

Gale Tree Consultancy

Tree Condition Report

Skeyne Drive, Pulborough

September 2023

Ref: TCR/463/23

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Summary

T1 White willow

- Decay beginning to form below ground level
- No further action required at this time
- Reassess in three years from the report's date

T2 White willow

- No evidence of decay forming at the level of assessment
- Reassess in three years from the report's date

T3 White willow

- Extensive decay forming across the level of assessment
- Internal features have slowed the sound waves to produce a spurious result, however, even when a revision is made to account for this, the area of decay remains large
- Recommendation to perform a reduction of the southwest primary stem section by c.4m has been made to lessen the loading on the lower stem area
- An option to remove has also be made
- If retained, reassess in two years from the report's date



1.0 Introduction

1.1 Client and Address

- Debbie Fieldus, DFC Property Management Ltd, 2-3 New Broadway, Tarring Road, Worthing, BN11 4HP

1.2 Site Address if Different from the Above

- Skeyne Drive, Pulborough, RH20 2BG

1.3 Date of Inspection

- 5th September 2023

1.4 Name of Inspector

- Andrew Gale *Dip Arb L6 (ABC) M.Arbor.A*

1.5 Our Reference

- TCR/463 /23

1.6 Instructions Received

- I have been instructed by Debbie Fieldus of DFC Property Management Ltd to perform decay evaluations on three trees within the grounds of Skeyne Drive
- I am to provide my findings in the form of a report detailing any remedial work that may be necessary

2.0 Scope of the Report

- This tree condition report relates to the ground level assessment of the tree, it does not consider any below ground issues unless stated otherwise
- The report addresses issues apparent on the tree at the time of the inspection, therefore the likelihood of failure is considered for three and two years respectively from the reports date based on the information gained on the day of the report and on the assumption that any recommended work will be undertaken in the time frame specified
- The site has not been checked for any statutory constraints
- The trees were not assessed for wildlife which would include birds or bats



3.0 Results of Inspection

3.1 Geneal Site Description

- The three trees are located along the eastern boundary fence line with the Carpenters Meadow playground
- The playground consist of an open area with play frames, swings etc. The swings are located to the north east of the site and the climbing frame to the south, closer to the boundary fence line
- Between the play area and boundary fence line is an area of rough ground, where nettles and brambles are growing. The playground is slightly elevated compared to where the three trees are growing and the ground drops away down to the fence line
- The trees are growing in a north-to-south arrangement with T1 being the northern tree, T2 the middle and T3 the southern tree
- The boundary line is heavily treed with a conifer hedge to the north and further, mixed tree species to the south
- To the west of the trees is a wide, open expanse of lawn; a Weeping willow recently failed in this area due to the effects of a decay fungus



The Carpenters Meadow playground is immediately behind the trees



3.2 Tree Species and Dimensions

No.	Species	Scientific Name	Height (m)	Crown Spread (m)				Age	Phys. Condition
				N	E	S	W		
T1	White willow	*Salix alba*	22.0	8.0	10.0	2.0	9.5	M	FAIR

3.3 General Description

- The tree has deeply fluted and included buttress roots[1]
- No evidence of decay fungi present, no changes in tone when assessed with the nylon headed mallet – see Appendix 1 Method of Inspection
- Deadwood with a diameter greater than 50mm was noted heading over the boundary fence line and over the Carpenters Meadow playground

3.4 Decay Evaluation

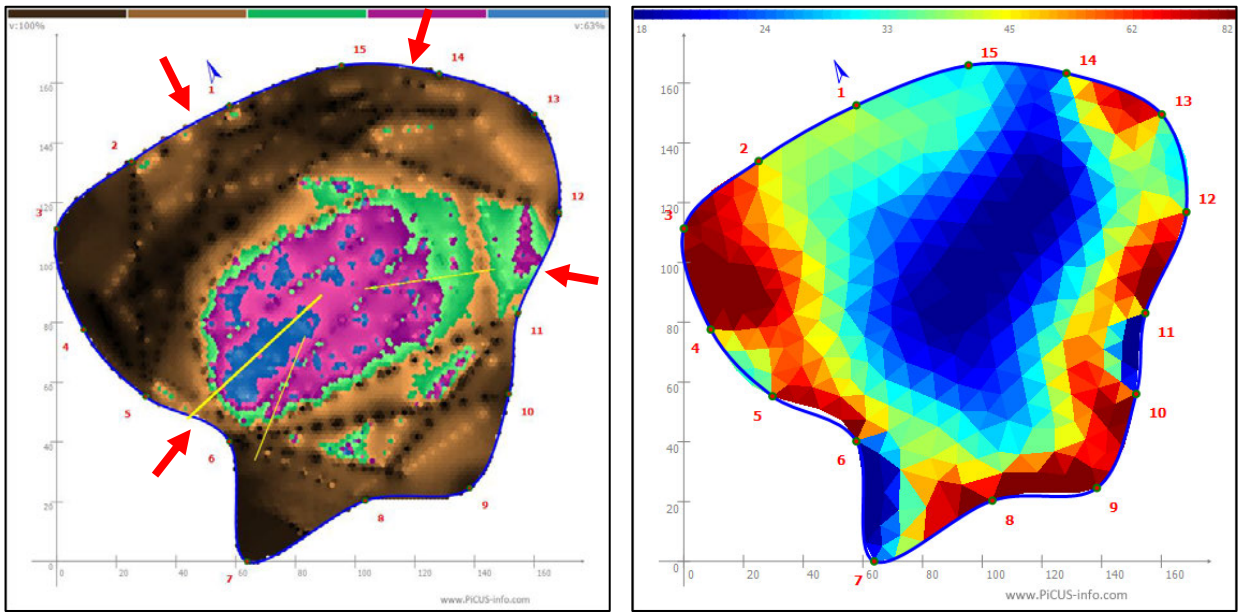
- To confirm the extent of any decay on the lower stem, the PiCUS 3 Sonic Tomography (SoT) unit and the PiCUS 2 Electrical Resistance Tomography (ERT) unit were used c.45cm above ground level (north side of the stem) with 18 measuring points (MP). MP 1 was placed at north for reference purposes – please see below:



[1] Buttress root – develops on a trunk and associated with the origin of a root adding strength and stability. When over exaggerated they can become deeply included with the opposing faces causing a barrier for sound waves to penetrate



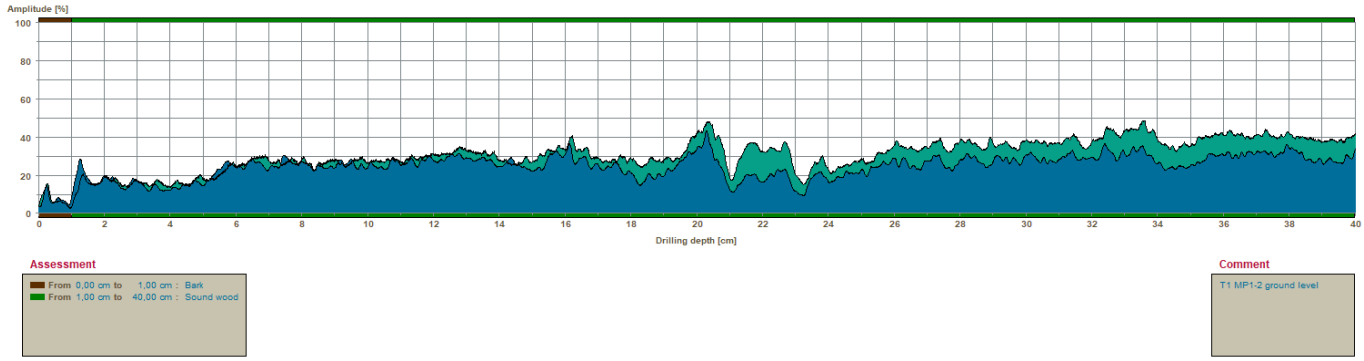
- The SoT assessment (below left) indicates an area in the centre of the stem that is transitioning from sound wood to decay/dysfunctional wood across the level of assessment as shown by the purple and green colouration
- The brown colour around the outer edge shows area of wood with high sonic velocity, and as such, sound wood



