Merewood
Arboricultural Consultancy Services

Arboricultural ASSOCIATION
Professional Member
No. PRO 1047

Arboricultural report for A horse chestnut tree (*Aesculus hippocastanum*) at Mandalay Willoughby Road Twickenham TW1 2QG

Client: Dominik and Katya Horn
Mandalay
Willoughby Road
Twickenham
TW1 2QG

Prepared by
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19/11/2024



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1.0 Instructions

1.1 I am instructed by Dominik and Katya Horn to carry out an arboricultural inspection at an advanced level of a horse chestnut tree at Mandalay, Willoughby Road, Twickenham. I am to provide a report that fulfils the following criteria

- A schedule to provide basic data, tree location and a condition assessment
- An assessment of the level of risk posed by the tree based on targets, defects and the likelihood of failure.
- A schedule of any subsequent work that may be required

1.2 The request for an advanced inspection of the tree, from ground level, including the employment of an Electrical Resistance Tomograph (ERT) and an IML Resistograph PD400 micro drill, has come about following concerns about the condition of the tree.

1.3 The purpose of the inspection is to establish whether or not the tree can realistically be retained.

2.0 Introduction

The Site

2.1 Mandalay is a detached property, part of a gated development, at the end of Willoughby Road. The house is located alongside the River Thames near Richmond Bridge and has a front garden given over partly to parking and a rear garden.

2.2 Mandalay is bordered by a slipway to the west, Willoughby Road to the south, the River Thames to the north and an adjacent residential property to the east.

2.3 Willoughby Road is a residential road in the St. Margarets area of Twickenham just to the south of Richmond. The surrounding area is characterised by medium density residential properties, offices and local shops.

2.4 The topography of the site is more or less level other than the slipway to the river and the embankment bordering the north side of the plot.

Date of Inspection

2.5 I inspected the horse chestnut tree at Mandalay, Willoughby Road on Tuesday November 7th, 2024.

Credentials

2.6 I confirm that I hold the National Diploma in Arboriculture which I attained

in 1987. I have studied and practiced Arboriculture for 40 years, during which time I have been involved with both the private and public sector.

2.7 I further confirm that I have completed the ABC awards Level 6 Professional Diploma in Arboriculture. This is the highest level of award in the industry.

2.8 I hold professional member status of the Arboricultural Association (M. Arbor A.), recognised as a higher vocational level within the industry.

2.9 I hold the LANTRA award for professional tree inspections have undertaken an intensive course in the principles and application of VTA Visual Tree Assessment. I have been assessed and found to have attained the advanced level of technical competence of a VTA Practitioner with Elite Training.

2.10 I have based this report on my observations and any provided information and I have come to conclusions in the light of my experience.

Legal considerations

2.11 It has been established that the property is situated within the Richmond Riverside Conservation Area. Under the provisions of the Town and Country Planning Act 1990 (Tree Regulations 2012) Section 211, any tree in excess of 75mm diameter (measured 1.5m from ground level), is protected. Prior to working any such tree in a Conservation Area (including pruning or felling), it is necessary to give a six week notice of intent to carry out the work to the Local Planning Authority.

Targets

2.12 The horse chestnut is within striking range, should it fail and uproot, of the slipway 3m to the west, the house 10m to the south, private moorings 6m to the north and the adjacent properties.

The horse chestnut - introduction

2.13 The subject horse chestnut (*Aesculus hippocastanum)* is an overmature tree located in the back garden of Mandalay 10m to the north of the house. It is 20m high with a crown spread extending for 6m N; 7m S; 7.5m E; 6m W. The tree has a stem diameter measured at a height of 1.5m of 141cm.

2.14 The tree is growing in open, but landscaped ground. The surrounds include pathways, decking, artificial (permeable) turf and shallow ponds to the south and east.

2.15 The horse chestnut is a useful feature in the local landscape (Pic.1), one of several fully mature horse chestnuts in the back gardens of the properties fronting the river here.

Pic. 1. The horse chestnut viewed from the southwest looking northeast

Report limitations

2.16 The condition of the tree has been based on a visual inspection made at ground level, using binoculars. The tree has not been climbed or accessed using a mobile elevated platform, as I have only been asked to make an inspection from ground level and to inspect the stem base.

2.17 Trees are dynamic living organisms that are subjected constantly to external stresses and to biological and non-biological influences. As such the structure of the tree could change at any given time.

2.18 The use of an Electrical Resistance Tomograph (ERT) alone cannot determine the condition of the wood inside a tree but should be regarded as an interpretive tool to be used in conjunction with other investigative methods. Thus is because electrical resistance can vary from tree to tree and even within an individual tree itself. ERT can also be influenced by the presence of metal buried in the wood.

Methodology

2.19 My investigations have included the use of an Electrical Resistance Tomograph (ERT) and an IML Resistograph PD400 micro drill in my assessment of the internal condition of the wood. Neither instrument actually detects decay but record anomalies that can help in the interpretation of the internal condition of the wood.

2.20 I have used a nylon hammer for the purposes of detecting changes in resonance which may indicate that further investigation is required. I have also used a steel probe to establish the presence of areas of softening wood or hollows that might warrant a more detailed examination.

2.21 The investigation has been conducted using the established principles of Visual Tree Assessment (VTA), taking into account:

- A distanced visual overview of the tree, taking account of its overall shape and form, foliage colour and general appearance appropriate to the time of year and any other elements that do not appear normal for the species.
- Exposure to the weather (either due to the tree being solitary or having been recently exposed to new wind forces following the removal of surrounding trees or other recent changes to the surrounds).
- Prevailing ground conditions such as erosion, ponding, soil characteristics and the presence/lack of surrounding vegetation.
- Information pertinent to the trees' history such as previously failed limbs, excavations, the appearance of fungal fruiting bodies, etc.
- The health and visual defects of the tree (its 'body language) e.g. cavities, foliage dieback, the appearance of deadwood, bulging or fibre buckling.

2.22 From this information a risk assessment is made of the likelihood of the parts most likely to fail in relation to the target/occupancy value within the trees failure area and recommendations are then made, which can include but are not necessarily confined to:

- Recommendation for further future monitoring or root/crown investigation.
- Remedial pruning/ limb removal or other tree surgery works such as cable bracing.
- Whole tree removal.

- Pruning for aesthetic reasons.
- Removal of significant deadwood.
- Or no work may be needed.

2.23 The primary reasoning behind this method of assessment is to identify a foreseeable failure, make an informed decision and to act upon it within a specified time and to know that the response is reasonable in relation to the target area and the financial resources available.

