Optera Structural Solutions

The Barn, Oxburgh,
Fosse Way, Stretton on Dunsmore, Rugby, Warwickshire, CV23 9JF
[redacted]

Arboricultural method statement to install a compact root barrier to the rear of the property.

Date	Services Performed By:	Services Performed For:
October 18, 2022	Optera Structural Solutions The Barn, Oxburgh, Fosse Way, Stretton on Dunsmore, Rugby, Warwickshire, CV23 9JF [redacted]	Sedgwick International UK 2 The Boulevard, City West Office Park, Gelderd Road, Leeds. LS12 6NY

POLICY HOLDER ADDRESS: 57 Aberdare Gardens, London. NW6 3AL

CLIENT REFERENCE: [redacted]

OUR REFERENCE:

ANTICIPATED START DATE: TBC

PROJECT MANAGER: Paul Milliam

Project Description

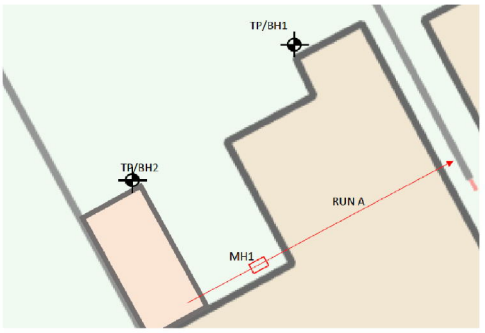
This method statement describes methods to be used to install a root barrier on a property with protected trees.

Project Discussion

The property has been extended to the rear and split into 4 self-contained flats. Damage was originally reported to the rear extension of the rear right ground floor flat 2. Subsequently damage spread and affected the rear left ground floor flat. Original investigations identified a fairly shallow foundation that rested upon clay soil. Roots were found below the footing and monitoring showed a cyclical pattern of movement consistent with root induced clay subsidence. The primary concern was several mature plane trees at the rear of the property located on third party land and protected with preservation orders. A willow tree within the rear garden of the risk property was removed given its size and proximity to the rear extension. Despite removal of the willow tree monitoring continued to show ongoing movement. Whilst the council has allowed the removal of protected trees the owner of the trees has refused to remove the trees. It is understood that all efforts to get the plane trees removed have been exhausted and therefore a remedial stabilisation scheme is required.

The current extent of damage is still focused to the rear single storey addition as well as the rear elevation of the main house. There are many mature trees to the rear of the property including the original plane trees originally implicated. Site investigations at the rear right corner of the rear right extension showed the foundation at 550mm deep supported by 250mm of clinker giving an overall depth of 800mm. Roots were found to a depth of 1.8m and a moisture deficiency was recorded in the zone of root activity.

Further site investigations were carried out: the investigations included 2 trial pits and bore holes: the foundation to the rear right extension (BH/TP1) was shown to be 550mm deep resting on clay. The clay was found to be very highly plastic and roots were found to a depth of 1.4m this being slightly shallower than the root depth of 1.8m found in the original investigations. The laboratory testing of the soil samples confirmed a highly plastic clay and a moisture deficiency in the zone of root activity. Roots were tested and found to emanate from the PLATANUS species and LAURUS more commonly known as plane and bay.

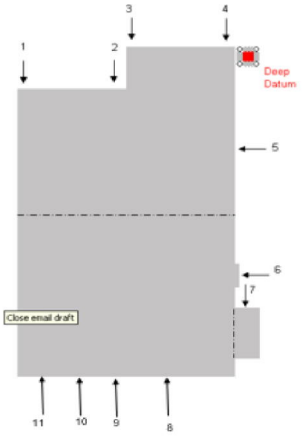


The second investigation was to the rear right corner of the rear left addition to flat 4. The underside of the foundation was unable to be confirmed as water was entering the trial pit and the footing extending down beyond 1.4m. The clay was found to be very highly plastic and roots where found to depth of 3m. However, the oedometer strains showed no significant moisture deficiency.

Level monitoring shows a cyclical pattern of movement consistent with clay shrinkage. The most significant movement and demonstration of subsidence is to the single storey rear right extension. Movement this summer showed downward movement of significance to points 1-5, these extending across the rear elevation of the extension.

