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TREE INSPECTION REPORT

Client:	Leigh Parish Council
Location:	The Green, Leigh, TN11 8QL
Date of Reference:	July 2024
Report by:	Max Ferretti ND Arb, TechArborA
Our reference:	TIR 16/07/24

Instructions received:

I am instructed by Louise Kleinschmidt to carry out a report to determine best practices to brace the leigh Oak and comment on the current bracing that has been implemented both in the past and more recently. I am further required to make recommendations regarding bracing works that maybe required in response to any specific defects that are recorded during my inspection.

Scope of survey:

The Leigh Oak tree was subject to a visual inspection from ground level, with the aid of binoculars and following the principles of the 'Visual Tree Assessment' method explained by Mattheck and Breloer (The Body Language of Trees, DoE booklet Research for Amenity Trees No. 4, 1994).

In assessing the potential risks posed by defective trees, recommendations for appropriate action are made in consideration of the guidance provided in '*Common Sense Risk Management of Trees)'* produced by the National Tree Safety Group (published by The Forestry Commission, 2011).

When considering bracing requirements, guidance was provided by the fact sheet, *Cable bracing, propping and related techniques*, Vetcert 2006, along with the *European cabling and bracing standard,* European Arboricultural Standards 2022.

All measurements are estimated and are intended to give an indication of size relative to other nearby site features.

Background:

The leigh Oak has been recorded as being a 'Veteran tree' by the Woodland Trust and details of which are recorded on their ancient and veteran tree inventory, (tree id 6360).

I was provided with a detailed assessment of the tree, including a condition report which was carried out on behalf of Leigh Parish Council in June 2024, by Matt Seale of Treework Environmental Practice. Since the condition report was produced around the same time as this one, it provides the current conditions of the tree, along with other relevant information and includes some good photographs of the bracing which can be used in conjunction with this report. I assume the report I was provided with contains accurate information, but cannot be held accountable for any missed details that a further condition report may have recorded during the time of my inspection.

Current bracing:

The photograph below shows current bracing methods which have been used to support branches and reduce the risk of branch failure.

Yellow lines indicate wire bracing (static system).
Positioned at 7 to 6 meters to east and 8 to 5 meters to west. Date of instillation not recorded but estimated 20 + years ago.

The Blue lines show Cobra bracing (Dynamic System).
2 systems positioned at 6 meters to east and 2 systems to the west, 5.5 meters and 10 to 5.5 meters respectively. A short length of Cobra brace is positioned north to south and at 6 to 5 meters respectively. The bracing is thought to have been installed in December 2022.

Fig 1. Current bracing looking NW

Cable Bracing, Propping, and Related Techniques:

What is it? Cable bracing is a technique used to link the branches or stem of a tree to reduce the likelihood of tree or branch failure. It helps stabilize a trunk or mechanical branch defect showing signs of static failure, such as broken forks or splits. The main goal is to prevent branches from failing and the tree from falling apart, thereby minimizing damage to people or property in case of a failure. This method is often combined with light pruning.

Why/When to Consider It?
- When extensive pruning needed to stabilize the branch or tree would compromise its viability.
- When replacing an old brace is necessary to prevent branches from falling if it fails.
- In some countries, it is primarily used on feature trees or those with special value.

Advantages of Cable Bracing:
- Cable bracing can prevent the failure of one or more branches, keeping the tree intact. It serves as an alternative to heavy pruning that could harm the tree’s viability (e.g., exposing ripe wood or non-durable heartwood, or removing too much foliage, which would be detrimental to the tree's health).
- It can act as a temporary measure during a multi-stage pruning process, preventing failure until the tree is stabilized through several pruning operations.
- It can be used as a risk management tool, minimizing the risk of damage to people or property in case of failure.