3.0 Findings

Roots and buttress

3.1 The roots of the tree grow in open ground, surrounded by light landscape features, mainly artificial grass and decking, unencumbered in their spread, other than to the north where the ground drops away sharply near the riverside (tidal), a fall in levels of about 4m at a distance of 5m from the tree.

3.2 The surrounding ground appears stable, with no evidence of the root plate uplifting. There have been no recent excavations around the tree and there are no fungal fruit bodies of pathogenic fungi present on the surrounding ground.

Lower stem

3.3 The lower stem has several brackets of *Ganoderma applanatum* attached to the lower stem on the east side. These include one aged bracket and four newer ones (more recent activity) with some reaction wood adjacent to the brackets (pic. 2).

Pic. 2. The fungal brackets (Ganoderma applanatum) seen on the lower east stem with newer reaction wood seen to the right of the brackets

3.4 Striking the base of the stem in this area with a nylon hammer gave a hollow sound up to a height of 0.5m and it was possible to push a steel rod into the wood to a depth of 40cm.

3.5 There were no other hollow sounding areas, or points where a steel probe could penetrate the wood around the base of the stem.

3.6 On the west side of the stem there is an open wound between 0.7 and 1.7m with a narrow vertical shape, 15cm wide at its widest point (pic. 3). This too has a small fungal bracket present (suspected *Ganoderma applanatum*).

Pic. 3. The open wound on the west side with the small fungal bracket visible

3.7 The open cavity is flanked by reaction wood, callousing around the exposed wood, and there is a small amount of exudation at the base of the wound.

3.8 An Electrical Resistance Tomograph (ERT) reading was taken at a height of 15cm above ground level (fig.1). This has been used in conjunction with the drill readings using the IML Resistograph PD400 micro drill (see appendix 1)

and the visual observations made to assess the internal quality of the wood.

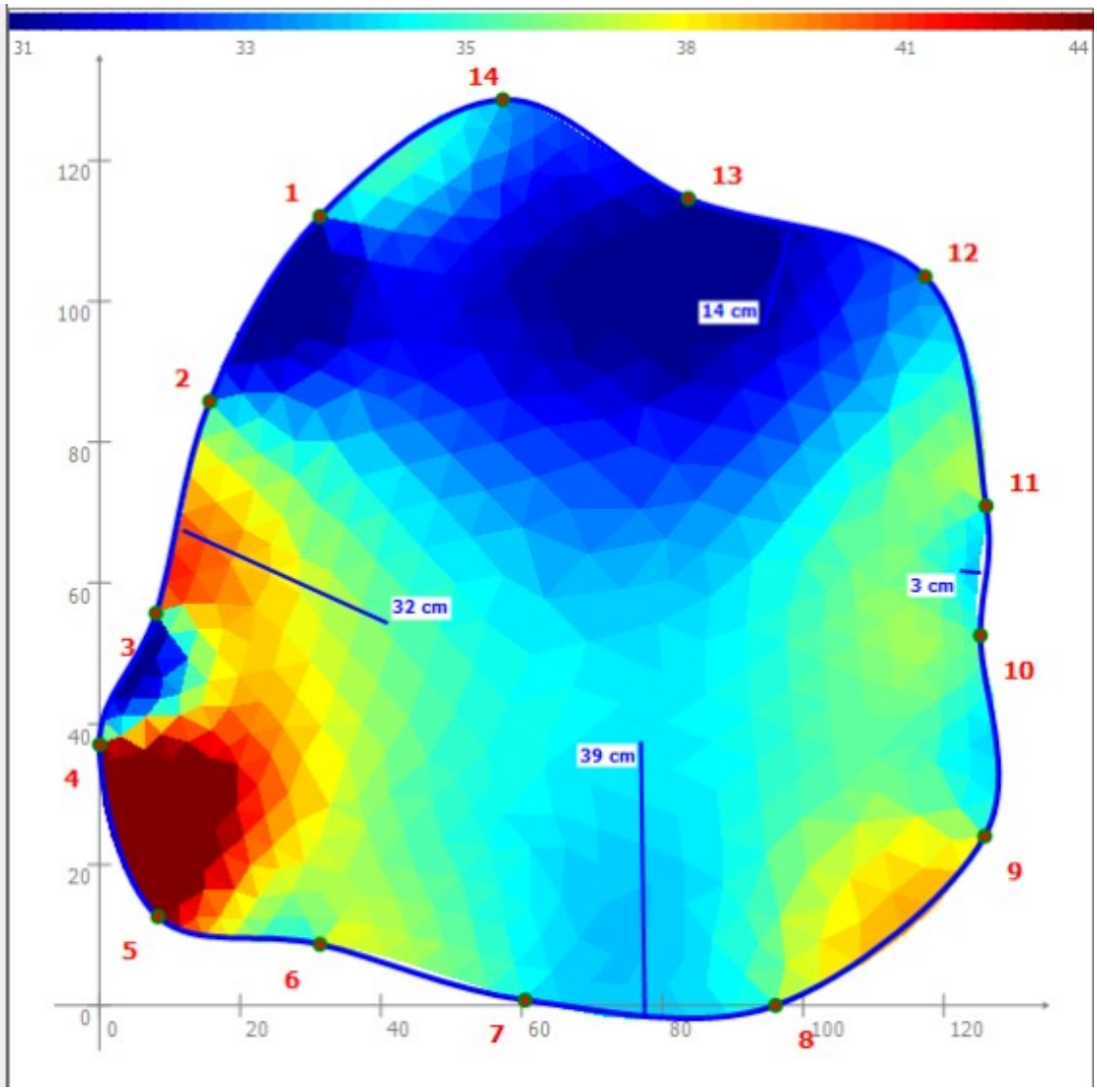


Fig 1. The ERT reading taken at 15cm where point 1 is north. The blue lines indicate the drill readings taken which are terminated where decay has been picked up. The key features here include the dark red at points 4-5, where the open cavity is, and the light blue green areas. These specifically appear behind the open cavity and behind points 10 – 11 were the fungal brackets have appeared

Main stem

3.9 The main stem has an upright habit with a few epicormic shoots to a height of 3m, where it subdivides first into two stems, with the more northerly stem then further dividing to create two more upright stems.

3.10 The unions between the upright stems are open with no tight forks or signs of decay or any other structural weakness.

3.11 A fourth stem has developed more as a large lateral branch and is growing off towards the north.

3.12 Each of the three upright stems has a well developed structure and old pruning wounds where the tree has been crown lifted in the past. The old pruning wounds have calloused over satisfactorily, although higher up the stems these wound occlusions are not all complete and there are indications of localised decay having affected the exposed wood in the past.

