notably, there are large beech trees which define the front boundary which we understand are subject to tree preservation orders.



Front elevation of the property

Site Investigation Result

The site investigation carried out by Fastrack, comprised 3 trial pits and boreholes which are all progressed by hand. The location of the trial pits is shown in the site plan below:



Trial pit 1 describes a concrete strip footing, 150mm thick, bearing onto a sand and gravel at 0.78m BGL. Due to the nature of the soils, it was impossible to penetrate with a hand auger and no further depth was achieved. We suspect that this is underlain by clay.

Trial pit 2 was a 100mm thick footing. Possibly a raft, bearing onto sand and gravel at 150mm below ground level and again the borehole was unable to penetrate past 500mm BGL due to the nature of the soil.

Trial pit 3 describes a 300mm thick, concrete strip footing, bearing on to an orangey brown silty CLAY at 800mm BGL. The borehole managed to achieve 1.8m before encountering a clayey GRAVEL and was aborted. The shear vein readings in the top 1.8m were not unduly high and do not indicate a desiccated clay soil.

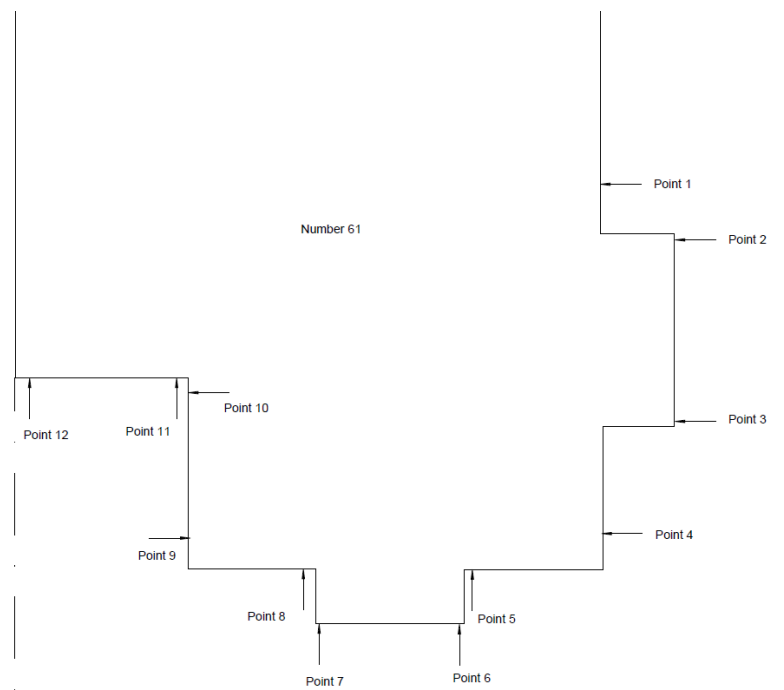
In borehole 3, samples were retained and tested within the laboratory. This confirmed the soils to be of high to very high plasticity clay soil and therefore susceptible to volumetric change with the changes in moisture content below a critical level.

Roots were found in trial pits 1 and 2 and these were subsequently identified under microscope. These were subsequently confirmed as a combination of Fagus (beech), Prunus (cherry) and Pomoideae (Apple and other fruit trees).

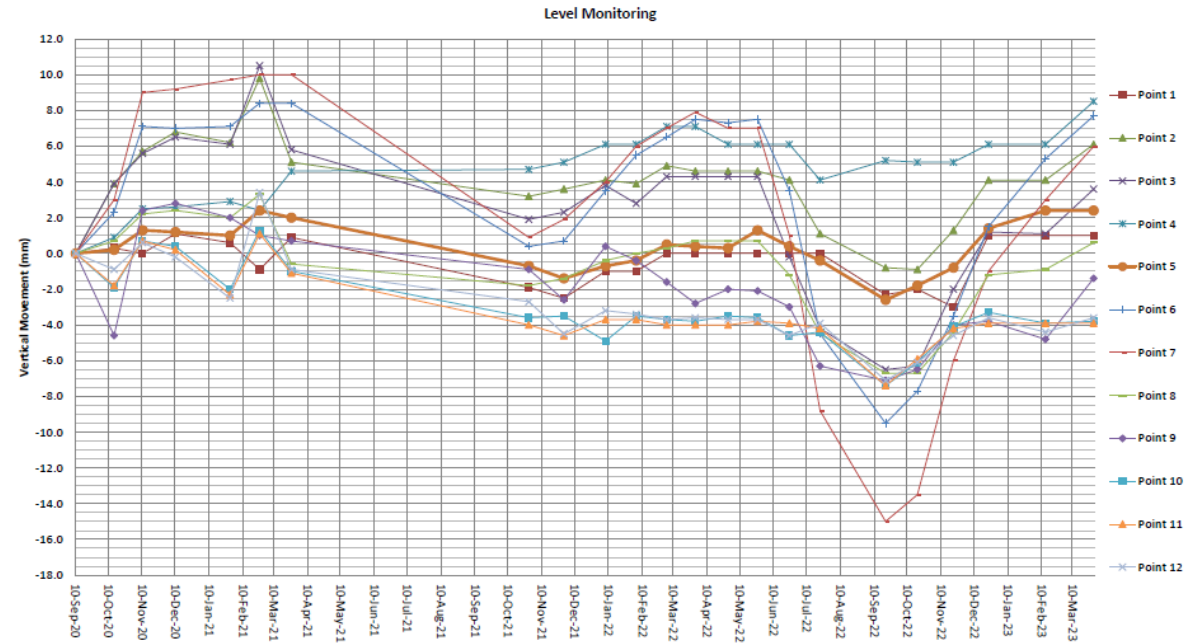
We have dealt with other properties in Chalk Hill and all have been found to be underlying high plasticity clay soils.