Disadvantages of Cable Bracing:
- It demands significant knowledge and skills from the arborist, including the selection of suitable equipment, proper cable placement, and familiarity with various bracing systems. Only specialists with adequate expertise should install bracing in biomechanically complex veteran trees.
- It requires regular inspection and maintenance.
- It can be expensive.
- It can be visually intrusive, though this can be mitigated by careful material and construction choices.
- It can alter force distribution in the tree, potentially reducing the natural reactive growth of the tree.
- Improper installation can shift the risk of failure to other parts of the tree (e.g., just above static cabling systems). Proper assessment before installing bracing systems is essential.
- It can interfere with or halt the natural aging process of the tree, which often includes natural retrenchment and branch breakage.
- The entire tree may still fail, even if part of it is prevented from failing, although this may be unrelated to the cable bracing.

Pre-Installation Considerations:

Product Review:

Thoroughly evaluate all available products and their properties to choose the best option for the specific situation.

Weight Bearing Capacity:

Ensure the system has sufficient weight-bearing capacity according to literature (ZTV Baumpflege, 2006) or by calculating the applied load and branch mass.

Cable Placement and Geometry:

Choose appropriate locations and installation geometry for the cables. Consider the impact on force redistribution, even with limited knowledge about the dynamic (frequency, damping) and static (stress/strain distribution) mechanical response to wind load.

Guidelines for Installing a Cable System:

Installing a cabling system demands substantial technical and biological knowledge due to the variety of approaches and systems available. It also requires an understanding of the tree’s mechanical response to wind loading. Therefore, arborists should seek in-depth knowledge or specialized training before recommending or installing cabling systems.

Types of Cabling Systems:

Dynamic vs. Static Systems:

Cabling systems are categorized into dynamic and static types, each with distinct aims, materials, and installation methods. Both types have their advantages and disadvantages, with the choice depending on the tree's condition and mechanical structure.

Static Systems:

Static systems use rigid materials (with low elasticity—up to 2%) and are installed under tension. Common types include static ropes, fixed rods, and steel ropes. They aim to stabilize trunks or branches showing signs of failure, providing a very strong, secure brace. However, they are expensive, require regular revision, and can be intrusive, changing the strain distribution and reducing the tree’s natural reactive growth.

There are fewer static systems available compared to dynamic ones. It's recommended to use compact systems provided by manufacturers or consult with tree biomechanics professionals. Key guidelines include ensuring all load-bearing components have sufficient capacity and keeping wires (ropes) from touching each other or the tree unless protected.

Dynamic Systems:

Dynamic systems use materials with high elasticity (5-26%) and are installed with some slack to allow for future growth. They aim to reduce the probability of tree or branch failure by dampening energy during rope elongation. These systems are flexible, allowing branches to move and conduct reactive growth. However, they require more frequent re-installations and regular revisions, which increases associated costs. They can also be damaged by friction or animals.

Table 1 The basic principles and differences between static and dynamic cabling systems.

	Properties	Types	Aims	Advantages	Disadvantages
Static systems[1]	• Systems with components made of rigid materials (with low elasticity – up to 2%). • Installed under tension.	• Static ropes • Fixed rods • Steel ropes	• To stabilise the trunk, or branch defect **with signs of failure** (broken forks, rips etc.). • To fix the branches/parts of the tree in a very rigid way.	• Provides very strong, secure brace.	• Expensive and demanding on installation. • Regular revision is needed. • Can be intrusive (depends on the system, see Table 3). • Can change the strain distribution and reduce the natural reactive growth (tree self-optimisation). • Can increase overall tree stiffness and reduce the tree ability to deal with dynamic loading [2].
Dynamic systems[1]	• Systems with components from materials with high elasticity (5-26%). • Installed with allowance for future growth and with slight slack in the rope.	There is range of cabling systems from different manufacturers. It is important to check the manufacturer's conditions of use and recommendations (e.g. durability of the system, carrying capacity, elasticity, revision interval, etc.). Three main kinds of rope material: • Polyester • Polypropylene • Polyamide	To reduce the probability of tree or branch failure by: • Eliminating the stress peaks by damping energy during rope elongation. • Installation of cabling system as a preventive measure – to catch the branch in the case of failure.	• Flexible, allows the branches to move and conduct reactive growth. • Can be adjusted as the tree changes over time. • If appropriately installed (correct tension/protective sleeve etc.), minimal damage to the tree is to be expected.	• More frequent re-installations and regular revisions are needed (according to manufacturer's instructions) so increasing associated costs. • Can be damaged (e.g. by friction or squirrels).