3.13 On the more southerly stem, an electric garden light has been attached by a metal bracket at 4m.

3.14 Each of the stems has numerous burrs off which epicormic growth is sprouting. This is consistent with the growth pattern of an ageing horse chestnut tree.

3.15 An Electrical Resistance Tomograph (ERT) reading was taken at a height of 100cm above ground level (fig.2). This has been used in conjunction with the drill readings using the IML Resistograph PD400 micro drill (see appendix 1).

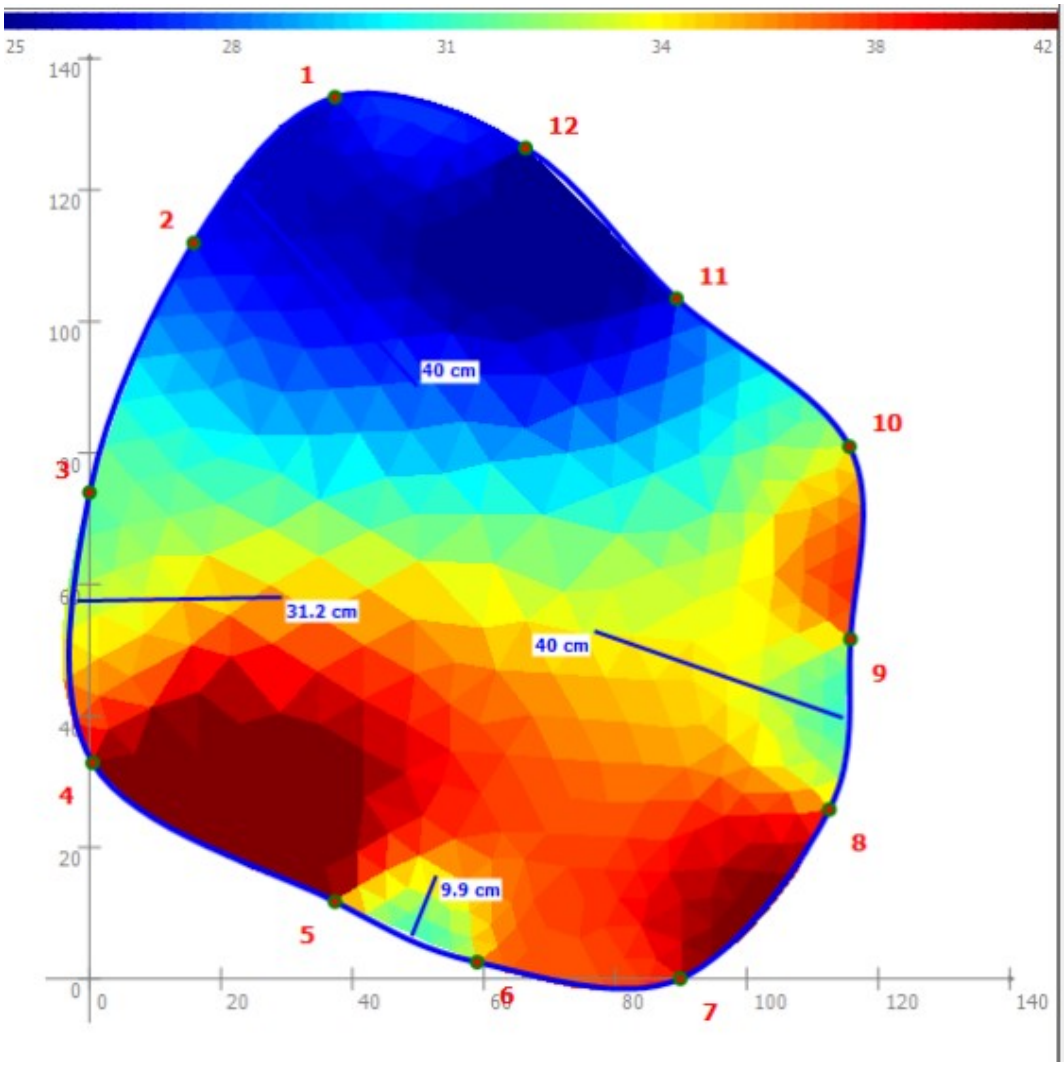


Fig 1. The ERT reading taken at 100cm where point 1 is north. The blue lines indicate the drill readings taken which are terminated where decay has been picked up. The key features here include the dark red at points 4-5, where the open cavity is. In general the indication is that decay is less extensive than lower down the stem.

Branches, crown, and leaves

3.16 The tree appears to have been reduced in size in the past (a long time ago). Regrowth arising from the old pruning wounds has been good and there is no obvious sign that decay has developed at any of these old pruning points.

3.17 The unions between the branches and the stem are open and appear in good condition, giving no cause for concern.

3.18 There is no sign of any cracking or splitting of the branches and no fungal fruit bodies were observed.

3.19 The upper crown appears to be thinning with the density of foliage here lower than can be observed in the middle and lower crown. There are areas of small dead wood beginning to show in one or two places.

3.20 Incremental growth is below average and bud development is also below par in the upper crown. The leaves have turned colour and are dropping. There is evidence that the leaves are infested with the leaf mining moth (*Cameraria ohridella*).

3.21 Overall this gives the impression of an overmature tree that is no longer growing with vigour, fighting decay in the lower stem and probably the root system.

4.0 Analysis of findings

Main types of decay

Soft rot/ facilitative rot – Wood initially becomes brittle due to cellulose degradation. This often results in ceramic brittle fracture of affected parts, should they fail.
Example : *Kretzschmaria deusta*

Brown rot – This rot type primarily degrades cellulose and hemicellulose, leaving the lignin intact. Wood shrinks notably in volume, sometimes cracking, becomes lighter and more prone to fracture cross the wood grain.
Example : *Laetiporus sulphureus*

White rot – This type of rot can degrade all three major constituents of wood: cellulose, hemicellulose and lignin. Two types of white rot are commonly reported:

Simultaneous white rot – all three constituents are broken down t similar rates.
Example : *Fomes fomentarius*

Selective white rot – lignin and hemicellulose are broken down initially, leaving cellulose relatively unaffected. Wood becomes soft, lighter in weight and colour and often much more stringy/fibrous.
Example : *Ganoderma spp.*

4.1 The records of the drillings made using the Resistograph drill are presented at Appendix 1. These have confirmed the presence of internal decay in the stem.

4.2 The Electrical Resistance Tomograph (ERT) measures the difference in electrical resistance through the wood. The reading provides a useful insight as to what is happening internally.

4.3 The different coloured areas are not necessarily absolutely accurate but do provide an indication of approximate location.