Level and Crack Monitoring - Site Sketch

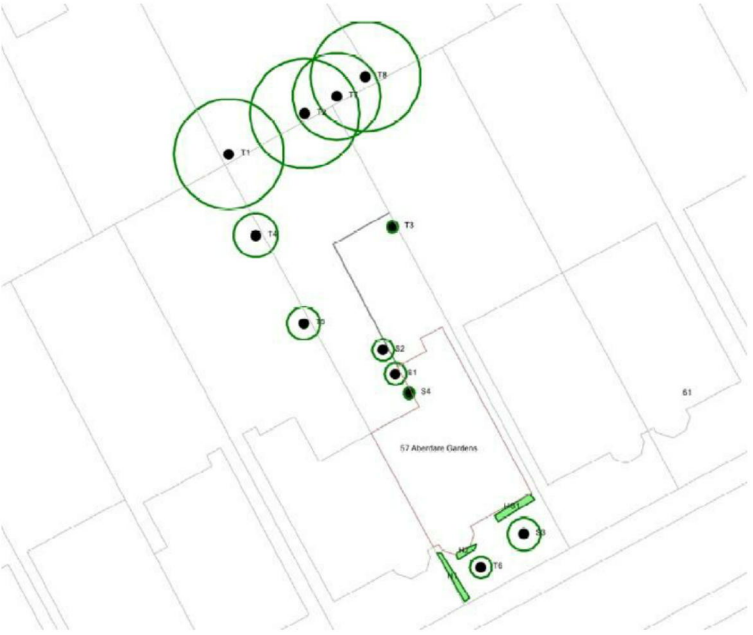
Our Ref: 246034 **Date of Issue:** 22/09/2022



The PRI arborist report details trees to the rear of the property and implicates plane trees T1, T2, T7 and T8 as being the influencing cause on the property with a resulting recommendation to remove them. This is enforced by plane tree roots being found under footing in TP1 along with Bay roots, assumed to link with S2 located on the left fence line.

4.2 Recommended vegetation management to address the current subsidence:

Tree No:	Species	Works Required
T1	Plane	Fell and treat stump.
T2	Plane	Fell and treat stump.
T7	Plane	Fell and treat stump
T8	Plane	Fell and treat stump

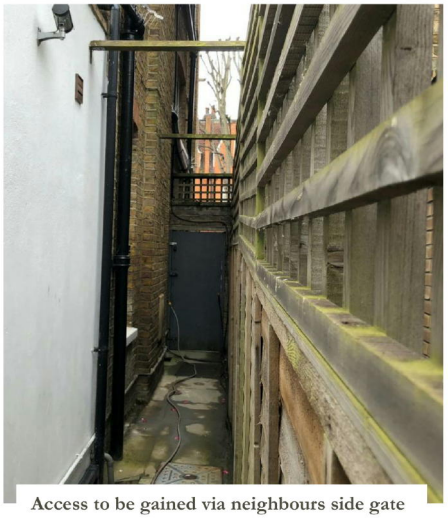


Root found with BH2 relate to willow/poplar, possibly maple and fig - a willow has previously been removed. We do not know the origin of the maple, but fig could come from T5.

Project Proposal

The restricted site access is a primary influence on scheme viability and cost. There is no access into the rear garden from within the curtilage of the property. The only external access to the rear would be via the gated side passage of No.59. If this could be used for access then a small micro digger or auger rig could be used.

Access to be gained via neighbours side gate



Access to be gained via neighbours side gate

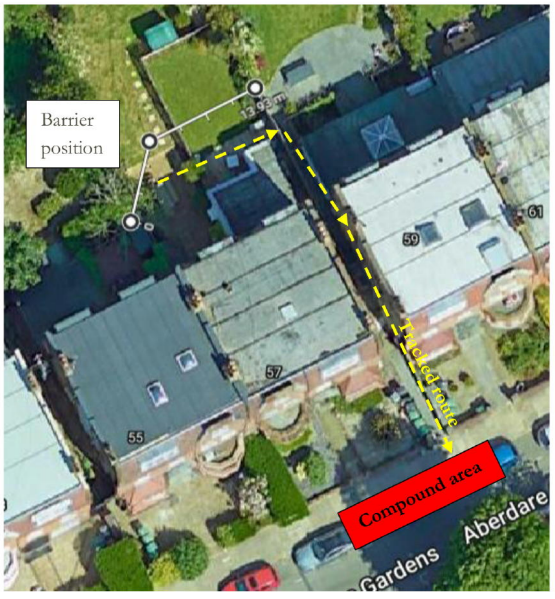
The root barrier will be installed to a depth of 3.5m deep and 13m long across the rear as shown on the plan below. This will provide protection against the plane trees. The root barrier is formed by drilling and installing secant piles wrapped in a copper impregnated woven fabric. Once the first hole is drilled, a 150mm spun cardboard tube is inserted into the hole. The tube is wrapped in a copper impregnated bio-

barrier and split along its length. The tube is then filled with pea gravel which forces the tube and barrier to the outer extremities of the drilled hole. As the holes are progressed a full barrier against root penetration is created.

