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Eleanor Kerrigan
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21 December 2023

BY EMAIL ONLY: [redacted]

Dear Eleanor

Tomography: Marlborough College 2023.

I refer to the recent inspections carried out by ultrasound tomography, backed up by resistance drilling where results were inconclusive, or to support findings.

Ultrasound tomography works by sending and recording propagation times for ultrasound waves passed through the tree at set heights depending upon where the area of concern is believed to be. In most cases this responds to a fungal fruiting body, hammer testing or a visible cavity or opening.

The drilling uses a micro-drill that records the resistance to rotation and insertion. The outcomes show real distance changes in wood density and is used where tomography is not possible or to confirm what may appear to be anomalous outcomes for the ultrasound.

The tests were carried out by a specialist contractor, James Pinder, Treecare Consulting Ltd., who has extensive experience with the use of this equipment, its capabilities and interpretation.

Three trees were identified for testing as a result of the recent visual inspections carried out and the length of time since previous testing was commissioned:

- Beech [T2] outside the squash courts;
- Black Pine [T236] in the Masters Garden;
- Beech [T324] entrance to the running track.

Individual inspection records are supplied [attached to covering email dated 22.12.23].

It is apparent from the tests carried out that trees [T236] and [T324] have acceptable levels of non-colonised wood and that these trees do not require any remedial works at present.

The Beech [T2], however, has significantly increased levels of colonisation and alteration of wood properties.

It is with regret that I have no real alternative than to recommend that this tree is removed.

Should you have any further questions, please do not hesitate to contact me.

Yours Sincerely

[redacted]

Director

MICFor, CEnv, ND Arb (RFS), F. Arbor. A

T2 Beech (*Fagus sylvatica*)

A mature tree some 20m tall with an average radial spread of 6-7m. The tree has a slight asymmetry to the south with a minor trunk lean in the same direction.

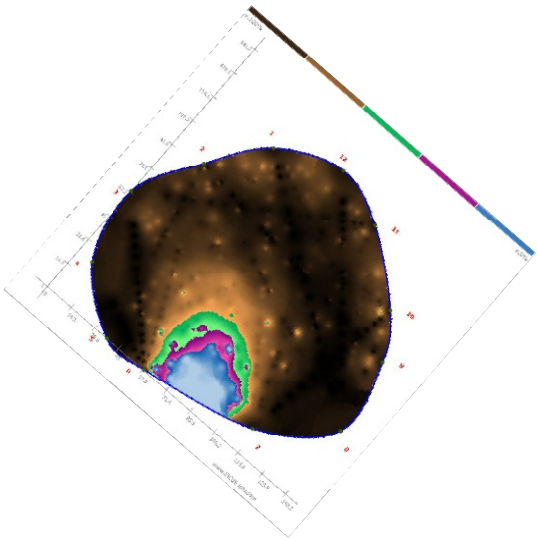
The tree is surrounded by tarmac and other hard surfacing.

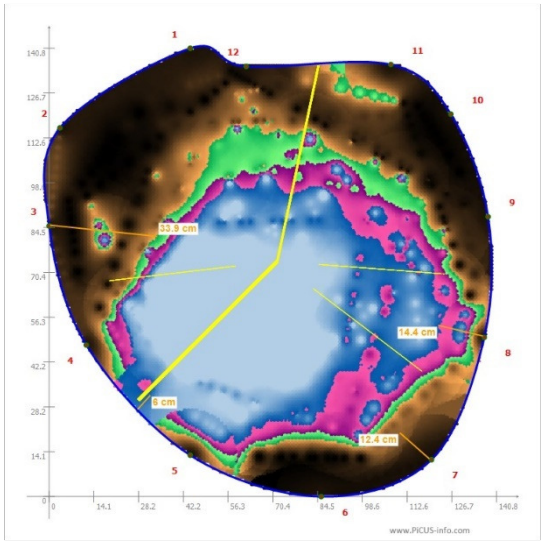


The tree has a history of producing fungal fruiting bodies of *Ganoderma australe/applanatum* over the last inspection regimes. These have been generally restricted to the basal area to the west of the tree. However, new brackets have been identified forming in multiple areas of the tree. The original fruiting point has ceased producing annual increment and the bracket has degraded and disappeared. New brackets are seen at ground and 2.7m north in a single seam (see picture right), 300 and 400mm east, 500mm east, and at 1.6m and 2.5m spiraling in the seam to the south. This has led to the need to review the previous tomography carried out in 2014 and 2016.

