BY APPOINTMENT
TO HER MAJESTY THE QUEEN
TREE SURGEONS
F.A. BARTLETT TREE EXPERTS CO. LTD.

Bartlett Consulting

TREE HEALTH & STRUCTURAL INTEGRITY REPORT

[redacted]

Date: 7th January 2019

CLIENT: [redacted]

SITE ADDRESS: 257 Goldhurst Terrace,
London
NW6 3EP

DATE & TIME OF VISIT: 7th January 2019

PEOPLE PRESENT: Mr G Davies (Bartlett Consulting)
[redacted]

REPORT COMPLETED BY: Mr G Davies

Summary:

In reading and understanding the contents of this report, it should be remembered that no tree can be deemed risk free. As with all things in the natural environment, they are subject to unpredictable forces such as extreme weather, effects of disease, and man's influence upon them. In reaching a conclusion as to a level of risk the tree poses, we investigate every obvious and available facet of the structure of the tree and its surroundings.

Where applicable, these conclusions and recommendations seek to reduce the risk to a level as low as reasonably practical, given the location of the tree, the site use, the owners' acceptance of the level of risk, and the perception of the tree's value to the environment.

Table of Contents

1.0 SCOPE OF REPORT

1.1 Survey Brief

To carry out an advanced Level 3* inspection and risk assessment of False Acacia *(Robinia pseudoacacia)* located within the grounds of 257, Goldhurst Terrace. London NW6 3EP. The commissioned Level 3 inspection consisted of an internal decay detection and structural integrity assessment with the use of the IML Resistance Micro-drill PD400.

To compile and collate all of the visual tree assessment survey and diagnostic information and data; to create a complete picture and understanding of the health and structural condition of the tree; to complete a qualified risk assessment and to make fully informed management recommendations, in accordance with current arboricultural practice and tree health care techniques.

1.2 Background

Mr. Tony Stitt, resident and representative for the free holder of 257 Goldhurst Terrace initially contacted Bartlett Consulting requesting an arboricultural report in order to gain a better understanding about the current condition of the single False Acacia located within the front garden of the property.

Concern has been raised by local residents as to the structural stability of the tree after a previous limb failure resulted in damage to a car parked on the adjacent public highway. The local tree officer has previously visited the site and advised that a tree report was obtained. Bartlett consulting has subsequently been commissioned to carry a full survey.

1.3 Report References

As a progressive company, we keep abreast of research data relating to Arboriculture. All observations, recommendations and works are based on current industry standard reference material and extensive FA Bartlett research findings, derived from the company's own facilities at the University of Reading in England as well as in Charlotte, North Carolina, in the USA. A selection of pertinent items is shown in Appendix 2.

Specific tree survey methodologies and references applied by Bartlett Consulting for this project include:

- Smiley, T, Fraedrich, B & Hendrickson, N. (2011) *Tree Risk Management.* Bartlett Tree Research Laboratories. Charlotte, NC.
- Dunstar, J.A, Smiley. T, Matheny. N, Lilly. S. (2013) *Tree Risk Assessment Manual.* International Society of Arboriculture. Champaign, IL.
- Lonsdale, D. (1999) *The Principles of Tree Hazard Assessment & Management (Research for Amenity Trees)* Department of the Environment. London.
- Shigo, A. (1991) *Modern Arboriculture.* Shigo & Trees Associates. Durham, NH.
- Mattheck, C, Breloer, H. (1994) *The Body Language of Trees (Research for Amenity Trees)* Department of the Environment, London.
- Mattheck, C, Bethge K, Weber K. (2015) *The Body Language of Trees – Encyclopedia of Visual Tree Assessment* Karlsruhe Institute of Technology Campus North.

1.0 SCOPE OF REPORT (continued…)

1.4 Report Limitations & Methodologies

This report is restricted to the False Acacia *(Robinia pseudoacacia)* detailed in the Survey Brief above. The statements, findings and recommendations made within the report do not take into account any effects of extreme climate and weather incidences, vandalism, changes in the natural and/or built environment around the trees after the date of this report, or any damage whether physical, chemical or otherwise.