- The ERT assessment (above right) shows a decrease in relative resistance in the centre of the stem, radiating away towards the north east side of the stem as shown by the blue colouration. The red around the outer edge of the stem shows areas of increased conductivity and as such, sound wood

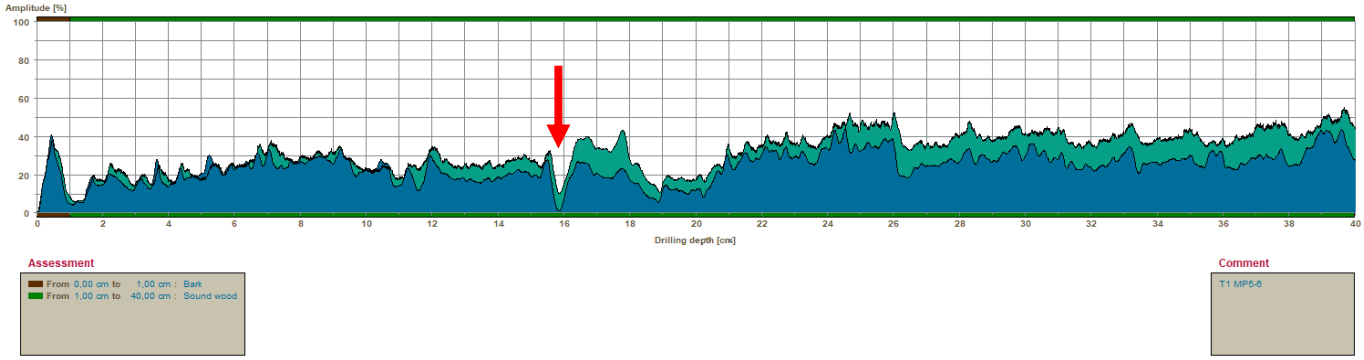
- To confirm the tomogram, the Resi PD400 was used in four locations, at the level of assessment – please see red arrows on the tomogram above and the drill traces below:

<u>Drill Trace 1 – between MP1 and MP2 ground level at a -30^0 angle into the rooting system</u>



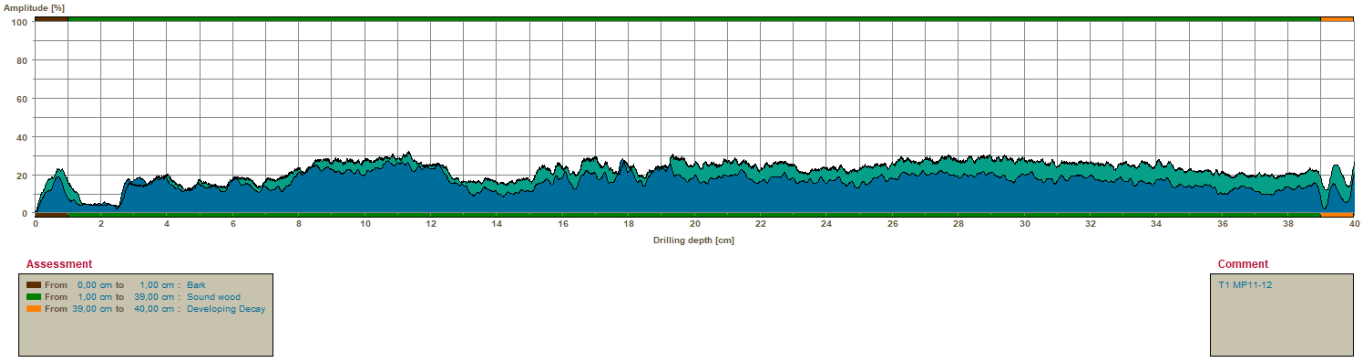


Drill Trace 2 – between MP5 and MP6 at the level of assessment

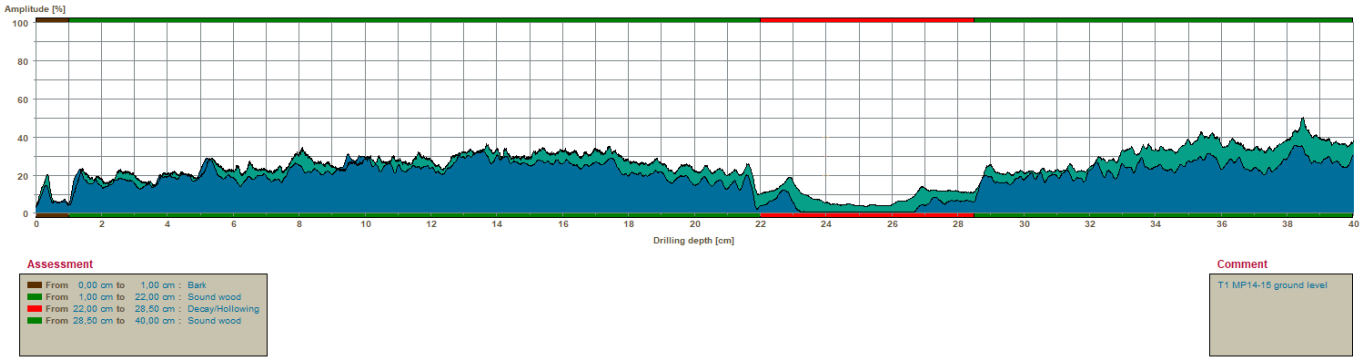


- The red arrow represents a crack in the wood

Drill Trace 3 – between MP11 and MP12 at the level of assessment



Drill Trace 4 – between MP14 and MP15 ground level at a -30^0 angle into the rooting system





3.5 Summary of Results

- The PiCUS 3 sonic tomography unit works by timing how long it takes for sound waves from one measuring point to reach the other measuring points; the resultant tomogram is an interpretation of those times
- The sound waves can be slowed and disrupted not only by wood exhibiting areas of decay, dysfunction or hollowing but also by deeply included buttress roots where the two opposing faces of bark act as a barrier; cracks within the wood structure can also impede the sound waves. These areas are shown as yellow lines on the tomogram
- The SoT assessment shows an area of dysfunctional wood forming within the central area of the stem, which is beginning to migrate away to the east
- The PiCUS 2 ERT unit uses electrical resistance as a means of differentiating between sound and decayed wood, and has the ability to detect features below the assessment level
- With the lack of any external wounds at ground level as a point of entry for a pathogen, it is my opinion that the decay is entering the stem via a damaged root or roots within the main rooting system. Typically, this occurs when the tap root is no longer required and becomes redundant
- This is confirmed by the ERT assessment which shows an area of reduced electrical resistance in the same area as the dysfunction in the SoT assessment, however, it also shows this area extending further to the northeast
- Drill Trace 4, which was undertaken at a -30^0 angle into the rooting system at this point on the stem, shows a decrease in drill resistance from c.22cm to c.28.5cm. This suggests the drill passed through the area of low electrical resistance, and as such decay, before entering sound wood. The remaining drill traces showed sound wood along their respective assessment lengths
- I am therefore of the opinion that the area of dysfunction as shown in the SoT assessment is not as large as first thought, and that the deeply included unions have slowed the sound waves sufficiently to influence the tomogram
- However, decay is beginning to establish below ground level, but the extent is not an issue at this time
- I recommend the removal of deadwood greater than 50mm in diameter from over the playground area
- Reassess in three years from the reports date