Tomography was carried out at near ground level and at 3.0m in response to the new bracket formation. Back up resistance drilling was carried out in multiple locations to confirm the findings of the ground level tomography.

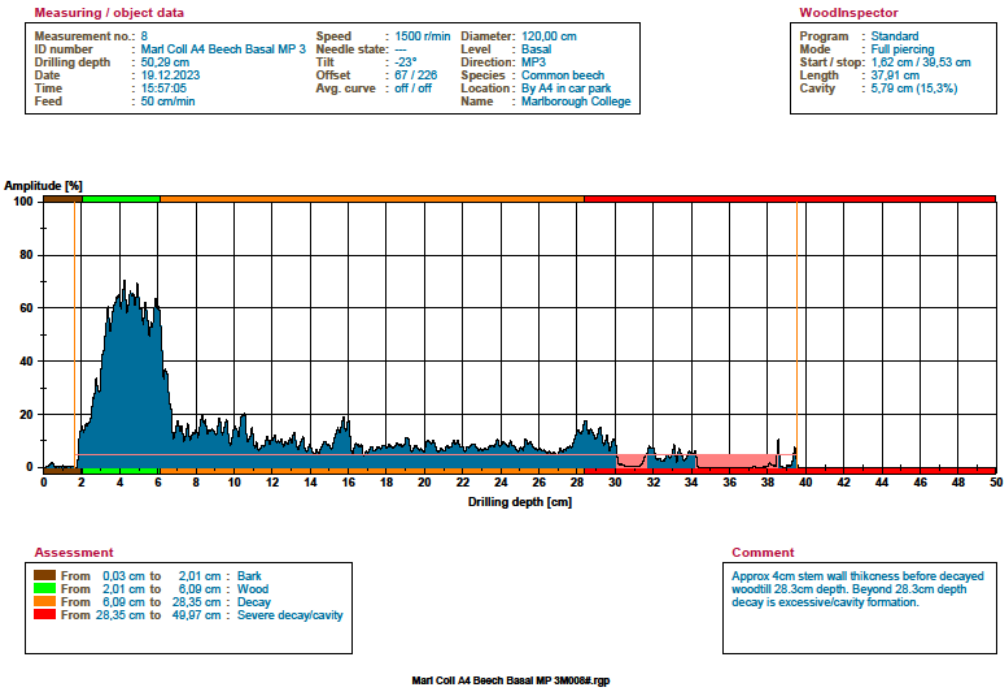
The lower scan, taken at 300mm above ground level, shows a marked increase in decay with the most significant decayed areas (shown in blue) having developed very rapidly since the scan in 2016. The 2016 scan result (see *left* below) has been rotated to align the measuring point numbered 1 to north. This clearly shows the dramatic increase in significantly altered timber (shown in blue).