Bartlett Consulting and Bartlett Tree Experts cannot accept any liability in connection with the above factors nor where recommended tree management is not carried out in accordance with modern tree health care techniques, within the timelines proposed and specification provided.

1.5 Assessment of Ecological Status of Tree & Potential Constraints

Following the site visit and tree survey and assessment, we believe that ecological associations specific to this tree are considered to be limited to nesting birds.

The Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way Act 2000, provides statutory protection to birds, bats, insects and other species that inhabit trees, hedgerows, or other associated vegetation. It is the recommendation of Bartlett Consulting that professional, detailed, advice from an ecologist is sought (if not done-so already) to confirm the consideration of Bartlett Consulting and to check if any such constraints apply to this site and its development proposals.

All trees must be thoroughly and properly assessed for nesting birds prior to the commencement of any recommended tree works.

*** Levels of Tree Assessment**

Level 1 Limited Visual Assessment: A visual assessment of an individual tree or a population of trees near a specified target, conducted from a specific perspective, in order to identify certain obvious defects or specified conditions. Observations are made from ground level and the tree is not climbed.

Level 2 Basic Assessment: A detailed visual inspection and assessment of a tree and the surrounding site. The basic assessment requires the tree risk assessor to walk completely around the tree. Tree dimensions are recorded using hand tools such as a diameter tape, laser range finder and measuring tape. Further information is gathered using a "sounding hammer", binoculars and other tools such as a depth probe.

Level 3 Advanced Assessment: An advanced assessment is performed to provide detailed information about specific tree parts, defects, targets, or site conditions. Methods of advanced assessment can include climbing inspections, decay detection, root excavations, lean monitoring and pull tests.

It is important to understand that as trees are living and dynamic organisms, it is not possible to maintain them free of risk. Some level of risk must be accepted in order to experience the full range of benefits that trees provide. As such, we reference the recently published document by the National Tree Safety Group (NTSG), Common Sense Risk Management of Trees (Forestry Commission 2011). This document provides guidance on trees and public safety in the UK for owners', managers and advisors.

2.0 TREE PRESERVATION ORDER & CONSERVATION AREA PROTECTION STATUS

The Town & Country Planning Act (Tree Preservation) (England) Regulations 2012 and the Town & Country Planning Act 1990 (as amended) provides legislative protection for trees within England.

A tree protection status check was conducted by Bartlett Consulting on 7th January 2019, through Camden Councils interactive mapping website available at:
http://gis.camden.gov.uk/geoserver/ConservationAreaExternal.html

2.1 Tree Preservation Order (TPO) Status

None identified

2.2 Conservation Area (CA) Status

South Hampstead Conservation Area established on 1st August 1988

2.3 Tree Management Implications

The False Acacia subject to this report is currently subject to statutory protection by virtue of its location within a conservation area. All works to this tree as prescribed within the recommendations can only be implemented after a Section 211 notice has been served to the local authority.

This report can be submitted with Section 211 notice as a supporting document. Bartlett would be happy to submit the application on your behalf, should you wish to proceed with any works arising from this report.

Please note that the removal of dead trees and the pruning of dead wood from living trees are permitted and "excepted" works under the 2012 Regulation listed above. These works can be undertaken only after 5 working days' notice has been given to the local planning authority.

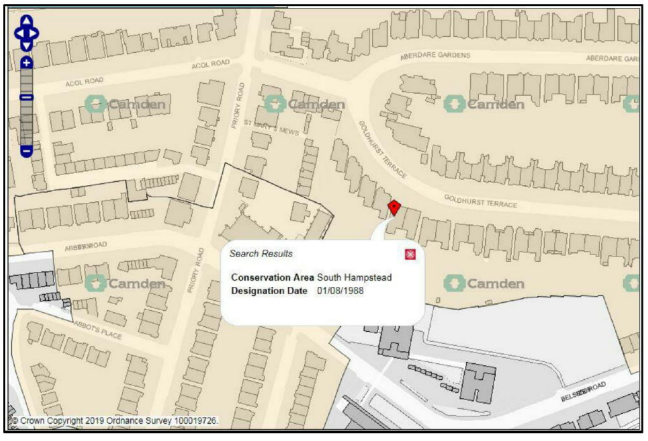


Figure 1: Screen-shot From Camden Council Interactive Mapping Service with 257 Goldhurst Terrace highlighted