Table from VetCert.eu fact sheet

The main types of static cabling systems.

Method	Technique	Advantages	Disadvantages	Notes
Synthetic rope	Synthetic static/ultrastatic rope is connected to a synthetic belt, which is tied around the branch or stem[3].	• Easy installation. • If appropriately installed (correct tension/protective tubing/…), minimal damage to the tree at the time of installation	• The rope should be installed under tension, which causes a tight connection between the belt and branch in the place of installation. There is a high probability that the belt will quickly be subsumed by the tree/branch and thus damage. • The rope is sensitive to friction and can be damaged.	
Wire wrapped around the branch/stem.	Metal wire is used for connecting the branches and is wrapped directly around the branch.		The high friction between the wire and tree causes damage in a vigorous growing branch. Wires cut into the tree and cause unnecessary damage.	Should not be used.
Wire rope and slats wrapped around the branch/stem.	Metal wire which is connecting branches is wrapped around the slats. The slats are fixed to the branches.	• If appropriately installed (correct tension/protective tubing/…), minimal damage to the tree. • Can be used on partially decayed branches or stems where residual wall thickness is sufficient.	• Expensive and demanding on installation. • If not installed and controlled properly, slats can cause damage to the branch, or can fall out. • In the case of extreme wind, the movement of branches can release the tension on the system and the connection between rope and slats can be damaged.	It is recommended in the cases where branch decay is expected at the location of installation.
Wire drilled through the stem or connected to rod/eye bolts.	A hole is drilled through the branch/stem through which wire is installed, secured and ensured by a block on the opposite side. Or wire is attached to a rod or bolt that extends through a branch or stem.	• Can also be used on soft-wooded tree species, in contrast to screw eyes. • Easier installation than the wire with slats. • If there is no sign of decay and the tree has high vitality, the wire/rod can prevent damage to the branch. No reinstallation needed.	• Damages ripewood/heartwood. • Creates a larger wound than a screw eye. • Can be more demanding on skills and experience when installed on large diameter branches or stems due to the requirement to drill a straight hole all the way through.	Cannot be installed where there are signs of fungal decay. The wire passes through the whole branch potentially causing large scale damage.
Wire connected to screw eyes (short screws into the tree).	Wire attached to a short screw that relies on gripping part of the branch or stem cross-section.	• Easier to install than an eyebolt. • Potentially causes less damage than a rod/eye bolt, as it is installed in the sapwood only.	• Not suitable for use on soft-wooded tree species (e.g. willow and poplar) as pins can be pulled out. • Should not be used on large diameter branches or stems because of their lack of strength.	Should not be used on partially decayed branches or stems.
Fixed rod	Steel rod put through the tree at the base of the branches or through a fork. Used when the branches are too close to each other, or tree has a split in the trunk and is in danger of falling apart.	• Can be used for branches which are very close each other. • If there is no sign of decay, the tree has high vitality, and the wire/rod is installed through a branch, overgrowth by the tree over the rod may not be a problem and is easier to manage than ropes around the branches which will need loosening as the tree grows. • No reinstallation needed. • Provides a very strong, secure brace.	• Damages ripewood/heartwood. • Strongly reduces the flexibility of the tree close to the braced area of damage. Makes it very unlikely the tree can produce reactive growth. • Once installed, it should not be modified or adjusted. If this may be necessary, it has to be considered at the time of installation.	Not suitable when the braced part of the tree contains decayed wood due to the possibility that the rod will get pulled out if decay extends to the installation point.