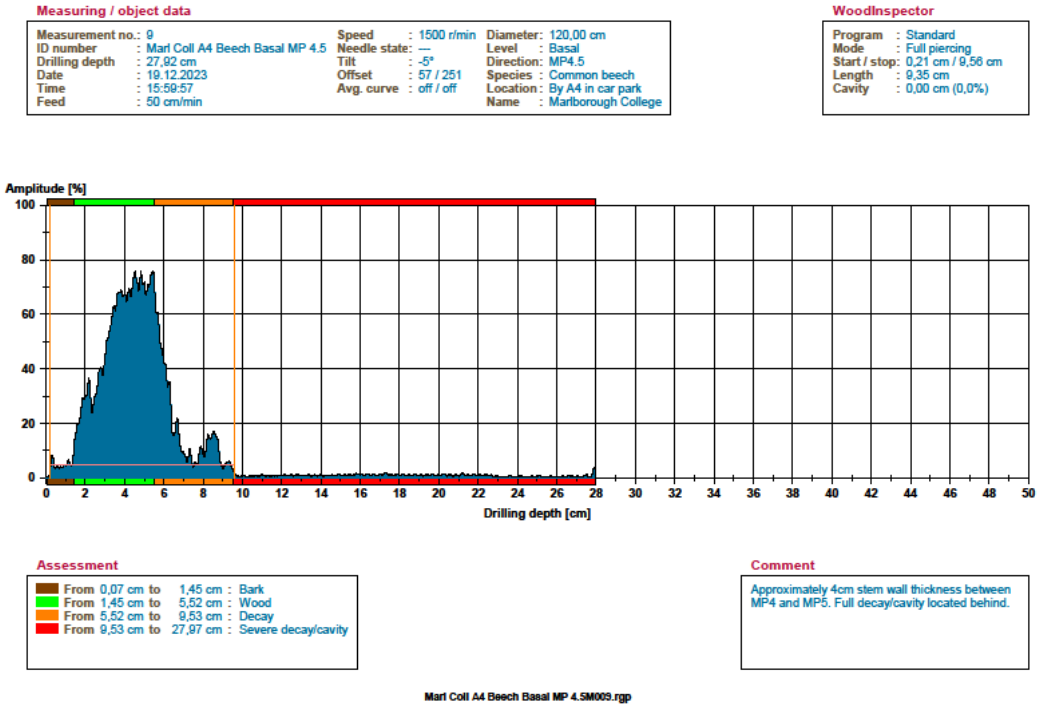


2016 2023

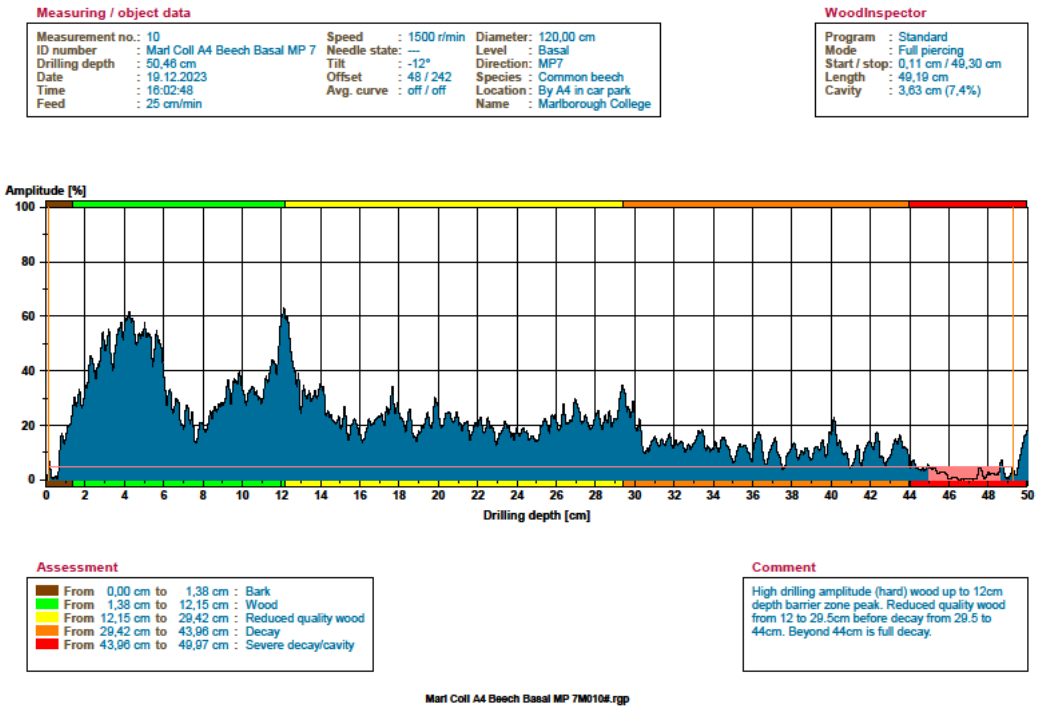
In order to ensure that these readings were correct, due to the unusual and rapid change, several resistance drills were carried out at various points that are located with reference to the measurement points for the tomography.