3.0 TREE & SITE DETAILS

Species	False Acacia *(Robinia pseudoacacia)*
Stem Diameter at 1.5m	660 millimetres
Tree Height	21.0 metres
Crown Spread	5.2(N) / 8.6(E) / 9.5(S) / 5.6(W)
Age	Semi-Mature (70 years ±10 years)
Vitality	Fair
Location	Within property frontage to the northern boundary
Targets	1. House No 257 Goldhurst Terrace (11.5m south of main stem)– **Constant Occupancy** 2. Neighbouring property No 259 Goldhurst Terrace (6.3m south-west of main stem) – **Constant Occupancy** 3. Public Highway with parked cars & associated pedestrian footpath (1.2m & 3.5m north of main stem) – **Occasional / Frequent Occupancy**
Rooting Environment	1. Hardstanding surface (non-permeable) public highway and associated footpath approximately 45% of rooting zone 2. Hardstanding pedestrian access to properties (non-permeable) approximately 20% of rooting zone 3. Front garden of property and neighbouring property (permeable) approximately 35% of rooting zone
Buttress / Lateral Roots	1. Prominent buttress formation 2. Partially buried root collar, not currently considered a significant concern 3. Lateral roots causing significant direct damage to the access path and boundary wall due to proximity
Main Steam	1. 10 degree lean on main stem to the south, self-corrected at 7.0m 2. Large open wound within the eastern quadrant of the main stem at 1.8m height above ground (measuring 2500mm x 600mm) resulting from previous failure (2016) of the northern co-dominant leader attributed to poor included union. 3. Approximately 35% loss in circumference of main stem at 2.5m and exposed heart wood, solid when probed around wound. 4. Evidence of reactive callus tissue forming to the edge of the wound although full occlusion is deemed unlikely do to size of wound
Crown	1. Asymmetrical crown bias to the south due to previous loss of the northern co-dominant leader 2. Further bifurcation of the remaining southern leader has resulted in a subordinated leader at 7.0m with signs of partially included union (unable to inspect up-close) 3. Major deadwood approximately 40mm (less than 10%) predominantly within the northern crown overhanging footpath and public highway 4. Previous crown reduction carried out 2013 back to previous pollarded points with approximately 2.5-3.0m regrowth.

4.0 TESTING USING A RESISTANCE MICRO-DRILL MACHINE

A Resistance Micro-drill is used to establish the internal structural integrity of an individual tree or tree parts. The device drills a micro needle with a bit diameter of 3.0 millimetres at a constant speed and measures both the drilling resistance and feed speed to a nominal depth of 40 centimetres within the stem or branch. The sawdust remains in the bore hole and thus closes the drilling tunnel.

The resistance of the wood to the drill is provided on a graphic image with the "feed curve" and timber density shown in blue, and the "drill curve" and shaft friction shown in green along the y-axis of the graph line. The depth of the drill is shown along the x-axis of the graph line. Both are shown at a scale of 1:1. The graph translates as information on the internal structure of the wood tested, indicating the levels of decay, unseen voids or cracks, and types of wood decay, as well as providing significant information about the material properties and thickness of the residual wall of sound-wood around the stem or branch.

4.1 Micro-drill Testing Locations

A total of 2 tests were conducted within the eastern quadrant of the main stem of the False Acacia at 1.3m & 2.0m height above ground level. The aim of the testing was to establish the extent of the tear below that visually identifiable. Both drill test locations are highlighted by a red dot within figure 2 below.

