Statement of Work

Optera Structural Solutions

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SOW OPT-9832 Quote to install a root barrier for BVS Subsidence Ltd.

CLIENT ADDRESS: [redacted]

POLICY HOLDER: Mr Phillip Jackson

POLICY HOLDER ADDRESS: 20 The Marts, Rudgwick, Horsham, West Sussex.RH12 3HH,

CLIENT REFERENCE: [redacted]

OUR REFERENCE: [redacted]

PROJECT MANAGER: [redacted]

DATE 19th June 2025

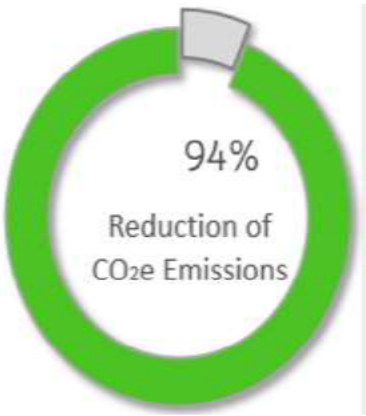
ROOT BARRIER PROJECT FEE: [redacted]

ETSIMATED DURATION: 3 weeks

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**	**2.2m**	**3.5m**	**5+m**	**3m**



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



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[redacted]

[redacted]

Carbon Emissions

The installation of a copper impregnated geotextile fabric is the most carbon neutral option available to the insurance repair marketplace. The average tree absorbs 21 kg of CO_2 per annum based upon a mature species. Felling trees releases carbon and replanting saplings takes many tens if not hundreds of years to offset the effect of felling the original species.

Traditional engineering solutions consume vast quantities of carbon, both in their execution with plant, spoil to landfill and the vehicle movements to and from site. In addition, the manufacture of concrete generates in the region of 72kg of CO_2 per ton and contributes 8% of all manmade carbon output in the world today.

From Optera's own investigations and research, we estimate:

- The average underpinning scheme omits 12 tons of CO_2.
- The average piled raft scheme omits 44 tons of CO_2.
- PU injection treatment omits 3 tons of CO_2.
- By contrast, a 10m root barrier omits just 1 ton of CO_2.

Not only is the root barrier installation both less disruptive and much quicker to install then traditional engineered techniques, but it offers carbon savings of between 88 and 95% and is still 67% more carbon friendly than our closest innovative competitor.

Method Statement

- It is assumed for the purpose of the quote that we can access the rear garden from a footpath at the rear, by removing a fence panel. We have also assumed that by extending the barrier into the neighbours garden that they will consent to the works and liaison in that respect will be undertaken by BVS
- A tree root severance application will be submitted for the works as it is believed that the causal trees are TPO protected.
- Set up site including compound area to be agreed with the client. This will be boarded, protected and secured with site fencing.
- All hard landscaping and reinstatement is to be undertaken by others.

- Take down the side fence for access to the neighbours garden and board and protect along the barrier line.
- CAT scan the barrier line and any services are to be hand dug and exposed prior to machine excavation.
- Working from the right hand side, form a trench 300mm wide to the target depth of 3.5m and place waste on boards to one side of the trench
- Once the first five metres has been dug and formed, line the trench with the copper impregnated bio barrier and backfill as dug arisings, using a specialist compactor plate on the excavator to ensure full depth compaction.
- Repeat this exercise until all of the barrier is dug and installed.
- Top up the trench with topsoil and reinstate the trench line with grass seed.
- Any remaining waste is to be conveyed to the front drive where it will be disposed to skip via tracked barrow.
- Reinstate the fences.
- Off hire and clear plant and equipment from site. A license may be required to access the rear garden via the pavement to the rear. We will explore this with the council and any [redacted]

Notes and Assumptions

i. **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 costs accordingly.**

ii. It is assumed that the excavations will be undertaken in virgin ground with no requirement for trench support or additional protections.

iii. No allowance has been made for the temporary disconnection or relocation of services or drainage.

iv. No allowance has been made for replacement of any plants, trees, shrubs, etc. that may be necessarily damaged or destroyed during the installation of the root barrier, or gaining access to the work area – it is assumed that this will be dealt with by means of a direct payment by the Insurance company after assessment by the loss adjuster.

v. It may be that the pavement to the rear is too narrow to access the rear garden and we may need to revert to a compact barrier. It is impossible ascertain this form the information available.

Warranty Details

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



optera
STRUCTURAL SOLUTIONS

[redacted]

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 disputes 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/fStructE), or a chartered building surveyor (MRICS)).

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, ionising 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

Clay-shrinkage subsidence is typically related to the encroachment of tree roots into the clay soils beneath the foundations of the property.