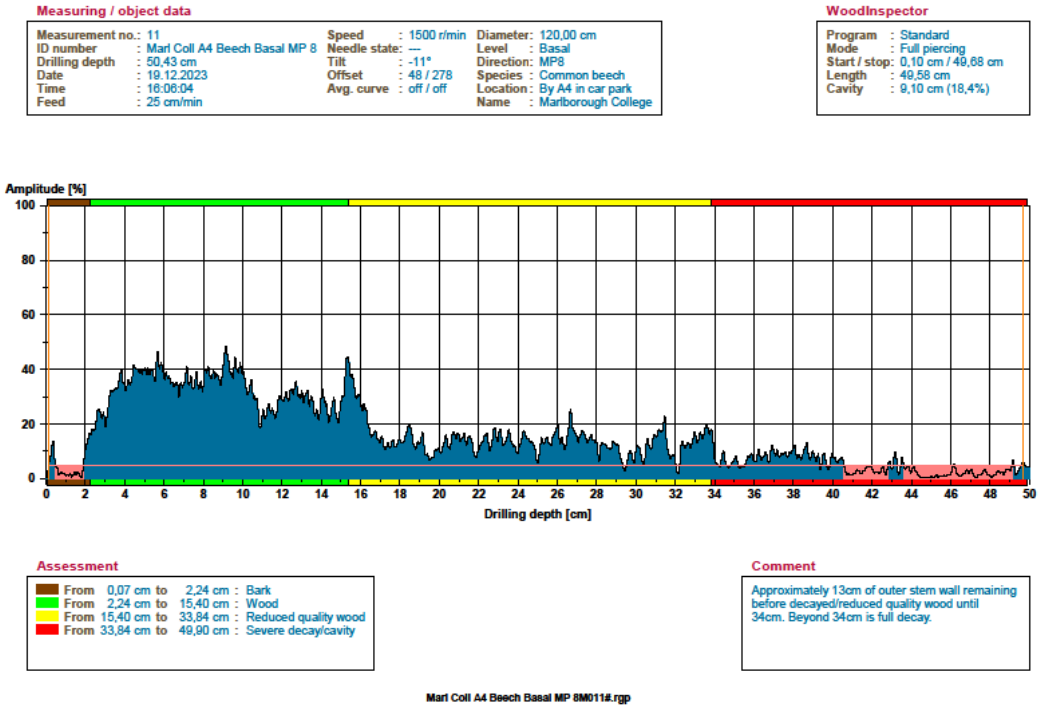
Inserted at measuring point 3



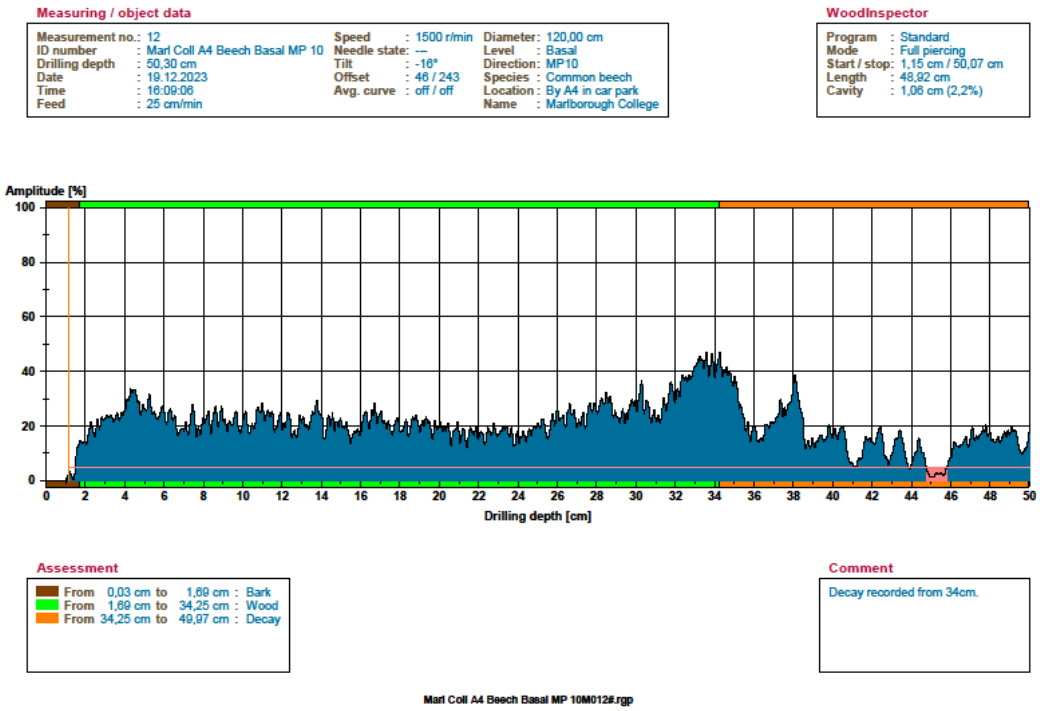
Inserted between measuring points 4 & 5



Inserted at measuring point 7



Inserted at measuring point 8

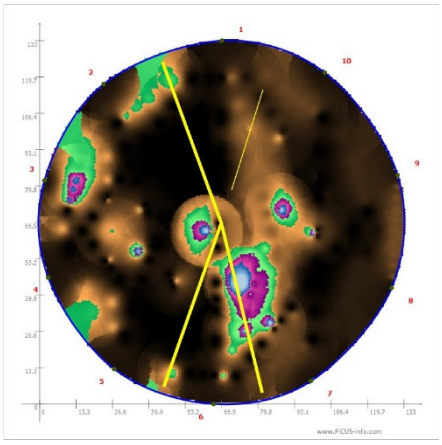


Inserted at measuring point 10

The first two traces, at the points of the greatest expected decay, illustrate the hollowing as so severe that the drill automatically stopped insertion and withdrew to prevent damage to the machine. The drill traces correspond very well with the tomography: measuring lines have been added to tomograph output at corresponding measuring points to illustrate this.

The tree has multiple non-integrated main unions at a general height of 3.5m supporting the main stems, which is typical of the species.

The upper scan shows that there is internal separation between the main eastern stem and the rest of the tree by the imposed “radial barrier to sound transmission” line shown in yellow right.



The decay levels are now also impacting these unions.

The stems are linked by a series of hollow braid cables at various points and levels. These supplement older historic steel cables.





The tree is showing increased decline in vitality with low, small bud density and the typical curling incremental growth of a beech in decline (see below *left*).

The tree has been reduced in the past to manage leverage on the structural unions. There is no internal growth development that would lend itself to further reduction points.





Opinion:

The fungal colonisation has been able to increase exponentially as a result of the continued decline in vitality of the tree. This is likely to be a combination of the hard surfacing around the tree; the repeated dry Spring experienced over the last 3 years; tree age and initial colonisations. The lack of energy production as a result of declining vitality has reduced the tree's ability to defend its internal structures from increased colonisation. This has led to the rapid spread of degradation of timber within the tree.

The lack of suitable growth points within the tree crown; the generally accepted species characteristics that results in a limited ability for Beech to respond to pruning and the declining vitality all indicate that further reductions of this tree - and maintenance as a reduced specimen over time - is not appropriate. The removal of further photosynthetic material will accelerate decline simply by asking the tree to do yet more with even less resources. To try to repair wounds formed from pruning, manage decay, respond to general imposed decline with less energy from remaining leaves will precipitate rapid and final collapse of function.