4.4 The ERT reading is backed up with drill readings and the two have been read in conjunction in order to build as accurate a picture as possible. Drill readings are assumed to have travelled in a straight line, although it is acknowledged that the drill can sometimes veer off at an angle.

4.5 The ERT reading used in conjunction with the Resistograph drill and the visual observations made at ground level build up a picture of a tree that is decaying internally.

4.6 The presence of the fungal brackets on the east side along with the ERT readings and the drill investigation between points 10 and 11 confirm that here the lower stem is extensively decayed, such that there is an inadequate thickness of the remaining sound wood on the outer edge of the stem.

4.7 Similarly, the drill reading taken between points 12 and 13 indicate internal decay at 14cm, leaving an inadequate thickness of the remaining sound wood on the outer edge of the stem.

4.8 The ERT reveals decayed or degraded wood to the south east and the south west sides of the stem at 15cm, although it has also picked up a strip to the south where the wood is showing more resistance.

4.9 The drill reading taken between points 7 and 8 did show a couple of spikes which could be knots, or possibly barrier walls resisting the spread of decay. The reading did pick up decayed wood deeper in towards the centre.

4.10 The overall picture of the lower stem is one of spreading decay with the main areas being towards the east, the centre and to the south.

4.11 The ERT and drill readings taken at 1m show that the stem higher up is much less decayed, other than some decay behind the open wound. This is consistent with the visual observations that included the presence of a small fungal bracket there.

4.12 The two sets of readings at 15cm and 100cm respectively show a pattern of decay that is progressing conically up the stem from the base, consistent with the growth strategy of several buttress decay pathogens including *Ganoderma*. These pathogens usually attack the root plate as well and symptomatic of this is the appearance of deadwood in the upper crown along with a general loss of vitality

5.0 Risk assessment

Part of tree at risk of failure	Nature of failure	Likelihood of failure	Target affected	Level of risk of harm attributed
Root plate	Entire tree uproots due to root failure	Some risk as the root plate of the tree is being affected	House, slipway, mooring and adjacent property	**Medium risk**
Lower stem	Tree stem fails due to brittle fracture	Raised risk due to decay being present	House, slipway, mooring and adjacent property	**Medium high risk**
Main branches	Branches break away from the main stem	Possible as the tree ages	Garden slipway, and mooring	**Medium to low risk**
Smaller branches, twigs or deadwood	Small branches and pieces of dead wood break away	Very probable, but unlikely to be significant	Garden	**Low risk**

Legend
Red background - Very urgent: Immediate action required. If possible, seal off area around the tree.
Orange background - Urgent. Recommended works should be carried out with 3 months if possible. Review needed within 1 year.
Yellow background – Moderately important – Recommended works to be carried out within 6-9 months if possible. Review needed within 2-3 years
Light green – No immediate urgency – Recommended works can be carried out within 1-2 years. Review needed within 4 years
Dark green - No significant risk. Works not needed. Review needed in 5 years.

See Appendix 1 for explanation of the risk assessment matrix.

6.0 Conclusions

6.1 The horse chestnut tree is a moderately significant tree in the local area and contributes to the local landscape, being one of several similar trees. However, the retention of this tree is becoming increasingly problematic.

6.2 The horse chestnut is decaying in the lower stem and possibly some of the root plate. The decay is mostly contained in the lower stem at present but the extent

of decay in the root plate is harder to determine. The pathogen causing this decay does typically contribute to windthrow after root fracture.

6.3 Horse chestnut as a species lacks heartwood with the structural wood of the tree being sapwood. This is less resistant to decay and once established decay can spread more rapidly tat is does in other species that do have a stronger heartwood such as oak or sweet chestnut.

6.4 The stability of this tree is therefore called into question, and failure of some kind will become an increasingly probable outcome as the tree continues to age.

6.5 Retaining the tree for the time being may be possible, but it cannot be stated with any certainty that the tree would not fail. Reducing the crown of the tree may be an option but is likely to be detrimental in the medium term as (a) the tree has been reduced in the past and (b) the age of the tree means that it would be less able to cope with the added stress of significant wounding.

6.6 The probability that decay would then further develop in the upper crown at wound points would be increased. If the tree was to be pruned, this would provide only a temporary solution. The tree is reaching the end of its useful life expectancy.

7.0 Recommendations/options

7.1 Option 1 would be to remove this tree. In the light of the findings of the investigations it is clear that decay is becoming advanced and that a failure is a predictable and increasingly probable event. The tree is at the end of its safe useful life expectancy and removing it now and providing a replacement tree of a suitable stature would represent positive arboricultural management. This would be my strongest recommendation.

7.2 Option 2 would be to prune the tree, crown reducing it by a substantial amount. This would reduce stresses placed on the tree by wind and would allow retention of the tree for some time to come. The approach is not without disadvantages though. First the amenity of the tree would be substantially diminished whilst branches regrew and there is a possibility that decay could gain a hold at pruning points.

7.3 There is also a possibility that some branches would be so shocked by the pruning that they might die back altogether. As well as this, there would remain a need to re-test the tree at regular intervals as a tree weakened by heavy reduction would be more susceptible to the lower stem decay developing at a faster pace. This is my less preferred recommendation.

7.4 Option 3 is to leave the tree alone and carry out a further investigation two or three years from now. This strategy carries a medium high level of risk in view of the fact that there has been no detailed investigation of the roots at present. This is my least preferred recommendation.