To ameliorate tree-root induced clay-shrinkage subsidence, the first option is generally removal of the implicated tree(s). However, where the tree(s) cannot be felled, for whatever reason, the next option would be to sever the roots between the tree and the property and form a barrier to prevent reestablishment of the roots.

The barrier will be positioned between the offending tree(s) and the affected part of the building, and will be installed to a depth designed to cut the tree(s) roots between the tree and the foundations; the act of excavation severs the roots, causing any roots beneath the foundations to wither and die. This prevents the tree(s) from extracting moisture from the clay supporting the foundations, allowing the clay to rehydrate and recover their natural moisture levels. Naturally, there is a period of time required for the recovery process to take place, but repairs can typically be undertaken shortly after the installation is complete.

The root barrier material favoured by Optera is a tough, copper impregnated geotextile membrane. This is normally installed using an excavator measuring no more than 2m in width. A trench is formed with the excavator and the arisings are either disposed of off-site or are stored on-site for use as backfill material.

The barrier is typically formed in 5m sections. Once the first 5m of the trench is excavated, the leading edge is bunded with a trench-sheet and the copper impregnated bio-barrier is installed, before backfilling with free-draining stone, or excavated arisings as appropriate to the site. Where 'as-dug' material is used, the backfill is placed in layers and consolidated with a compactor plate attached to the excavator. The process is then repeated until all of the designated barrier has been installed. If reinstatement works are to be undertaken by another contractor, Optera will fill the trench to the surrounding surface as a temporary measure to allow consolidation and avoid a trip-hazard until the permanent reinstatement can be completed. Any excess spoil will be cleared from site along with the plant, welfare, and protections.

How do Copper Root Barriers work?

In the UK the shrinking 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 the Spring and Summer months. The shrinkage results in both vertical and horizontal ground movement that, when transmitted to a building's foundations, cause damage to the building's structure. The amount of shrinkage depends on the type of clay soil, the type and size of vegetation, and on weather patterns.

The moisture content of a clay soil tends to vary with depth. Closer to the surface there can be relatively large changes in soil moisture content between summer and winter as a result of evaporation from the ground surface, the drying effect of the Sun and general vegetation, including grasses. Such variations are normally confined to the upper 1m of the ground. However, where trees are growing within influencing distance of a building, then the soil moisture profiles will fluctuate much more widely through the seasons and to a much greater depth; in response, soil volume changes are amplified, and consequential building movements will be far greater.

It is quite possible that a building will coexist with nearby trees for many years without any noticeable damage, so what is the trigger for the onset of damaging levels of movement? The answer is usually a combination of the tree(s) getting bigger and developing larger leaf areas, but very often it is linked with a particularly hot, dry period of weather.

The process of clay-shrinkage subsidence is a reversable one and buildings experiencing damage in response to a period of hot, dry weather will typically see an improvement (crack widths will reduce) following a corresponding period of cooler, wetter weather when the clay is able to recover its moisture levels and swell back to its former volume.

The intention of the Bio-root barrier is to divorce the building (or more specifically the clay soils supporting the building's foundations) from the influence of the trees and thereby stop the seasonal soil moisture fluctuations, allowing the building to remain stable throughout the year.

The bio-root barrier is strong and flexible, with very high tear resistance, as well as being water-permeable, thus allowing the natural movement of water through the ground without impediment. The Copper contained within the core of the membrane also acts as a chemical repellent to the roots without constituting a hazard to plants or animals. The Copper foil securely bonded within the porous geotextile membrane, releases Copper ions into the adjacent soil by forming Copper Carbonate (verdigris); these signal adverse conditions to any roots growing towards the barrier, preventing a proliferation of roots close to the barrier. The levels of Copper generated do not constitute a burden on the eco-system or impact groundwater quality.



Outdated, impervious barriers divert rather stop roots and may prevent the movement of groundwater causing unintended consequences. The use of Optera's permeable barrier stops roots both by forming a physical impenetrable obstacle and by acting as a chemical inhibitor to the reestablishment of roots.

The multi layered membrane is welded together, retaining its flexible qualities, allowing it to be cut and effectively resealed to fit round buried services. The barrier material itself has a 60 year service life expectancy.

The chemical inhibitor effect prevents the proliferation of root against the barrier face, which was often a problem associated with conventional barriers, where increased moisture levels could encourage root growth.

Following installation of the root barrier, the trench may be backfilled with 20mm single sized stone, alternatively, and dependent upon site conditions, backfilling could be done with as-dug material, which would be placed and compacted with a plate-compactor mounted on the excavator arm. In specific circumstances, we may also use no-fines concrete on the structure side of the shield.

Some degree of surface settlement can be experienced following completion, where this happens, Optera will return to top-up the trench; typically this occurs within the first six months of installation.