3.6 Tree Species and Dimensions

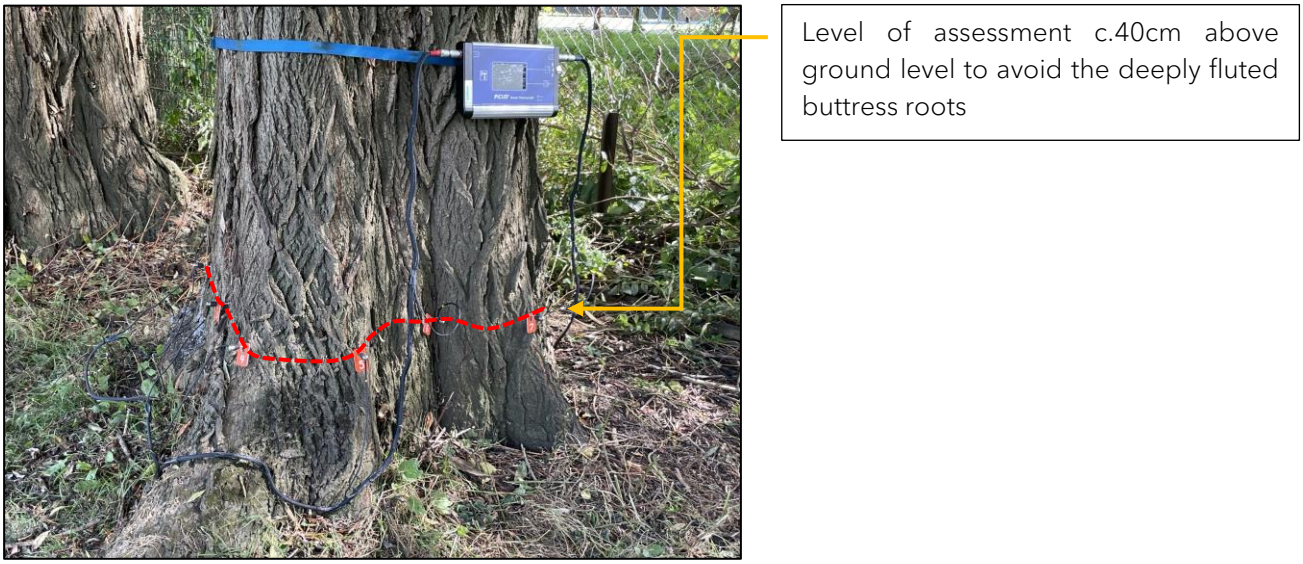
No.	Species	Scientific Name	Height (m)	Crown Spread (m)				Age	Phys. Condition
				N	E	S	W		
T2	White willow	*Salix alba*	24.0	2.0	7.5	2.5	8.0	M	FAIR

3.7 General Description

- The tree has buttress roots developing around the basal area with one more deeply fluted buttress root which heads on a south west direction
- No evidence of decay fungi present, no changes in tone when the area was assessed with the nylon headed mallet
- Deadwood with a diameter greater than 50mm was noted heading over the boundary fence line and over the Carpenters Meadow playground

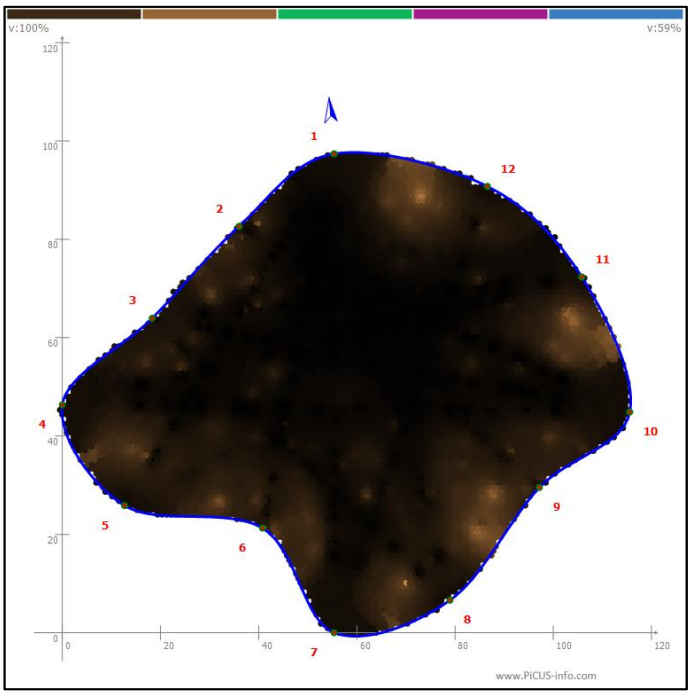
3.8 Decay Evaluation

- To confirm the extent of any decay on the lower stem, the PiCUS 3 sonic tomography unit was used c.40cm above ground level (north side of the stem) with 12 measuring points (MP). MP 1 was placed at north for reference purposes – please see below:



- The tomogram overleaf indicates an area of high sonic velocity across the level of assessment as shown by the brown colour present



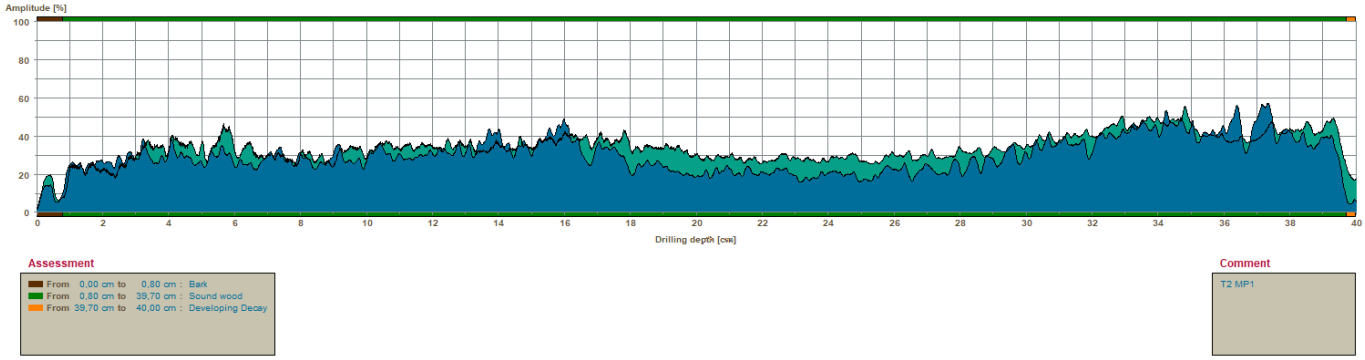


Level of assessment c.40cm above ground level to avoid the deeply fluted buttress roots