8.0 Disclaimer

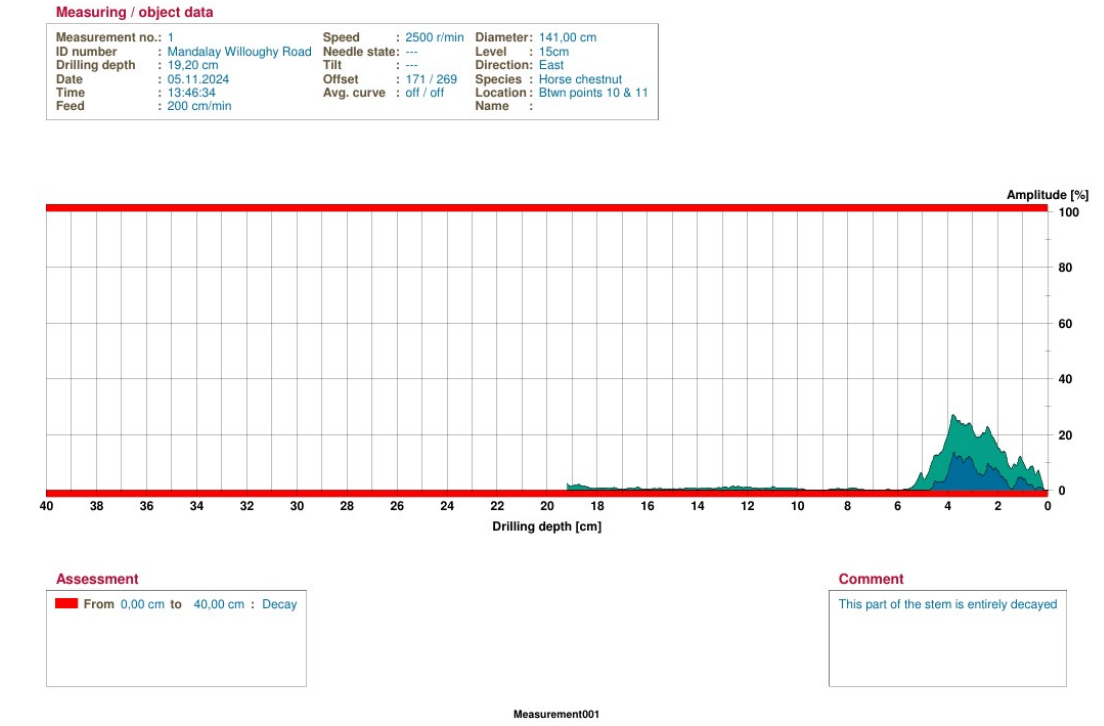
8.1 The statements made in this Report do not take account of extremes of climate vandalism or accident, whether physical chemical or fire. Merewood Arboricultural Consultancy Services cannot therefore accept liability in connection with these factors, nor where prescribed work is not carried out in a correct and professional manner in accordance with good practice. The authority of this Report ceases at any stated time limit within it, or if none stated after two years from the date of the survey or when site conditions change or pruning or other works not specified in the Report are carried out to or affecting the Subject tree(s), whichever is sooner.

Simon Hawkins Dip Arb L6 (ABC), ND Arb, MArborA

Bibliography

Manual of wood decay in trees – Weber & Mattheck
Principles of Tree Hazard Assessment and Management – Lonsdale
Diagnosis of Il Health in Trees- Strouts and Winter
The Body Language of Trees: Encyclopaedia of Visual Tree Assessment – Mattheck Bethge & Weber

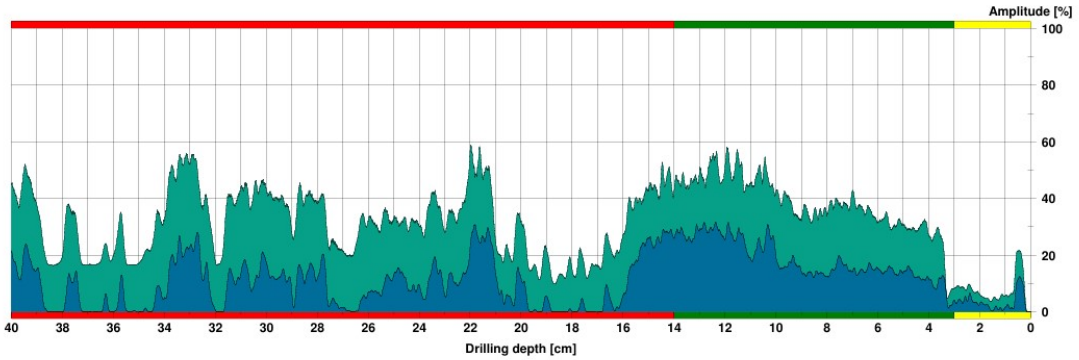
Appendix 1
The Resitograph readings and interpretation



Measurement 1 taken at 15cm on the west side of the stem where the fungal fruit bodies are present. The wood behind the fungal brackets is entirely decayed.

Measuring / object data

Measurement no.	: 2	Speed	: 2500 r/min	Diameter	: 141,00 cm
ID number	: Mandalay Willoughy Road	Needle state	: ---	Level	: 15cm
Drilling depth	: 40,18 cm	Tilt	: ---	Direction	: South east
Date	: 05.11.2024	Offset	: 167 / 268	Species	: Horse chestnut
Time	: 13:49:00	Avg. curve	: off / off	Location	: Btwn points 12 & 13
Feed	: 200 cm/min			Name	:



Assessment

From 0,00 cm to 3,00 cm : Bark
From 3,00 cm to 14,00 cm : Sound wood
From 14,00 cm to 40,00 cm : Decay

Comment

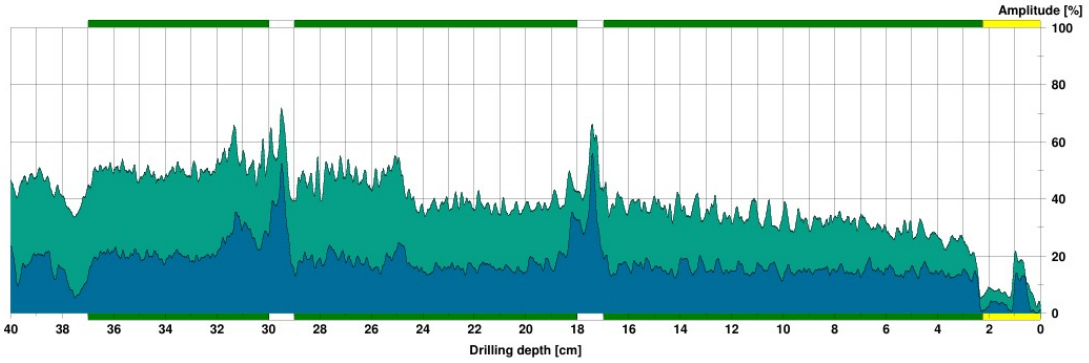
Extensive decay detected in this part of the stem

Measurement002

Measurement 2 taken at 15cm on the north west side towards the centre of the stem. This reveals the wood on the outer edge is initially reacting to the decay, trying to resist further spread, but that after 14cm the resistance collapses and the wood has become decayed.