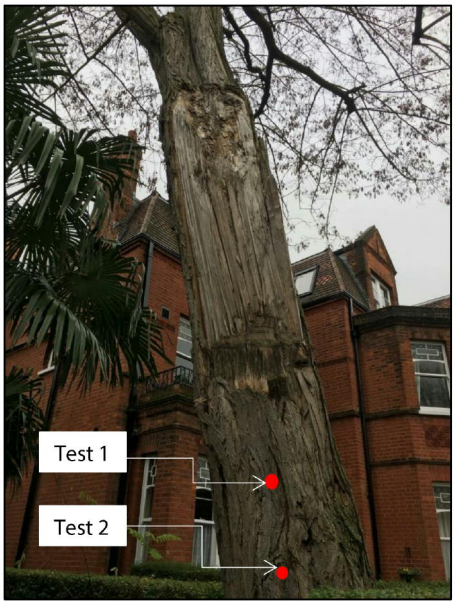
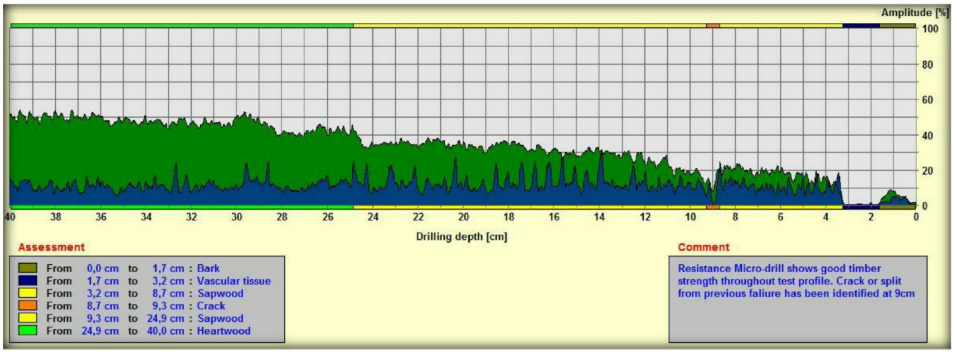


Figure 2: Image Showing Resistance Micro-drill Testing Locations on False Acacia within the eastern quadrant

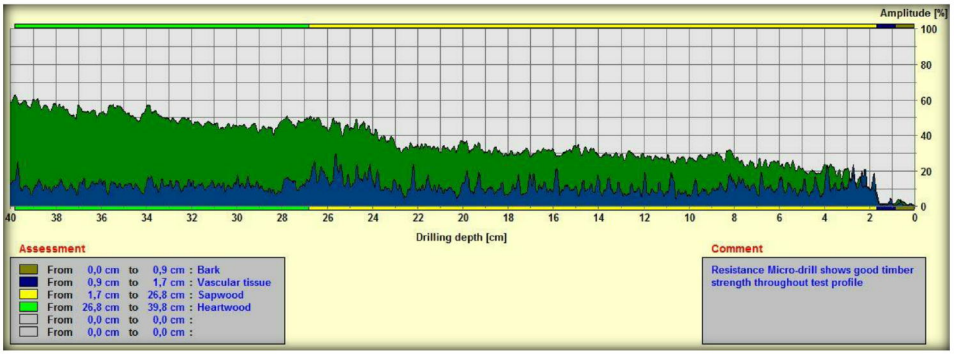
4.0 TESTING USING A RESISTANCE MICRO-DRILL (continued…)

4.2 Resistance Micro-drill Test 1 & 2

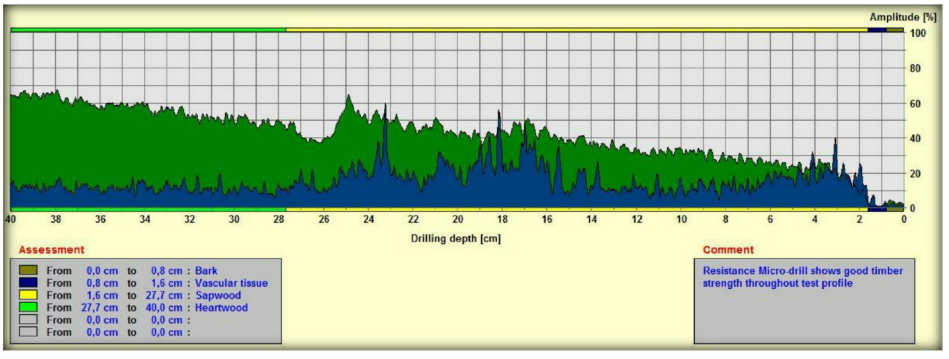
Test 1 Eastern Quadrant at 2.0m above ground level