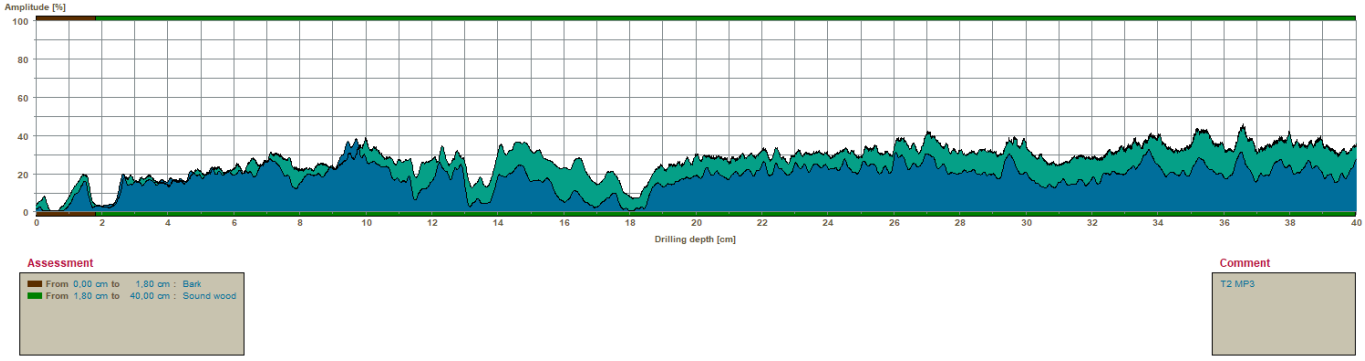
Blue arrow referencing north

- To confirm the tomogram, the Resi PD400 was used in four locations, at the level of assessment – please see the drill traces below:

Drill Trace 5 – MP1 15cm below level of assessment angled at -30^0 into the rooting system

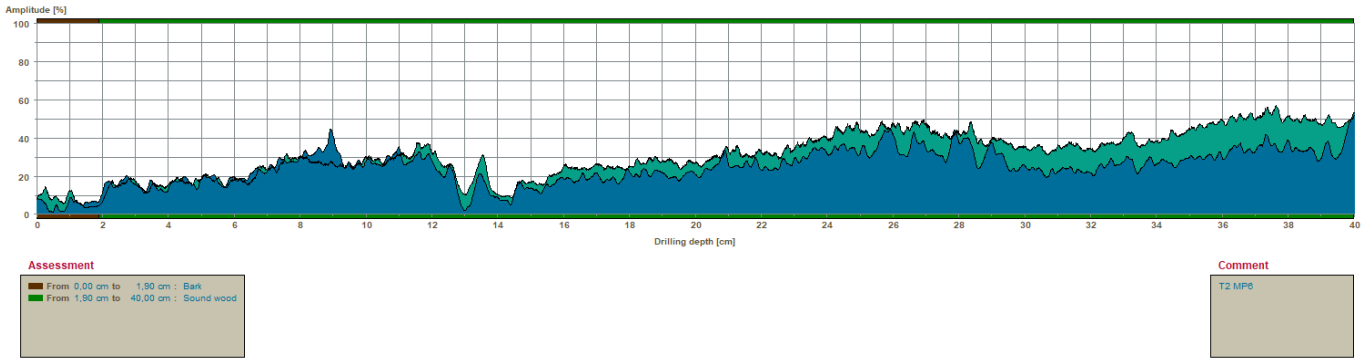


Drill Trace 6 – MP3 15cm below level of assessment angled at -30^0 into the rooting system

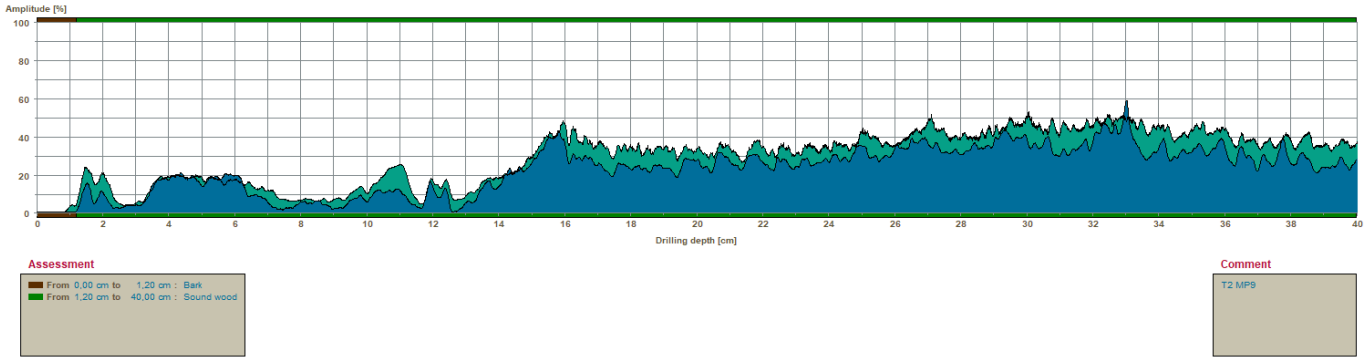




Drill Trace 7 – MP6 15cm below level of assessment angled at -30^0 into the rooting system



Drill Trace 8 – MP9 15cm below level of assessment angled at -30^0 into the rooting system



3.9 Summary of Results

- The tomogram shows an area of high sonic velocity, and as such sound wood, across the level of assessment
- The four drill traces, which were undertaken at ground level, and at an angle if -30^0 into the rooting system, all show sound wood is present along their respective assessment lengths
- However, Drill Traces 6 and 8 do show small areas of reduced resistance
- This could be the start of dysfunction occurring, but at this time, does not pose a risk
- No further action required at this time
- Reassess in three years from the reports date



3.10 Tree Species and Dimensions

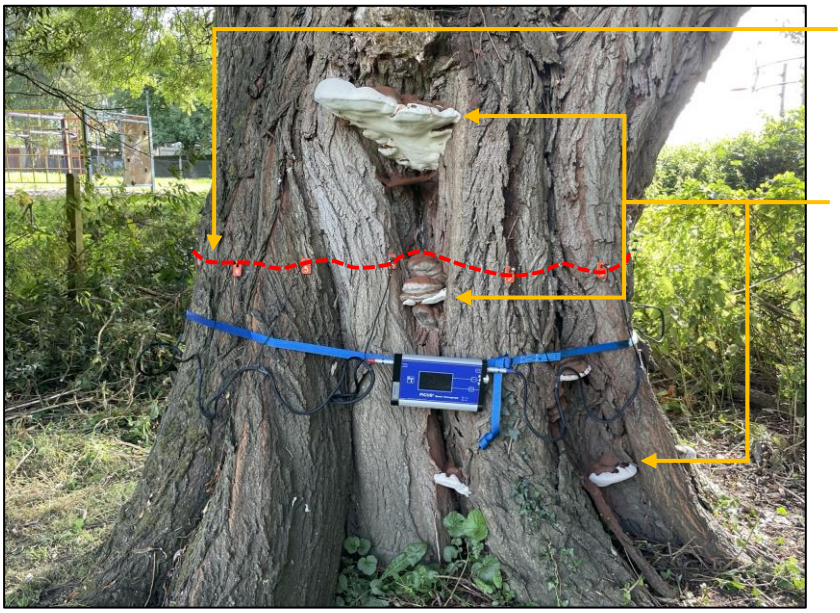
No.	Species	Scientific Name	Height (m)	Crown Spread (m)				Age	Phys. Condition
				N	E	S	W		
T3	White willow	*Salix alba*	21.5	2.5	8.0	9.0	10.0	LM	FAIR

3.11 General Description

- The tree has large, deeply included buttress roots around much of its lower stem. Some of the depths between the buttress roots extend to c.60cm
- Brackets of the decay fungus *Ganoderma australe* were recorded on the south and west side of the stem, from ground level up to c.2.8m
- On the east side of the stem, multiple, desiccated tiers of the decay fungus *Laetiporus sulphureus* were noted up to c.1.8m above ground level
- Dull tones were heard around much of the east, south and west side of the lower stem when the area was assessed with the nylon headed mallet
- The stem bifurcates as c.2.5m forming three primary stem sections (PSS) in a northeast-to-southwest arrangement