Measuring / object data

Measurement no.	3	Speed	2500 r/min	Diameter	141,00 cm
ID number	Mandalay Willoughy Road	Needle state	---	Level	15cm
Drilling depth	40,18 cm	Tilt	---	Direction	North
Date	05.11.2024	Offset	130 / 269	Species	Horse chestnut
Time	13:55:01	Avg. curve	off / off	Location	Between points 7 & 8
Feed	150 cm/min			Name	



Assessment

From	0,00 cm	to 2,25 cm	:	Bark
From	2,25 cm	to 17,00 cm	:	Sound wood
From	17,00 cm	to 18,00 cm	:	Knot
From	18,00 cm	to 29,00 cm	:	Sound wood
From	29,00 cm	to 30,00 cm	:	Knot
From	30,00 cm	to 37,00 cm	:	Sound wood

Comment

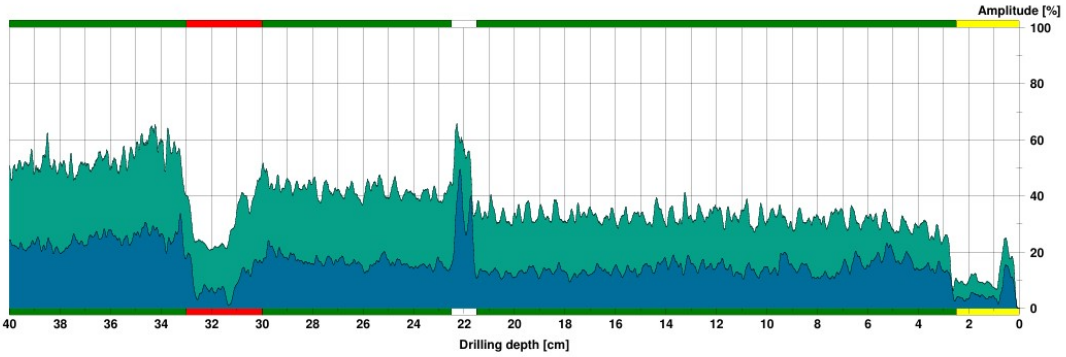
A couple of knots in the wood have been picked up here. Towards the end of the drill (after 37cm) the quaity of the wood degenerates indicating decay

Measurement003

Measurement 3 was taken at 15cm on the south side towards the centre of the stem. The reading shows sound wood in this part of the stem with a couple of spikes suggesting possible knots (or similar obstruction) in the wood. Deeper in, near 40cm the quality of the wood appears to degrade with a late drop in the needle reading. This would correspond with the area of decay on the west side.

Measuring / object data

Measurement no.	: 4	Speed	: 2500 r/min	Diameter	: 141,00 cm
ID number	: Mandalay Willoughy Road	Needle state	: ---	Level	: 15cm
Drilling depth	: 40,19 cm	Tilt	: ---	Direction	: West
Date	: 05.11.2024	Offset	: 128 / 266	Species	: Horse chestnut
Time	: 13:56:29	Avg. curve	: off / off	Location	: Between points 2 & 3
Feed	: 150 cm/min			Name	:



Assessment

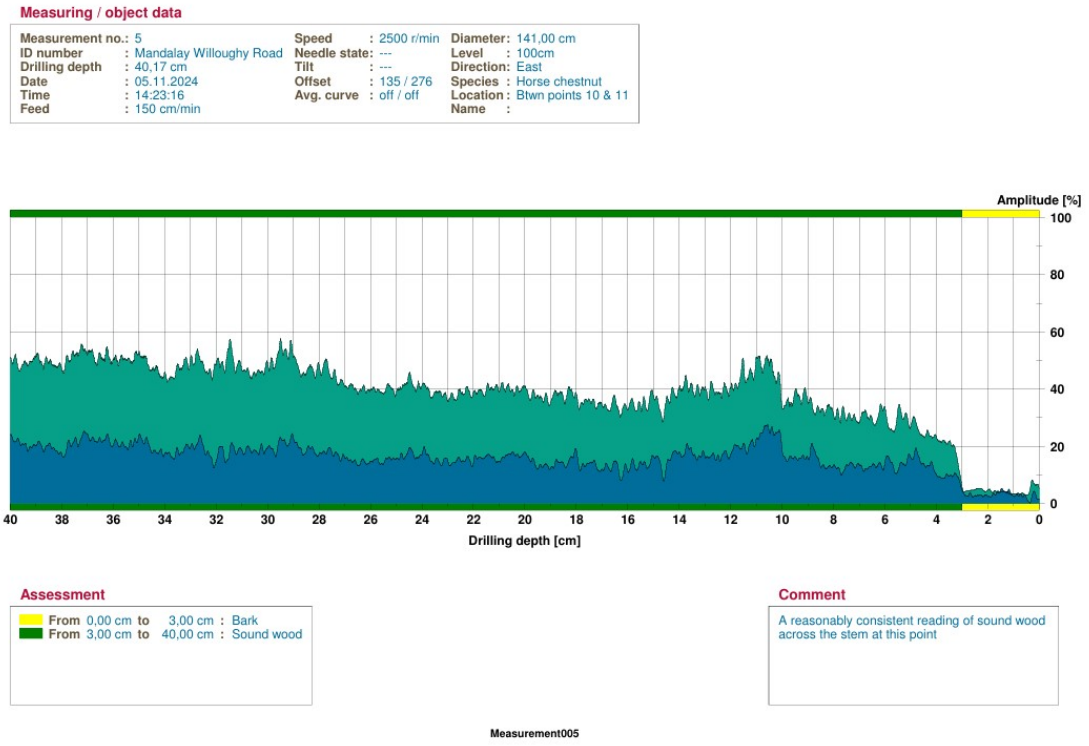
From	0,00 cm	to	2,50 cm	: Bark
From	2,50 cm	to	21,50 cm	: Sound wood
From	21,50 cm	to	22,50 cm	: Knot
From	22,50 cm	to	30,00 cm	: Sound wood
From	30,00 cm	to	33,00 cm	: Decay
From	33,00 cm	to	40,00 cm	: Sound wood

Comment

The spike in the reading is probably a knot or similar in the wood. A small pocket of decay has been picked up.

Measurement004

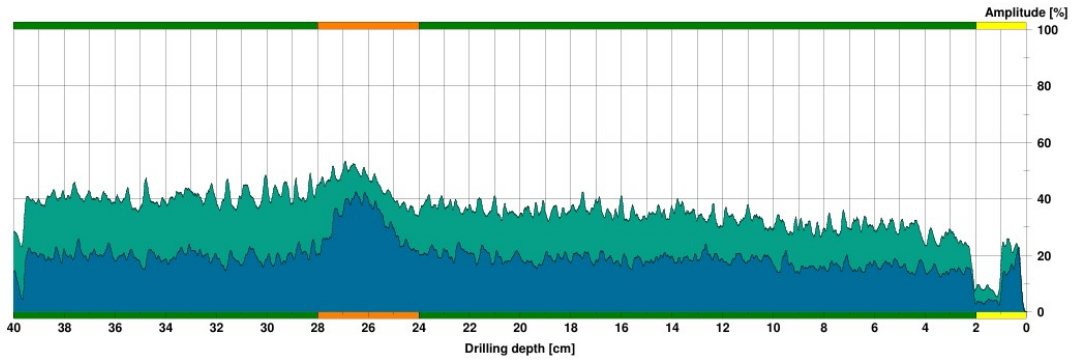
Measurement 4 was taken on the east side at 15cm towards the centre of the stem. The sound wood is punctuated by the presence of a knot (or similar obstruction) before encountering a small pocket of decay. The steep incline of the drill reading deeper into the stem shows a strong resistant barrier wall.