Test 2 Eastern Quadrant at 1.3m above ground level



Test 3: Control test northern quadrant at 1.0m above ground level



4.0 TESTING USING A RESISTANCE MICRO-DRILL (continued…)

4.3 Resistance Micro-drill Results Interpretation

Whilst comparing the three test results, the Resistance Micro-drill (IML Resi PD400) shows that the general resistance through the zones of vascular tissue and sapwood is good and consistent, when compared to the control test, as shown with the green graph (drilling curve). The amplitude is found to be ranging between 20% and 40%, where the differences in wood resistance are better distinguished.

Test 1 located within the eastern quadrant directly below the wound (2.0m height above ground level) clearly identifies the presence of a small internal crack / split at 9cm resulting from the previous failure of the northern co-dominant leader.

Test 2 located directly below test 1 at a height of 1.3m above ground level did not identify the continuation of the crack or split at this level and shows good structural integrity of the main stem with no decay or dysfunction continuing vertically down the stem from the wound.

6.0 PHOTOGRAPHIC OVERVIEW

Image 3: as viewed from a northern aspect showing the extent of the wound and partially included union of the subordinate leader at 7.0m highlighted above

Image 4: as viewed from an eastern aspect showing approximately 35% loss of main stem at 2.5m

Image 5: View of tree from an eastern aspect highlighting the lean on stem and its asymmetrical crown

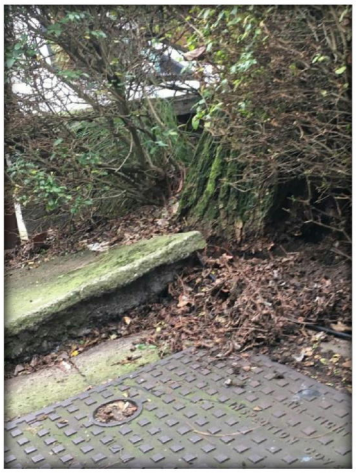


Image 6: Direct damage caused by tree to the private path in proximity to drain

7.0 DISCUSSIONS & CONCLUSION

Failure and subsequent loss of the northern co-dominant leader in 2016 has resulted in a significant wound and exposed heartwood leaving the tree vulnerable to the spread of decay and fungal pathogens. Furthermore, we consider that the failure has structurally compromised the main stem with an estimated 35% loss of timber representing over 1/3 of the stem circumference. The tree has responded to the failure through the development of wound-wood (a barrier zone) around the edges of the wound; however, this new growth is unlikely to ever fully compensate for the loss in timber strength or ever fully occlude the wound.

The loss of the northern co-dominant leader has also resulted in an unbalanced crown with a bias to the south in the direction of the residential properties, which has resulted in excessive static loading on the tension aspect of the main stem and area of failure and wounding. If failure of the main stem was to occur it would most likely fall in the direction of the two properties.

Further level 3 testing with the Resistance Micro-drill was undertaken in order to establish the presence of an internal crack / split resulting from the failure beyond what was visually identifiable. Tests revealed a small crack at a height of 2.0m above ground level (9cm depth) although did not identify a continuation of this crack when tested at 1.3m.

Direct damage caused by the trees incremental growth has been observed to both the boundary wall and private path causing significant amounts of movement as shown in image 6.

Finally, although the False Acacia is of a prominent position adjacent to the public highway and associated footpath, contributing to the public amenity, the resulting large wound and loss of canopy is of a significant detriment to the visual appearance of the tree reducing that amenity and landscape value.