3.12 Decay Evaluation

- To confirm the extent of any decay on the lower stem, the PiCUS 3 sonic tomography unit was used c.1m above ground level (north side of the stem) with 18 measuring points (MP). MP 1 was placed at north for reference purposes – please see below:

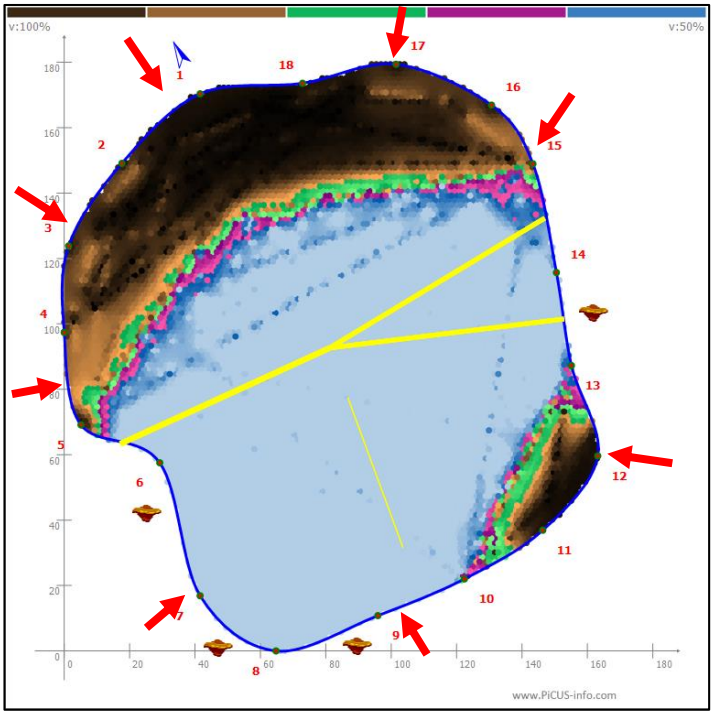


Level of assessment c.1m above ground level to avoid the deeply fluted buttress roots

Note the multiple brackets of the decay fungus *Ganoderma australe* on the south and west side of the stem



- The tomogram indicates an extensive area of low sonic velocity across the level of assessment as shown by the blue colour present
- The thin strip of high sonic velocity across the northern aspect of the stem indicates where sound wood is present



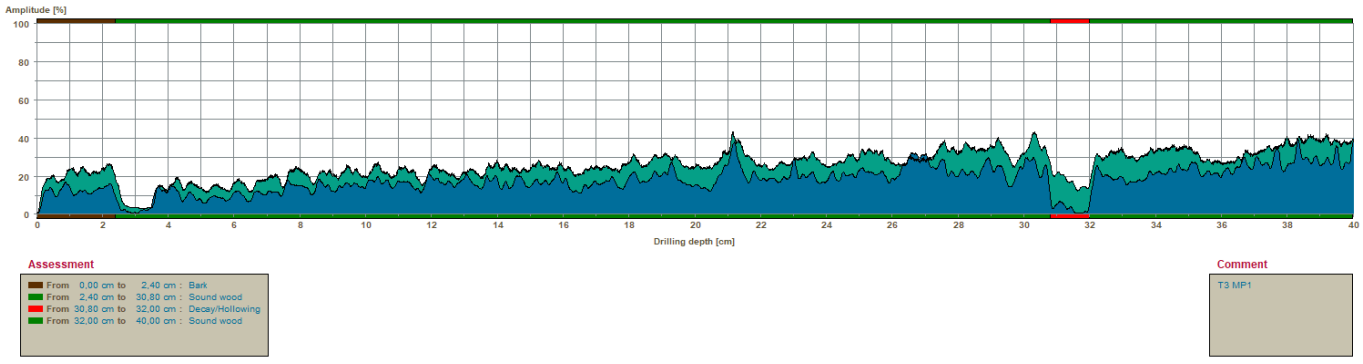
Blue arrow referencing north

Red arrows referencing the location of the eight drill assessments

Fungi symbols noting the location of the multiple layers of decay fungi

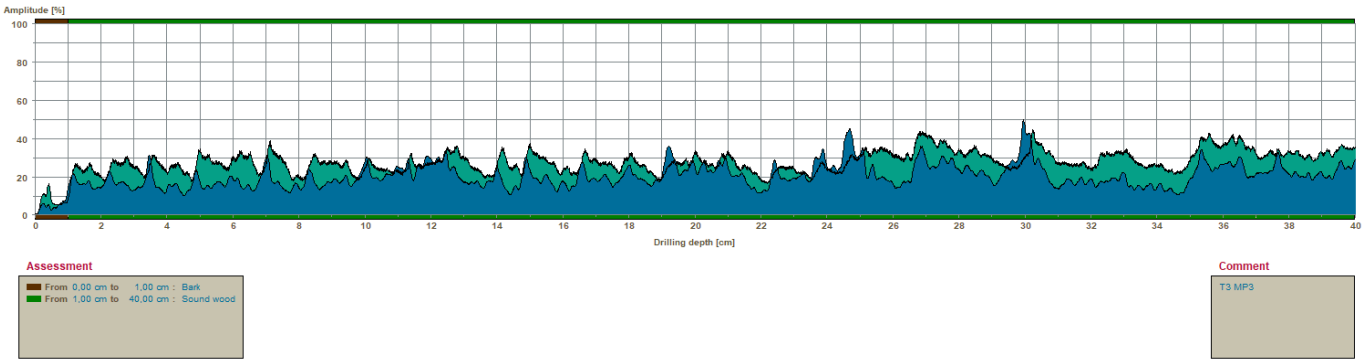
- To confirm the tomogram, the Resi PD400 was used in eight locations, at the level of assessment – please see the red arrows on the tomogram above and the drill traces below:

Drill Trace 9 – MP1

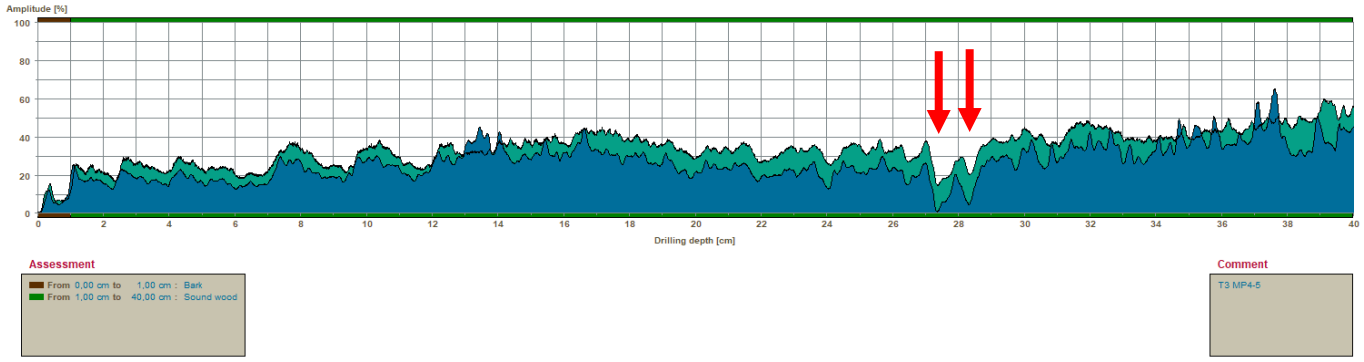




Drill Trace 10 – MP3

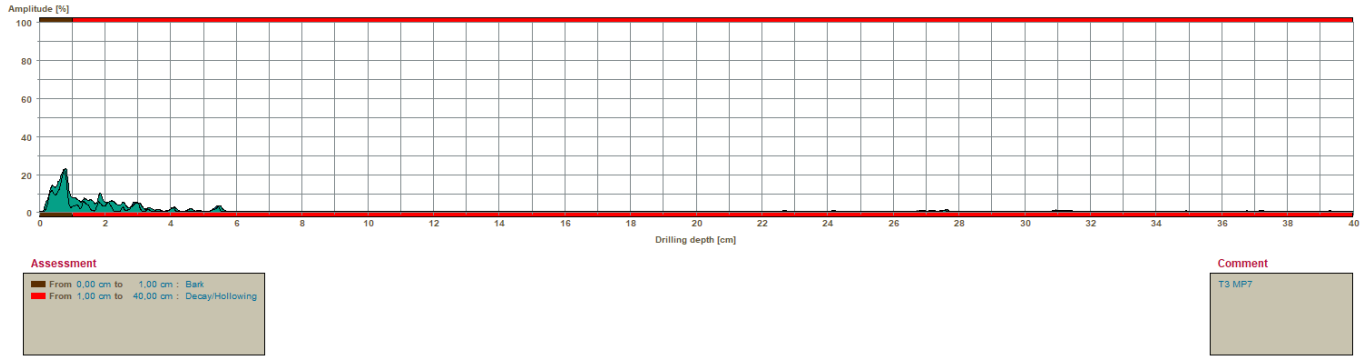


Drill Trace 11 – between MP4 and MP5

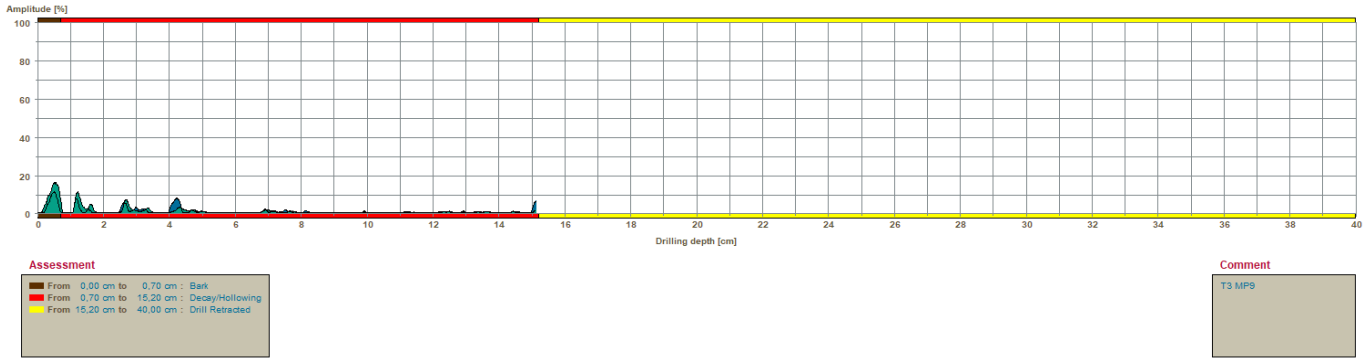


- Red arrows referencing cracks within the wood structure

Drill Trace 12 – MP7

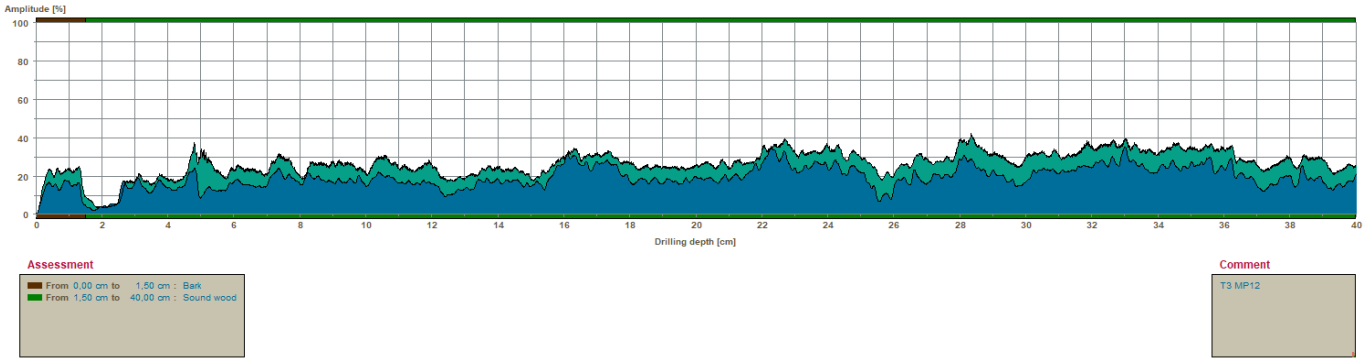


Drill Trace 13 – MP9





Drill Trace 14 – MP12



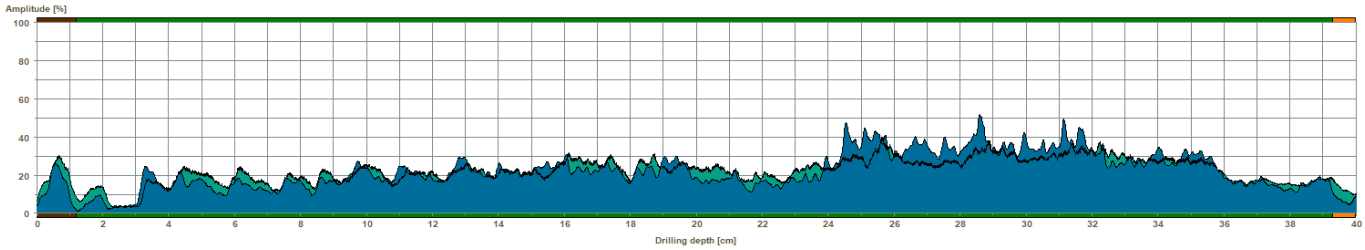
Assessment

From 0,00 cm to 1,50 cm : Bark
From 1,50 cm to 40,00 cm : Sound wood

Comment

T3 MP12

Drill Trace 15 – MP15



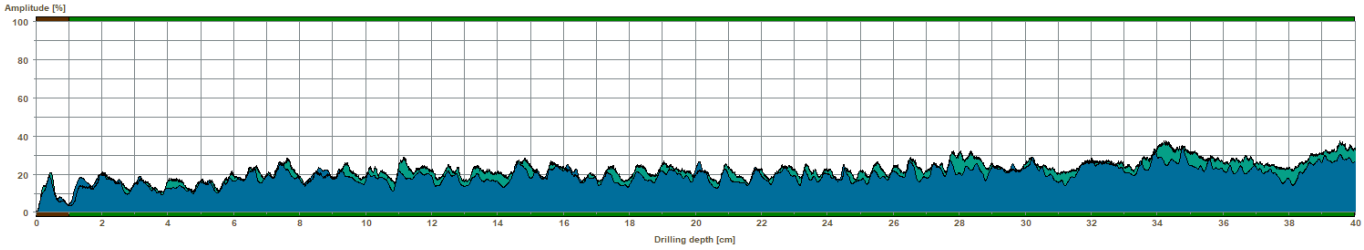
Assessment

From 0,00 cm to 1,20 cm : Bark
From 1,20 cm to 39,30 cm : Sound wood
From 39,30 cm to 40,00 cm : Developing Decay