Measurement 5 was taken at 100cm from the west side towards the centre of the stem. Whilst this is above the fungal brackets, there is no evidence of active decay here, suggesting that if decay is travelling up the stem, it has developed a conical shape in doing so. This is typical of a *Ganoderma* development pattern.

Measuring / object data

Measurement no.	6	Speed	2500 r/min	Diameter	141,00 cm
ID number	Mandalay Willoughy Road	Needle state	---	Level	100cm
Drilling depth	40,16 cm	Tilt	---	Direction	South
Date	05.11.2024	Offset	124 / 259	Species	Horse chestnut
Time	14:25:32	Avg. curve	off / off	Location	Between points 1 & 2
Feed	150 cm/min			Name	



Assessment

From	0,00 cm	to	2,00 cm	Bark
From	2,00 cm	to	24,00 cm	Sound wood
From	24,00 cm	to	28,00 cm	Reaction wood
From	28,00 cm	to	40,00 cm	Sound wood

Comment

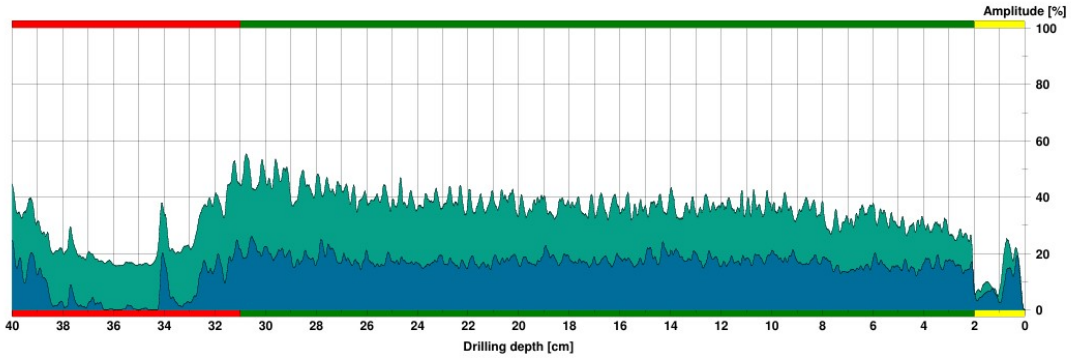
A small area of reaction wood, more resistant to drilling was detected.

Measurement006

Measurement 6 was taken at 100cm on the north side of the stem towards the centre. Another reading of sound wood confirming that decay has not developed higher up in the stem. The unusual bulge in the reading indicates more resistant wood, a reaction to something not accounted for.

Measuring / object data

Measurement no.	7	Speed	2500 r/min	Diameter	141,00 cm
ID number	Mandalay Willoughy Road	Needle state	---	Level	100cm
Drilling depth	40,17 cm	Tilt	---	Direction	South west
Date	05.11.2024	Offset	112 / 268	Species	Horse chestnut
Time	14:26:05	Avg. curve	off / off	Location	Between points 3 & 4
Feed	150 cm/min			Name	



Assessment

From	0,00 cm	to	2,00 cm	: Bark
From	2,00 cm	to	31,00 cm	: Sound wood
From	31,00 cm	to	40,00 cm	: Decay

Comment

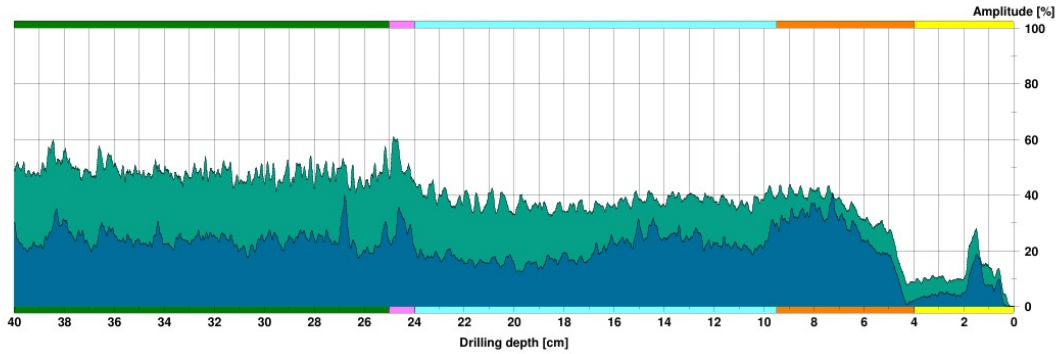
Decay found deeper toward the interior of the stem

Measurement007

Measurement 7 was taken at 100cm from the north east side towards the centre. This crosses the area of decay on the east side of the stem with the open wound between 0.7 – 1.7m. Decay, likely linked to the wound is picked up after 31cm.

Measuring / object data

Measurement no.	: 8	Speed	: 2500 r/min	Diameter	: 141,00 cm
ID number	: Mandalay Willoughy Road	Needle state	: ---	Level	: 100cm
Drilling depth	: 40,18 cm	Tilt	: ---	Direction	: North
Date	: 05.11.2024	Offset	: 114 / 268	Species	: Horse chestnut
Time	: 14:27:55	Avg. curve	: off / off	Location	: Bewteen points 5 & 6
Feed	: 150 cm/min			Name	:



Assessment

From	0,00 cm	to	4,00 cm	: Bark
From	4,00 cm	to	9,50 cm	: Reaction wood
From	9,50 cm	to	24,00 cm	: Degraded wood
From	24,00 cm	to	25,00 cm	: Barrier wall
From	25,00 cm	to	40,00 cm	: Sound wood

Comment

The wood is resisting the spread of decay on the outside, but internally the quality of the wood is gadually being lost. A further barrier wall at 24cm seems to be the point where decay is being arrested for the time being

Measurement008

Measurement 8 was taken at 100cm from the south side towards the centre of the stem. There appears to be a loss of quality of the wood between 10 – 24cm, possibly an indication of early stage decay. This is supported by the presence of slightly resistant reaction wood (a higher resistance to the drill) just before the area of degraded wood and a barrier wall at 25cm.