Considering the targets present, the main A4 constantly busy with traffic, the occupation of these areas by staff and students and the significant and historic structures of the College, places a risk that is unacceptable.

The tree is inevitably going to decline further. As the decay increases there is a real likelihood of either total tree failure from the rootplate, or sectional collapse from the main unions.

Whilst these upper section collapses may be controlled to a degree by the cabling, this is by no means certain. Even if the main sections are held in the canopy, their outlying parts will reach buildings or the ground surrounding the tree.

Recommendation:
This tree should be felled without undue delay. The tree is not considered "imminently" dangerous and therefore the appropriate notice must be served on Wiltshire Council as the tree is within the Conservation Area of Marlborough.

A copy of this arboricultural opinion should accompany the notice as, due to the importance of this tree in the public realm, there is the potential for public concern over this decision.



T236 Black Pine (*Pinus nigra*)

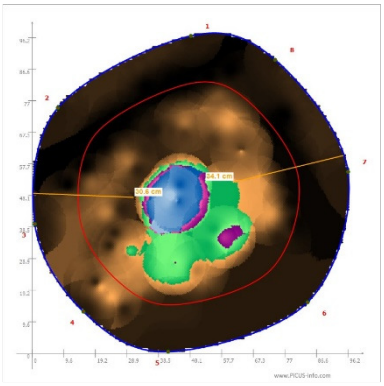
A mature tree some 18m tall with an average radial spread of 4m.



The tree grows in close mown grass and in a generally open tree scape.

A typical single stem specimen with whorls of branches developing in the mid to upper crown.

An open cavity at 4m SE has produced fruiting bodies of *Phaeolus schweinitzii* but these have not been produced recently. A newer bracket has appeared from 5.5m west and is associated with a slight seam in the trunk. Frass (dry desiccated wood dust) is appearing from the cavities. A bulge of functional wood has formed below this bracket.



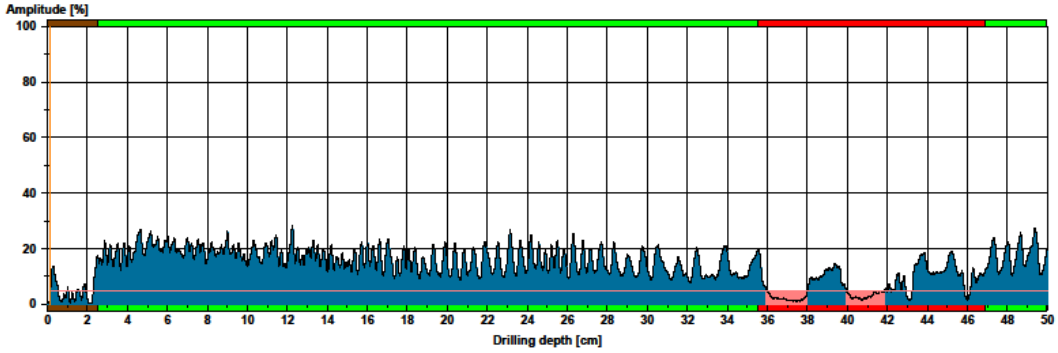
Tomography was undertaken just above the main opening where previous fruiting bodies have been produced. The results are shown below left. Hammer sounding above this, where the newer brackets can be seen, returned consistent tones. As a result a single resistance drill was undertaken to confirm the expected limited amounts of change in this area (see below *right*).