Comment

T3 MP15

Drill Trace 16 – MP17



Assessment

From 0,00 cm to 1,00 cm : Bark
From 1,00 cm to 40,00 cm : Sound wood

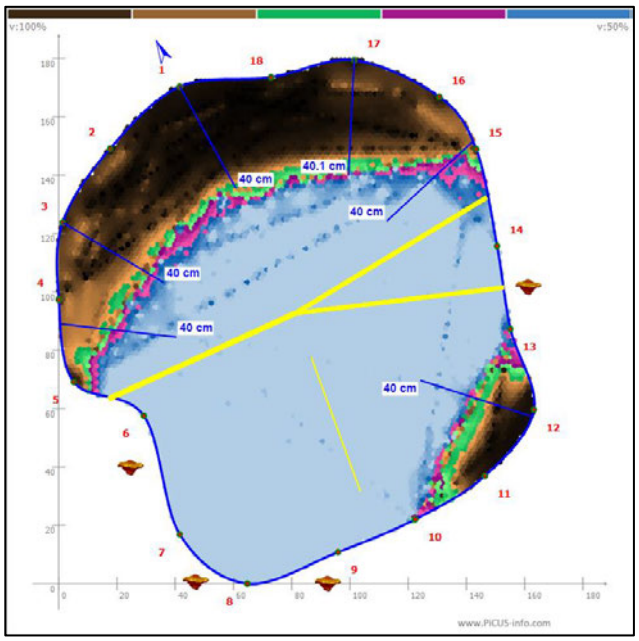
Comment

T3 MP17



3.13 Summary of Results

- The tomogram indicates an expansive area of decay and dysfunction across a large area of the stem as shown by the blue colouration; however, I believe this not strictly to be the case
- As mentioned in s.3.5 Summary of Results, sound waves can be slowed and disrupted by deeply included buttress roots and other internal features that are not visible externally. These have, in my opinion, resulted in a spurious tomogram in this assessment
- With the exception of Drill Traces 12 and 13, all drill assessments reached their 40cm drill lengths relatively unimpeded proving sound wood is present – see the drill traces overlaid onto the tomogram below. Drill Traces 12 and 13 have not been overlaid as the decay they show is extensive



Yellow lines showing internal features that slow down the sound waves

Drill traces overlaid at their full lengths – drill traces undertaken at MP7 and MP9 omitted due to the extensive decay

- I believe that the southwest primary stem section is either a mature section of sucker growth or a mature branch that developed below the point of bifurcation and has subsequently fused and become enveloped to form part of the overall stem shape. This region of the tree begins at the deep concavity between MP6 and MP7 and continues around to the concavity between MP10 and MP11
- This means that the inner bark layers between the main stem and secondary stem section have slowed the soundwaves which has contributed to the initial expansive area of low sonic velocity; this is visible with the two yellow lines that transect this part of the tomogram
- However, this does not negate the extent of decay as shown by Drill Traces 12 and 13
- The two types of fungus are present, causing two differing types of decay
- *Ganoderma australe* causes a localised white rot to form. As the decay advances, the lignin is degraded fully leaving the cellulose behind; in extreme cases, the decay can result in windthrow and failure of the stem or root plate. Whilst the decay fungus *Laetiporus sulphureus* causes a brown rot to form where the cellulose is removed leaving the lignin behind which can result in a brittle fracture to occur
- Therefore, the southern portion of the tree is being affected by wood decay fungi that react in differing manners, both of which can result in failure of the affected part of the tree



- In my opinion the southwestern primary stem section should undergo a severe reduction in height to reduce the loading on the affected part of the lower stem
- I would suggest a reduction of c.4m is necessary, to take place on all apical and lateral branch lengths on the southwest primary stem section – see below. This should be undertaken within twelve months of the reports dates
- Care should be taken however as the three trees have grown to form one crown mass and on overzealous approach on T3, could affect the other two trees



Approximate line of reduction to include those branches heading east and west to establish a more compact crown form

Lateral branches heading east and west on T2 may also need to be shortened to establish a more balanced overall crown form

- There may be a need to prune branches immediately adjacent to this area of the tree, including those on T2 to produce a more balanced crown form
- Remove deadwood greater than 50mm in diameter from over the playground
- I do not believe there is a need to remove the tree at this time, but with the two fungi's ability to degrade the wood structure this may not always be the case. Therefore, the option to remove the tree completely could be justifiable, although not necessary at this time in my opinion
- If the tree is removed, there may be a need to reduce the remaining two trees as they will then be exposed to wind loads not currently experienced
- If retained, reassess in two years of the reports date



4.0 Recommendations

- Implement the tree work in the time period specified
- Reassess in three years of the reports dates
- This time frame should be shortened in the event:
    - The tree's local environment changes significantly
    - Further fruiting bodies emerge from anywhere on the three trees
    - After extreme weather events such as:
        - Wind gusts in excess of Force 8 on the Beaufort Scale – see Appendix 3
        - After named extreme weather events

- If the trees are located within a conservation area or subject to a tree preservation order, a formal application to the local planning authority will be required and written consent obtained prior to any work is carried out

This concludes my report.

[redacted]

Andrew Gale *Dip Arb L6 (ABC) M.Arbor.A*

Date: 8th September 2023

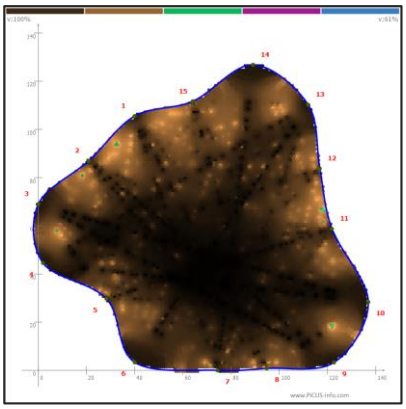
Arboricultural ASSOCIATION Professional Member

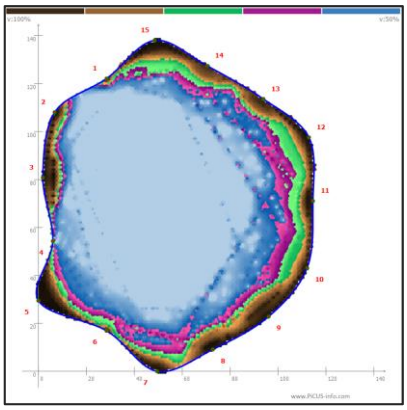


5.0 Appendix 1

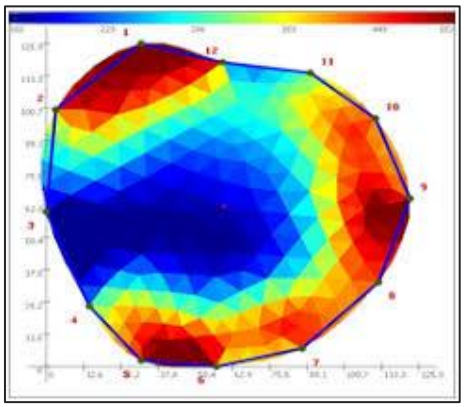
Method of Inspection

- A nylon headed mallet is used to sound the stem, any change in tone can be an indicator of decay or loose bark which may warrant further investigation
- Where necessary, a thin steel rod is used to assess the depth of cavities and concavities between buttress roots to check for decay, the solidness of the inner sides of a cavity and to assess the depth of any cracks or splits that may be present
- PiCUS 3 Sonic Tomography (SoT) unit uses the relative velocity of sound waves induced across the stem to produce a colour shift image where dark browns represent wood with higher velocities and as such sound wood
- Lower sound speeds caused by decay or hollowing are represented by lighter colours with blue/white indicating significant decay/hollowing. On the examples below, the tomogram on the left indicates a sound tree and the tomogram on the right, a trees with significant decay or hollowing:





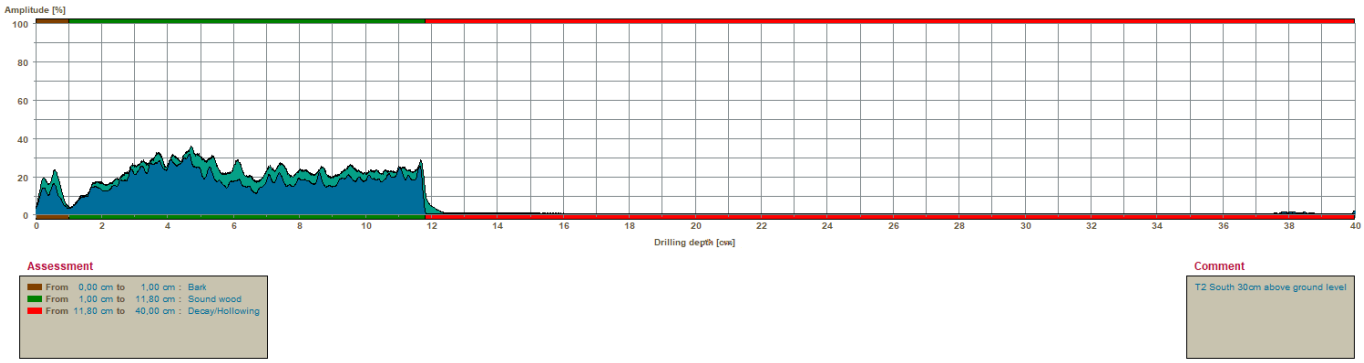
- A further assessment using the PiCUS 2 Electrical Resistance Tomography unit (ERT) can be used
- The PiCUS 2 ERT unit produces an electrical current to assess the condition of the wood within the tree. Changes in the water content, cell composition and chemical elements will change according to the condition of the wood – see below



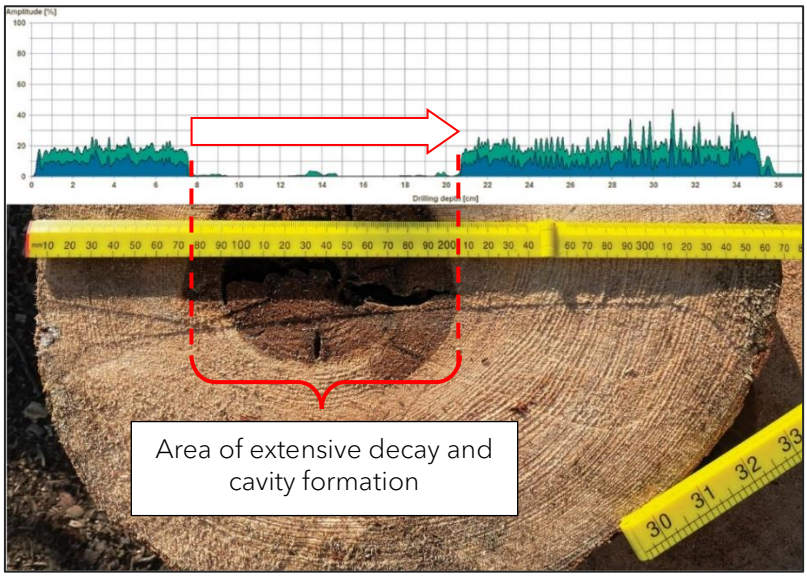
- The blue colouration in the tomogram indicates an area of high conductivity suggesting advancing decay



- An IML Resi PD400 microdrill, which measures the resistance of a very fine drill bit to a depth of 400mm, can be used for further confirmation. Significant drops in drilling resistance are indicative of decay or hollowing
- On the example below, extensive decay is indicated from a depth of 11.8cm through to the end of the assessment



- Please note, historically Resi drill traces have read from right-to-left due to the configuration of the original machine. However, by using the software available, I have flipped the drill traces to read left-to-right, the more conventional way to read a graph
- On the image below, you can see where the drill entered the area of extensive decay and cavity at c.7.5cm and re-entered the sound wood at c.20.8cm; the drill exited the stem at c.35.4cm





Appendix 2

Survey Key

Tree No.	Relating the tree being assessed	
Species	Common name in English	
Scientific name	The current scientific name will be used	
Height	Measured using a TruPulse digital clinometer and shown in metres (m)	
Crown Spread	Measured using a TruPulse digital clinometer and shown in metres (m)	
Age Class	Young [Y]	recently planted or established within the last 5 years
	Semi Mature [SM]	a well-established youngish tree but far from full maturity
	Early Mature [EM]	long established nearing its full size but not fully mature
	Mature [M]	fully mature tree that has met its full size
	Late Mature [LM]	a fully mature tree that has passed its peak; may exhibit areas of decline
	Veteran [V]	a tree with the physical characteristics of an Ancient tree but is not ancient in years compared to other trees of the same species
	Ancient [A]	a tree that has past full maturity and is old or aged in comparison to other trees of the same species
Physiological Condition	GOOD	No significant physiological problems
	FAIR	Some physiological problems
	POOR	Significant physiological problems
	MORIBUND	In a serious and irreversible decline
	DEAD	Not alive
Tree Structure	Main Stem	The stem, from ground level up to the point at which it bifurcates
	Primary Stem Section (PSS)	The larger stem sections that emanate from the main stem after bifurcation; form the main crown structure
	Secondary Stem Section (SSS)	The stem sections that emanate from the primary stem sections that contribute to the inner crown structure
	Tertiary Stem Section (TSS)	The stem sections that emanate from the secondary stem sections that contribute to the inner and outer crown structure
	Subordinate Branch Structure (SBS)	The smaller diameter branches that help form the inner and outer branch structure; leaf bearing twigs emanate from these to form the crown



Appendix 3

Beaufort Number	Name	Knots	MPH	Effects Observed on Land
0	Calm	Under 1	Under 1	Calm, smoke rises vertically
1	Light Air	1-3	1-3	Direction of wind is shown by smoke drift but not by wind vanes
2	Light Breeze	4-6	4-7	Wind felt on face, leaves rustle, ordinary wind vane moved by wind
3	Gentle Breeze	7-10	8-12	Leaves and small twigs in constant motion, wind extends light flag
4	Moderate Breeze	11-16	13-18	Raises dust and loose paper, small branches are moved
5	Fresh Breeze	17-21	19-24	Small trees in leaf begin to sway, crested wavelets in inland waters
6	Strong Breeze	22-27	25-31	Large branches in motion, whistling heard in telegraph wires, umbrellas used with difficulty
7	Near Gale	28-33	32-38	Whole trees in motion, inconvenience felt in walking against the wind
8	Gale	34-40	39-46	Breaks twigs off trees, generally impedes progress
9	Strong Gale	41-47	47-54	Slight structural damage occurs – chimney pots, slates removed
10	Storm	48-55	55-63	Seldom experienced inland, trees uprooted, considerable structural damage occurs
11	Violent Storm	56-63	64-72	Very rarely experienced, accompanied by widespread damage
12	Hurricane	64 and over	73 and over	