In conclusion, we would advise that the tree structure has been compromised as a result of the 2016 failure resulting in a significant change in the dynamic loads and stresses experience by the tree. Sufficient adaptive growth is unlikely to ever occur, especially within a suitable period of time, due to the size of the wound and harsh living environment of the tree, leaving the False Acacia exposed and at increased risk of structural failure with static, high value, targets in striking distance.

Taking into account all the above mentioned factors, we must regrettably conclude the removal of this tree is deemed the most appropriate course of action. The replacement planting of a more appropriate tree for the location will go some way into mitigating for the loss.

Upon completion of the risk assessment, following the Level 3 investigations, the likelihood of whole stem failure has been categorised as 'Probable', whilst the likelihood of impacting the target is 'Medium'. The consequences of failure have been categorised as 'Significant' with the identified targets being residential property as well as parked cars on the public highway

The final risk rating is classified as 'Moderate'.

Table 01: Schedule of Tree Works

Tree Reference	Specification of Works
False Acacia	•Fell & Remove •Replant with appropriate specimen tree

9.0 RISK ASSESSMENT

Bartlett Consulting uses the International Society of Arboriculture's (ISA) Tree Risk Assessment methodology, referred to as TRAQ. This is a 'qualitative' system which uses a matrix-based combination of ratings, to reach a conclusion of associated risk. The standard Bartlett Consulting time-line within the TRAQ system is three (03) years, unless otherwise stated within the report.

Risk is the combination of the 'likelihood' of an event: in this case the failure of a tree or part of a tree, and the severity of the potential consequences. A hazard is the likely source of harm. The two tables below define both the likelihood and risk levels as per the TRAQ system.

Table 02: Likelihood of Failure

Classification	**Description of Likelihood** (As per Dunster, Smiley, Matheny, Lilly 2013)
Improbable	Failure is not likely during normal weather conditions and may not fail during severe weather conditions, within the specified time frame of three years.
Possible	Failure could occur but is unlikely during normal weather conditions, within the specified time frame of three years.
Probable	Failure may be expected under normal weather conditions, within the specified time frame.
Imminent	Failure has started or is most likely to occur in the near future, even if there is no significant wind, weather, or increased load.

Table 03: Risk Rating

Risk Level	**Description of Risk** (As per Dunster, Smiley, Matheny, Lilly 2013)
Extreme Risk	Failure is imminent, with a high likelihood if impact on people and/or property, with severe consequences.
High Risk	Failure likely to very likely with significant consequences; or failure likely with severe consequences – to impact on people and/or property.
Moderate Risk	Failure likely to very likely with minor consequences; or failure somewhat likely with significant to severe consequences – to impact on people and/or property.
Low Risk	Failure unlikely with negligible consequences; or failure somewhat likely with minor consequences – to impact on people and/or property.
Tree Removal and Tree Surgery	Weakened crown anchor points or root system possible requiring full risk assessment by Arborist and Climber prior to tree works to determine appropriate working methods.

NOTE: Customer Must Make Tree Workers Aware of this Statement

CAUTION: Trees with structurally weak root systems, main stems or branches may not have sufficient structural strength to withstand dismantling works. The weight of people climbing the tree or using the tree branches as load carrying points may increase the load to the point of tree or branch failure. Persons engaged on such works must undertake a thorough risk assessment of the structure of the tree before finalising a working method. Alternative work methods to consider may include the use of crane or mobile elevated platform.

We trust that the contents and recommendations contained within this report were informative, easy to understand and helpful to you, with regards to managing your tree. Should you have any further questions or concerns, please do not hesitate to contact us again.

REPORT CLASSIFICATION: Tree Health & Structural Integrity Report

REPORT STATUS: Final

REPORT COMPLETED BY: Mr G Davies. *FdSc Arb*
Arboricultural Consultant

SIGNATURE: [redacted] **DATE: 08/01/2019**

REPORT REVIEWED BY: Mr Jason Hasaka *HNDArb TechArborA*
Principal Arboricultural Consultant

SIGNATURE: [redacted] **DATE: 10/01/2019**