Level monitoring

Level monitoring was established in September 2020. Points were located about the front and the right hand flank of the property as shown below:



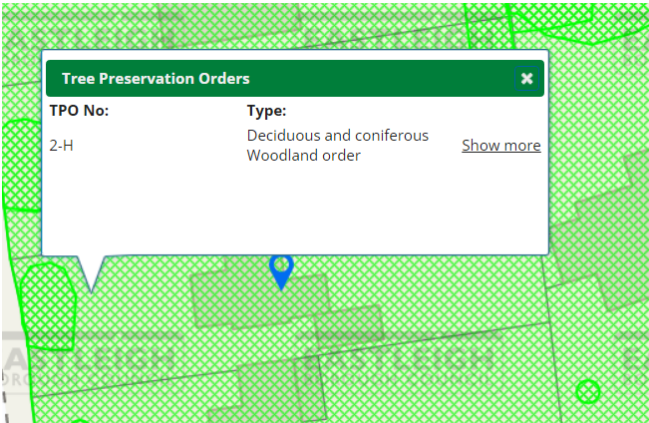
The readings have indicated a cyclical pattern of movement with both upward movement during the wetter winter months when the trees are dormant and without leaf and subsequent downward movement during the drier warmer summer months of the year. This cyclical pattern of movement is only seen in tree root induced clay shrinkage subsidence claims.



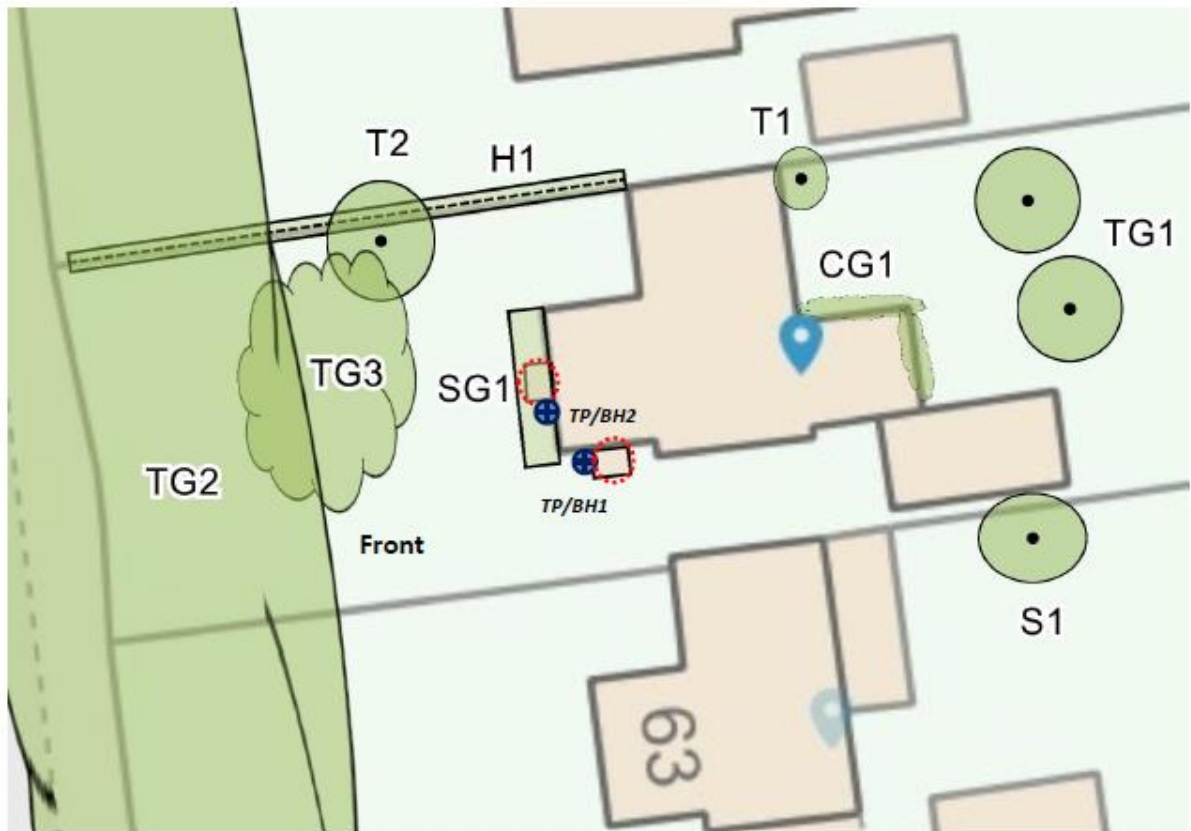
The most movement is noted about points 6 and 7 at the front of the property on very shallowly founded structure and the maximum magnitude of movement is indicated to be in the region of 26mm.