Measuring / object data

Measurement no.	7	Speed	1500 r/min	Diameter	80,00 cm
ID number	Marl Coll Pine FFB Wall	Needle state	---	Level	8m
Drilling depth	50,26 cm	Tilt	+1°	Direction	West
Date	19.12.2023	Offset	82 / 239	Species	Scot's Pine
Time	11:12:57	Avg. curve	off / off	Location	Masters Garden
Feed	100 cm/min			Name	Marlborough College

WoodInspector

Program	Standard
Mode	Full piercing
Start / stop	0,13 cm / 50,24 cm
Length	50,11 cm
Cavity	3,96 cm (7,9%)



Assessment

From	0,03 cm to	2,49 cm	Bark
From	2,49 cm to	35,51 cm	Wood
From	35,51 cm to	46,88 cm	Severe decay/cavity
From	46,88 cm to	49,97 cm	Wood

Comment

Drill reaches central decay/cavity at 35.5cm depth until 47cm. At 47cm the drill returns to drilling through annual growth rings.

Marl Coll Pine FFB Stem Wall at height M007#.rgp

Multiple lower branches have been removed historically. The majority show limited degradation and reasonable response growth.

Vitality is normal. Two adjacent Scots Pine have recently died, and this is most likely associated with Spring drought and the generally slight incompatible nature of this species in these soils.

Opinion:
The scan taken at the lower cavity opening, and drill reading taken at the upper fruiting point, shows a developing column of decay vertically but with a slow increase laterally. This leaves a tubular cross section with a very limited extent at the point of current fruiting. Currently the amounts of tube wall remaining intact is within the commonly accepted tolerances proposed by Claus Mattheck as being unlikely to affect structural integrity.

Whilst there is some debate in relation to the ratio proposed, there is no alternative accepted hollowing equation in the arboricultural industry. This tree, being of “median” size, fits in to the model and none of the questioned parameters are exceeded.

Recommendation:
No works are required to this tree at present. Continued inspection as per the Marlborough College Tree Policy should be maintained.

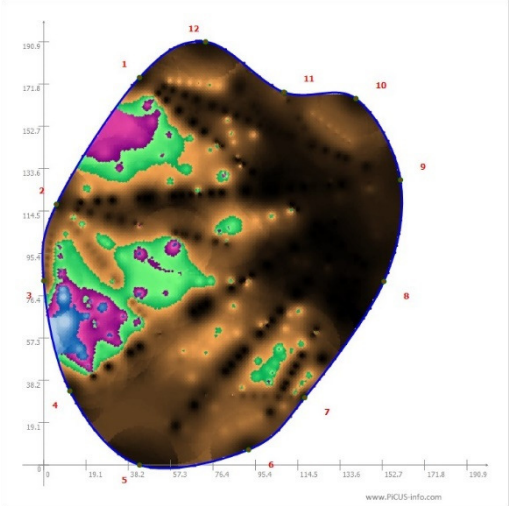


T324 Beech (*Fagus sylvatica*)

A mature tree some 24m tall with an average radial spread of 6-7m. The tree has a slight asymmetry to the west due to the presence of other mature trees in this tree group.

The tree is growing in mown grass in a linear group of trees between the tennis courts and the access to the pavilion for the athletics track. Bramble grows around the base.

The buttress is a typical flared and extensive structure of a mature Beech. The basal scan shows a "decay pocket" between measuring points 1 and 2. This is an obvious buttress valley. Similarly the green areas at point 7 is a tighter area between buttress spurs due to form.



The tree has several emerging and established fruiting bodies of *Ganoderma australe /applanatum* between the buttresses to the south and north. Hammer tones remain constant around the tree with a slight change to the south west. This is the area where previous fruiting bodies have emerged.

Tomography was undertaken at 200mm above ground level which was still within the flared buttress region.

There are two large wounds on the main stem, at approximately 7m and 154m from larger historic limb failures. No fruiting bodies are visible around these areas and wound wood response growth is significant, particularly at the higher wound. There is no stem swelling response growth on the main stems associated with these wounds.

The vitality of the tree is normal for age and species.

OPINION:
The scan shows that there is only a limited area of decaying wood within the cross-sectional area. This is on the compression side of the tree. As broadleaves produce most compensation growth to load in tension there is limited effect on structure.

Recommendations:
No works are required to this tree at present. Continued inspection as per the Marlborough College Tree Policy should be maintained.