The root barrier will be installed with a miniature piling rig that is only 680mm in width and ran along track mats reducing the impact on any hard and soft landscaping. Given the size of the rig used and the method of installation the root barrier can be installed to within 500mm of the property.

The amount of excavated spoil is significantly reduced with the compact barrier, allowing a small track barrow to be used for the removal of spoil, this being loaded directly into a skip positioned on the front drive. The smaller plant and machinery used allows the working area to also reduced allowing the ground to be protected with boards, reducing the reinstatement cost. However, the offset to installing a compact root barrier is that it takes longer to install compared to the open trench method, and so time related costs are higher. As a result of this it is not possible to manually cut tree roots.

Enabling work will involve removing the neighbour's side gate and fence, laying polythene and hardboard protection to the pathway and across the garden. The dividing fence between the rear gardens of the flats would be taken down and set aside. The slabbed patio to the rear elevation would be lifted and set aside for later relaying. The auger rig would then be set up to commence the barrier installation. The spoil taken from the secant trench would be removed from site via the neighbour's side passage and placed into skip located on the highway. Parking bay suspension and hoarding licences will be required. Once the barrier has been installed full reinstatement of hard and soft landscaping will be undertaken. All gates and fences will be reinstated and the site cleared, cleaned and left tidy.



Works in brief

Pre works:

- Skip licence and permit/parking bay suspension.(Optera)

Barrier works: Compact Barrier Option A

- Set up site and take delivery of welfare and plant, and store in compound area created with Heras fencing within suspended parking bays on highway.
- Carry out a thorough CAT scan of the works area, identifying the services to property.
- Protect the works area with plastic sheeting and Sterling boards along haul route through side access and rear garden.
- Remove gates and fencing along haul route and barrier line and set aside for later refitting.
- Lift paving slabs and set aside for reuse.
- Mark out barrier location and position.
- Mobile tracked auger rig and set up jig
- Form barrier using a series of augered boreholes with a specialist auger rig to make a secant trench. (Design length 13m, depth 3.5m).
- Excavated material to be removed by track barrow to spoil site and skips on highway.
- Insert copper cored geotextile backed tubes.
- Backfill with pea shingle.
- Backfill the final 200mm with MOT type 1 and relay paving.
- Backfill the final 200mm with topsoil and grass seed along barrier line.
- Refit gates and fences.
- Remove all, plant, machinery and spoil and leave works area clean and tidy.

Notes:

a) **Should excess ground water be experienced then additional costs may apply for sheet piling trenches and dewatering excavation.**

b) **Hard landscaping reinstatement will be localised to the affected area along the barrier line, and will be relayed using previously set aside slabs.**

c) **No drainage works have been allowed for and will be chargeable if required.**

d) **Access onto neighbours land to be arranged by others before works start.**

e) **Root Severance agreement has been allowed in quote due to protected nature of trees.**

Proposed Plan of Works for 6448

START DATE: TBC

DURATION: 3-4 weeks

Completion Criteria

Contractor shall have fulfilled its obligations when:

- Contractor accomplishes the Contractor activities described within this method statement
- The Policy Holder is in agreement 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 Sedgwick Engineer
- Site has been vacated and all plant and materials removed for which Optera are responsible.

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 Sedgwick. 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 project arboricultural consultant.
- If variation works are agreed, works will be booked in at the request of the Sedgwick Engineer and OPTERA will seek formal approval via Sedgwick.

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.

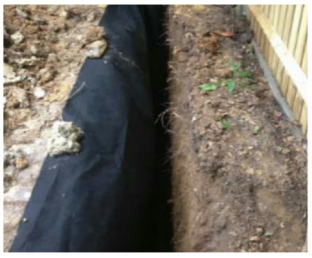
Trees are known to cause clay soils to shrink by drawing water through their roots, predominantly during spring and summer. This shrinkage results in both vertical and horizontal ground movements that, when transmitted to a building's foundations, cause damage to the building structure. The amount of 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.

Specification of front Barrier					
Barrier Type	**Length**	**Max Root Depth at house**	**Minimum depth to be achieved with barrier**	**Distance between tree / Vegetation and barrier**	**shortest distance between barrier and foundation**
Copper	**13m**	**3m**	**3.5m**	**6m+**	**1m+**