Table from VetCert.eu fact sheet

Dynamic Cabling Systems:

Installation Rules:

Follow the manufacturer's instructions for dynamic cabling systems, ensuring all components are from the same manufacturer. Ropes should have slight slack, not remaining tight, and must be protected if in contact with branches or other objects. The distance between the branch and interlock should be 0.5 times the branch diameter at the installation location, with an angle between ropes of less than 60°.

Location and Dimension:

Dynamic systems should be installed in the upper part of the crown, with careful consideration of branch length, rope angle, mass of branches, height of installation, and wind force. Multiple cabling systems or combinations of dynamic and static systems can be used as needed.

Geometry of Cabling:

Bracing configurations may include:
- Direct Connection: Connects two branches directly.
- Triangular Configuration: Supports the crown in multiple directions, dissipating wind energy.
- Ring-Shaped Configuration: Deals with lateral swaying forces, avoiding excessive pruning.

Revision and Replacement of Cabling Systems:

Regular checks are essential, with intervals defined by manufacturers. Cabling systems must be replaced after reaching their maximum lifespan, in case of damage, significant changes in tree condition, or failure of a significant part of the crown. The same approach as for a new installation should be taken for reinstallation, ensuring appropriate treatment of the defect before removing the old system.

Conclusion:

Following these guidelines ensures the safe and effective installation of cabling systems, enhancing the structural integrity and longevity of trees.

Recommendations:

In accordance to the methods set out in this report the positions of two, 8 tonne, non-shock absorbing Cobra systems should be repositioned as shown in fig 2. All other Cobra systems should be removed. The older static cables which have been in place for a much longer period should remain.

The Cobra system's central position within the crown should be located to the dominant and most central stem at a height of 10 meters and with shallow angles to attachment points both east and west and at 9.5 to 10 meters and 8 meters respectively. The system must be installed with some slack to allow for future growth and consideration must be given to the weight of the branches regarding foliage and wind conditions at that time.

Due to the significant decay within the trunk and first limbs at crown break, I don't think static bracing is the right option for this tree. I've discounted it due to the insufficient strength for secure holding.

Bracing works should be carried out by a person/company who has previous experience with installing these systems and is familiar with both: European Cabling and Bracing Standard: [EAS - European Cabling & Bracing Standard (europeanarboriculturalstandards.eu)] along with guidance notice from VETcert: [Cable bracing & propping.pdf (vetcert.eu)]. Instalment of new bracing should take place within a 12-month timeframe form time of writing. Records and scheduled inspections of the system must take place no longer than every 2 years by a suitably qualified arboriculturalist.

Fig 2. Position of cobra brace, looking NW

Constraints:

The bracing assessment is primarily based on the information collected during the inspection and from ground level only. Recommendations are informed by the tree's vitality, site conditions, and decay processes, but no additional tests or measurements have been conducted and any recommendations made are valid for one year only.

The results, conclusions, and recommendations in this report are based on the conditions observed at the time of inspection. Tree growth is ongoing and subject to natural processes, which means any detrimental factors may progress over time. Therefore, the observations and data collected reflect the tree's current condition and context.

While recommendations are my own and grounded in my thorough analysis and expertise, they are not exhaustive. Engaging in further discussions and collaborative efforts may uncover even more effective solutions.

Any significant site alterations affecting the assessed tree, including changes in elevation, water conditions, extreme weather events, or other site modifications, or any decline in tree vitality or the appearance of fungal fruiting bodies, will require a re-evaluation of the trees.

All measurements, compass bearings, proportions, and age estimates are approximate, recorded using appropriate instruments, and presented with suitable resolution.

This report does not address the effects of leaves, fruit, exudations, or insect activity associated with trees that may impact people or property, nor does it consider toxicity, allergic properties, or tree-related nuisances such as root intrusion.

Signed.. MFerretti

Max Ferretti ND Arb, TechArborA, T/A Absolute Arboriculture

Date: July 2024