Arboricultural Recommendations

The arboricultural report from MWA suggests that TG2 and SG1. SG1 has already been removed but TG2 which contains the large beech trees at the front of the house, have not been felled as requested. TG1 is subject to a tree preservation order and the chances of consent to removal are not considered strong. To this end, insurers are looking at viable alternatives to abate the tree root nuisance. Having examined Eastleigh Borough Councils website and planning portal, it appears that the entire property is covered by a blanket TPO:



The plan below indicates the implicated vegetation.



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 Elm 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.

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 20mm angular stone to within 200mm of the surface. The arisings will be stockpiled in an agreed area and periodically collected by grab lorry. This process is then repeated until all of the barrier is installed. The trench will be topped up with compacted type 1 MOT stone and the tarmac drive reinstated on completion.

Barrier Design

The information supplied, implies that the damage is caused by TG2 (two beech trees to the front of the risk address and SG1. It should be noted that point 12 for examples has moved a notable amount and there is an adjacent hedge, S1 which this barrier is not designed to defend against. Equally, the foundations in TP2 to the front are only 150mm below ground level and are therefore susceptible to normal climatic movement. The barrier is unable to provide defense against, what is, an abnormally shallow footing, vulnerable to typical climatic fluctuations and the client is assumed to be satisfied that this does not provide an ongoing threat.

Method Statement

It is assumed for the purpose of the quote that the installation of the barrier and site compound is agreed with the homeowner and will be located on the drive. The quote is based on the reinstatement of the excavated trench in tarmac only. No allowance for the temporary removal or diversion of any drains, or the take down of the fence has been included within the scheme and would incur additional costs if required.

The proposed works will comprise the following:

- **Pre-start.** Visit site to confirm location of barrier, agree site access and compound area.
- **Pre-start.** Make formal TRS application and await approval.
- 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 conflicting with the proposed barrier line are to be hand excavated and exposed prior to machine excavation.
- Using a floor saw, form a 40mm wide saw cut across the tarmac and break and remove to the spoil pile.
- An open trench, 300mm wide will be formed to a depth of 3.5m which is some distance past the last detected root of the SI but it should be noted that the SI was very shallow and didn't achieve any notable depth to determine the accuracy of root detection. The arisings will be conveyed to the spoil pile.
- 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 20mm angular stone to within 200mm of the surface. .
- 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 compacted type 1 MOT stone to within 70mm of the finished drive and any broken edges will be cut back.
- The edges will be sealed with bitumen and the trench laid with two coat hot rolled macadam and compacted with a vibrating plate compactor.
- All protective fencing, welfare and plant will be off hired and cleared from site and the area left tidy on completion.
- No allowance has been made for serving party wall notices on the adjoining owners which we assumed to be undertaken by others if it is deemed appropriate to do so.

Proposed Plan of Works for 7343

START DATE: A TRS will be submitted on approval and we plan to commence works within 4 weeks of a successful planning application. .

COMPLETION DATE: Within 2 weeks of starting the works.

Notes and Assumptions

- **The project Fee is valid for 60 days from the date of this report, after which we reserve the right to review the scheme and cost accordingly.**
- The scheme will be subject to a site visit being undertaken to verify the scope of works and access arrangements.
- 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.

Completion Criteria

Contractor shall have fulfilled its obligations when:

- Contractor accomplishes the Contractor activities described within this SOW.
- 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 SOW or a Variation of works 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 request to the other party.
- 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.
- Upon completion of the variation works, these will be invoiced separately to the initial authorized project.