Appendix 2
The Risk Assessment Matrix

To calculate the assessment of risk, guidance from the National Tree Safety Group has been followed. This in turn follows guidance from the HSE which sets out a tolerability of risk, wherein anything that is deemed to have a risk factor of less than 1:1,000,000 is deemed broadly acceptable (no action needed). A situation where a risk of between 1:100,000 to 1:1,000,000 is deemed tolerable (where risks need to be managed 'as low as reasonably practicable' and risks that are greater than 1:10,000 are unacceptable. The assessment of risk for trees has been calculated, weighing the probability of a component part of the tree failing against the likely severity of such an event arising.

Probability is based on an estimate of how likely such an event would take place over a twelve-month period, taking into account species, seasonal changes and the overall current condition of the tree. A probability of 1 to 100 for example indicates that if 100 identical trees showed an identical defect, the chances are that one of those trees would suffer a failure as a result of that defect over a 12-month period.

Level	Probability	Description	Individual failure mode
1	1 in 10 or greater	Inevitable	The event will occur in the near future
2	1 in 10 to 1 in 100	Probable	The event will very likely occur within the next 12 months
3	1 in 100 to 1 in 1000	Occasional	The event may occur within the next 12 months to three years
4	1 to 1000 to 1 in 10,000	Remote	The event may occur within the next three years but is unlikely to
5	Less than 1 in 10,000	Improbable	Most unlikely that the event will occur

Severity is based on how damaging the failure of a component would be and is influenced by the likely target (usually within falling distance of the tree or branch) and the size of the component. Thus, a small branch may be more likely to drop, but is less likely to result in any harm whereas a large scaffold limb failing could have far more severe consequences.

Where the target is a road or footpath, the density of traffic is also takes into account. A busy main road attracts a higher severity relating that a quiet footpath.

Category	Degree	Description
1	Negligible	No discernible risk noted
2	Minor	Failure of small twigs or branches highly unlikely to result in any harm or injury
3	Moderate	Failure of branches that may cause some limited damage or minor injury
4	Significant	Failure of branches or the whole tree that could lead to major damage or serious injury
5	Severe	Complete failure of major limb or the whole tree is inevitable and will result in major damage or serious injury

The level of probability is then matched to the degree of severity to give an indication of urgency so that works can be prioritized and budgeted for.

		Impact				
		1	2	3	4	5
		Negligible	Minor	Moderate	Significant	Severe
Probabilty						
1	Very likely	Low Medium	Medium	Medium High	High	High
2	Likely	Low	Low Medium	Medium	Medium High	High
3	Possible	Low	Low Medium	Medium	Medium High	Medium High
4	Unlikely	Low	Low Medium	Low Medium	Medium	Medium High
5	Very unlikely	Low	Low	Low Medium	Medium	Medium

High level items should be dealt with immediately. There may be a need to secure the area to prevent people entering the area until such time as works can be carried out if there is any delay.

Medium high items should be dealt with within 3 months of being notified. A higher level of urgency may be required if seasonal factors such as autumn gales are expected

Medium level items should be dealt with within 6-9 months

Low medium items can be dealt with within one to two years. The status of such items may change if subsequent surveys identify a change of circumstance

Low level items do not require attention

Appendix 3
Glossary of terms

Apical dominance
The ability of a shoot apex to continue growing while inhibiting the axillary buds

Axillary Buds
The bud in the angle (axil) of a leaf stalk (petiole) and stem, which, during the growing season, may remain quiescent or give rise to a lateral shoot.

Barrier zone
A layer of atypical wood analogous to heartwood laid down by the vascular cambium and so following an annual ring in cross section (Barrier iv in the CODIT system)

Buttresses
A local swelling of the stem at the base of a tree associated with the origin of a root. The buttresses are generally separated by flutes, or a root flare.

Canopy
Of a single tree, its crown, emphasizing the spreading and enclosing character. Of a forest, the crowns of the larger trees considered collectively.

CODIT
Abbreviation for the Compartmentalization of Decay in Trees, a concept advocated by Alex Shigo and colleagues in which there are said to be four barriers to the spread of decay in trees. Barrier iv also known as the barrier zone is the most effective in confining decay

Crown
The main foliage-bearing part of the tree comprised of small branches & twigs considered collectively. The shape of the crown is partly determined by growth habit, partly by site factors.

Electrical Resistance Tomograph
An instrument for calculating the relative resistance to an electrical current passed transversely across the stem of a tree. Higher resistance to an electrical current might suggest dryer areas of wood whilst areas of lower resistance suggest a greater water content. Electrical currents can be influenced by other factors too, such as the presence of metal in the stem.

Epicormic shoots
Shoots arising from dormant buds in a tree's main stem or framework branches

Incremental strip
An active area of rapid wood growth often associated with stress response

Occlusion
The continued radial growth of new wood, including wound wood, which gradually grows over wounds to the woody parts of trees.

Phloem
The living tissue in plants specialized mainly for conducting substances from the aerial part of the plant to the roots.

Reaction wood
Wood with atypical anatomy that grows in a region of the tree which experiences high mechanical stresses.

Resistograph
An instrument for estimating the extent of internal decay in trees by means of a small-diameter drill. The resistance to the drill bit is continuously recorded either on graph paper or on a computer readout, low resistance suggesting advanced decay.

Root plate
The part of the rooting system (excluding the small outermost roots) that are required to keep a tree windfirm.

Roots
The rooting environment around the tree, including soil, principal larger structural roots near the tree and the trunk supporting the main stem. Typically, the inspection will include a check for fungal fruit bodies or similar evidence of fungal activity; wood-structure defects or recent excavations that could have affected the stability of the tree.

Root plate
The part of the rooting system (excluding the small outermost roots) that are required to keep a tree windfirm.

Stem
An above-ground axis of a vascular plant supporting itself and all parts distal to it, namely any branches of higher order (see branch order) and their foliage, flowers fruit, etc. The stem also has functions of transport, storage and growth etc.

Trunk
The lower part of the main stem, visually well-defined and generally lacking side branches.

VTA
Visual Tree Assessment. The standard approach to tree risk assessment consisting of the diagnosis of structural defects and the evaluation of their significance from visible signs and the application of biomechanical criteria.

Xylem
The tissue in vascular plants that transports mainly water and nutrients from the roots through the aerial part of the plant to the leaves and buds. Xylem occurs in localized vascular bundles in herbs and some species with ligneous systems. In plant species having secondary thickening these bundles coalesce to give a continuous cylinder of secondary xylem, or true wood.