Warranty Details

All Optera whole life scheme designed barriers are issued with a 10-year company warranty, the details of which are seen below:



Warranty Note

Building Repair Warranty

Contractor	Optera Ltd.
Warranty Reference Number	xxxx
Supplier Registered Office Address	Seven Stars House, 1Wheler Road, Coventry, England, CV3 4LB
Supplier Company Number	07468088
Supplier Job Reference Number	xxxx
Commencement Date	xxxx
Expiry Date	xxxx
Homeowner's Name	xxxx
Location of Works	xxxxx
Description of works undertaken and Warranted the "Works"	Works completed pertaining to Optera's Statement of Work. Dated xxxxx

Signed for and on behalf of Optera Ltd:-

Name: Spencer Caizley
Sign: Spencer Caizley
Position: Director
Date: xxxxx

Warranty

The Contractor warrants that for a period of 10 years from the date of completion of the Works detailed above, the Works undertaken and/or the materials installed shall be free from defect. In the event of a failure, proven to be due to faulty workmanship by the Contractor, or materials supplied and installed by the Contractor, the Contractor will make or cause to be made, all repairs necessary to enable performance in accordance with this warranty.

Any dispute as to whether any defect or failure is attributable to faulty or sub-standard workmanship or materials shall be referred to an arbitrator, who should be a suitably qualified and experienced Chartered Engineer, or Chartered Surveyor (i.e. a chartered civil, or structural engineer (MICE/IStructE), or a chartered building surveyor (RICS)).

This warranty is specific to the location and Works as detailed above and is subject to the following qualifications and conditions:

Qualifications

The Homeowner acknowledges that the Contractor shall not be responsible for remediation of any of, or any combination of the following causes:

1. The cost of routine maintenance, overhaul or modifications or loss or damage arising therefrom, or for which compensation/recourse is provided by legislation such as the Consumer Credit Act 1974;
2. Any wilful acts or wilful omissions of the Homeowner or persons acting on their behalf
3. Any loss of use, any consequential or economic loss of any kind or description whatsoever including, but not limited to loss, costs, damages, expenses or penalties for any reason;
4. Any damage caused by war risks, sonic booms or nuclear radiations;
5. Any damage or defect caused by wear and tear, sunlight, normal deterioration, neglect in maintenance, any change in colour, texture, opacity or discolouration or staining or superficial deterioration or marring of finishings or surface appearance or aging process;
6. Any claims first notified outside the period of this warranty or any claims for any defects that the Homeowner should reasonably have been aware of any defects for which the Homeowner receives a discount/reduction in the cost of the Works;
7. The use of the Works for any purpose other than that for which they were originally intended and as stated in this document;
8. Any claim, loss or damage caused by or consequent upon a peril that can be insured under a Household or Commercial Buildings or Property Owners Insurance policy whether insured or not, other than in respect of subsidence, heave or landslip as a direct result of defective workmanship or materials in the Works herein warranted;
9. Placement, erection or construction of anything on or through the Works without the written permission of the contractor;
10. Any costs, losses, expenses or damages for death, bodily injury, disease, illness or injury to mental health;

11. Any abnormal use of the Works or the imposition of any load greater than that for which the Works were designed in whole or in part, structural alterations, repairs, modifications to the Works during the period of this warranty unless agreed in writing by the Contractor;
12. Any claim, loss, destruction or damage caused by pollution or contamination;
13. Any claim involving cosmetic cracking or blemishes that do not affect the performance of the Works;
14. Any claim, loss, destruction or damage due to defective design;
15. Any issues caused by the materials after expiry of the manufacturers product guarantee.

Conditions

- A. The Homeowner shall notify the Contractor in writing of any defect within 21 days of discovery and give the Contractor reasonable opportunity to inspect the alleged defect and the area affected. During such an inspection, the Contractor shall be permitted to take such notes, photographs and/or samples as he deems necessary
- B. In the event of a failure attributable to workmanship, the Contractor's sole responsibility shall be limited to the costs of making good such repairs as necessary to enable the Works to perform as originally warranted.
- C. Any work carried out to rectify any failure or deterioration covered by this warranty shall not extend the duration of this warranty.
- D. If an alleged failure or deterioration is proven to not be the responsibility of the Contractor, then all costs associated with the investigation of such failure shall be borne by the Homeowner.
- E. This warranty does not become valid or enforceable until such time as payment in full for the Works has been received by the Contractor.

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.

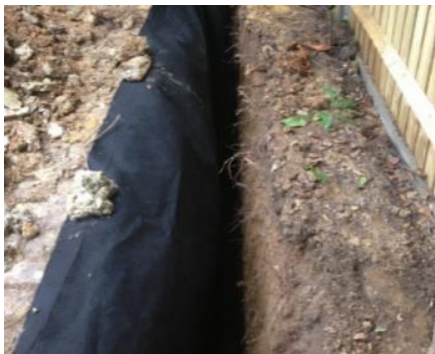
The water content of a shrinkable clay soil will vary with depth, remote from and near to a large tree. Near the ground surface there can be relatively large changes in soil water content between summer and winter as a result of evaporation from the ground surface and transpiration by the grass. Such 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 copper 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 than 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 be 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.