ARTEMIS TREE SERVICES

Site
The Lakes,
Belfry Avenue,
Harefield,
UB9 6HY

Prepared for
Mary Strachan

Prepared by
Oliver Coleman
FdSc Arb, DipHE Arb L5

25th July 2024

Decay Detection DD-31320

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ARTEMIS TREE SERVICES

Table of Contents

1. Brief

1.1 Artemis Tree Services ltd has been instructed by Mary Strachan to undertake decay detection investigation of one Beech (*Fagus sylvatica*) tree using a Resistograph PD400 microdrill and provide recommended management actions based on our findings.

1.2 The investigation has been promoted by the discovery of a cavity formation at the base of the trunk.

2. Report limitations

2.1 Climbing inspections have not been carried out as part of the investigation.

2.2 Conclusions and recommendations relate to the condition of the site and tree at the time of the inspection only. Comments valid for a period of 1-year from the date of this report.

2.3 By their very nature, trees can never be entirely free of risk. The laws and forces of nature dictate a failure rate, even among intact trees with no apparent defects. The recommendations in this report cannot guarantee the elimination of all risk.

2.4 The report does not include risk assessment of trees in relation to subsidence.

3. Introduction

3.1 Qualifications

3.1.1 I hold an FdSc in Arboriculture from Northampton University and Level 5 HE Diploma in Arboriculture from Moulton College. I have also passed the Lantra Professional Tree Inspection course (PTI).

3.2 Site Description

3.2 The site is a private residential property with the tree located in the rear garden to the North.

3.3 Trees

3.3.1 The tree in question is one Beech (*Fagus sylvatica*). Full tree details and observations from the initial visual assessment are recorded in Appendix 1.

3.3.2 It should be noted that previous fungal fruiting bodies have been located by the client around the rooting area to the south-west of the tree.

4. Methodology

4.1 Decay detection was undertaken using a Resistograph Resi-PD400 microdrill. The Resi-PD400 accurately measures the drilling and feed resistance along a needle as it is inserted at a constant rate into the wood of a tree. This enables small changes of internal wood structure to be detected. Readings from each drilling can be found in Appendix 2 of this report.

4.2 Tree height was recorded using a Haglofs Digital Clinometer and laser distance measurement device. Stem diameter measurement was recorded using a diameter measuring tape.

5. Documents provided

- Tree survey schedule (Appendix 1.)
- Resistograph drill readings (Appendix 2.)

6. Findings

6.1 Decay detection

6.1.1 The tree was drilled a total of 12 times. It was drilled at the cardinal and intercardinal points at 0.05cm above ground level. It was then drilled at the cardinal points at 0.5m above ground level.

6.1.2 Tables 1 provides an interpretation of the readings. The reading graphs are included in Appendix 2.

Table 1

Tree ref.	Drill no.	Position	Interpretation
T1	1	0.05m North	Typical amplitude for sound wood up to 17cm depth. Drops in amplitude at 17-23.75cm indicating areas of decay. Significant drop in amplitude from 23.75-40cm depth indicates cavity formation.
T1	2	0.05m North East	Typical amplitude for sound wood up to 28cm depth. Drops in amplitude at 28-29cm, 32-34.5cm and 35-37cm depths indicating initial stages of decay. Drops in amplitude 34.5-35cm and 37-39.5cm depths indicating advanced decay.
T1	3	0.05m East	Typical amplitude for sound wood up to 38.2cm depth. Drop in amplitude at 38.2-40cm depth indicating advanced decay/hollowing.
T1	4	0.05m South East	Typical amplitude for sound wood up to 40cm depth.
T1	5	0.05m South	Typical amplitude for sound wood up to 21.75cm depth. Significant drop in amplitude from 21.75-40cm indicating advanced decay/hollowing.
T1	6	0.05m South West	Typical amplitude for sound wood up to 23cm depth. Drops in amplitude at 23-28.5cm, 29.5-30.75cm, 31.5-32.5cm, 35.5-36.5cm depths indicating areas of decay. Significant drop in amplitude at 39-40cm depth indicating advanced decay/hollowing.
T1	7	0.05m West	Typical amplitude for sound wood up to 2cm depth. Significant drop in amplitude at 2-15.2cm depth indicating cavity formation.
T1	8	0.05m North West	Typical amplitude for sound wood up to 14cm depth. Slight drop in amplitude at 14-19.5cm indicating areas of initial stage decay. Further drop in amplitude from 22-32.5cm indicating advanced decay/hollowing.
T1	9	0.5m North	Typical amplitude for sound wood up to 20cm depth. Significant drop in amplitude at 20-40cm depth indicating cavity formation.

Tree ref.	Drill no.	Position	Interpretation
T1	10	0.5m East	Typical amplitude for sound wood up to 6cm depth. Slight drops in amplitude at 6-8.5cm and 18-20cm indicating areas of initial stage decay. Further drops in amplitude from 20-40cm indicating advanced decay/hollowing.
T1	11	0.5m South	Typical amplitude for sound wood up to 16.75cm depth. Slight drop in amplitude at 16.75cm-18cm indicating area of initial stage decay. Further drops in amplitude from 18-40cm indicating advanced decay/hollowing.
T1	12	0.5m West	Typical amplitude for sound wood up to 2cm depth. Significant drops in amplitude from 2-6.5cm, 13.5-14.5cm and 16.5-40cm indicating advanced decay/hollowing.

7. Analysis

7.1 The diameter of the tree (102cm) is larger than the depth possible to measure to with the machinery (40cm radius), however a visual inspection of the cavity opening on the west side of the trunk confirmed that the heartwood has been compromised and has areas of decay/hollowing up and down into the stem.

7.2 Using Mattheck and Breoler's "t/R ratio", which suggests that a tree should have a minimum of 33% holding wood across the radius of the stem, tree T1 should have a minimum of 33.6cm sound wood around the outside of the stem.

7.3 From the readings tree T1 has approximately 50% remaining sound wood at 0.05m from ground level, however there is noticeable visible degradation of the underside of the buttress roots on the west side of the stem.

7.4 From the readings tree T1 has approximately 13-15% remaining sound wood at 0.5m from ground level (measurements 9-12).

8. Conclusions

8.1 The tree has less than 33% recommended holding wood at 0.5m and given the fungal fruiting bodies decay strategy, poses a risk of fracture at the base of the tree.

8.2 Following the decay detection investigation, it is my opinion that the tree currently poses a moderate to high risk of harm to people and property due to the extent of decay and proximity to buildings and public access areas.

9. Recommendations

9.1 Remove the tree as close to ground as possible.

Appendix 1

ARTEMIS TREE SERVICES

Tree Ref.	Species	Height (m)	Stem diameter (cm)	Crown spread (m)	Age class	Physiological condition	Structural condition	Observations
T1	Lime (*Tilia* Sp.)	18	102	16	M	F	F/P	Basal cavity on W side of stem probed to 91cm horizontally. Decay of buttress root to SW and audible hollowing under the bark at base on NW and N sides of stem. Cluster of young fungal fruiting bodies 2.5m from stem to W with appearance of *Perreniporia fraxinea*. Browning of foliage and apical dieback of branch tips in upper crown and lower crown to E and W. Some minor deadwood in lower and inner crown.

Appendix 1

ARTEMIS TREE SERVICES

Survey Key

Diameter (mm)
Stem diameter in millimetres measured at 1.5m above ground level. Where the stem is divided below 1.5m, measurement is taken as directed by BS:5837 Annex C.

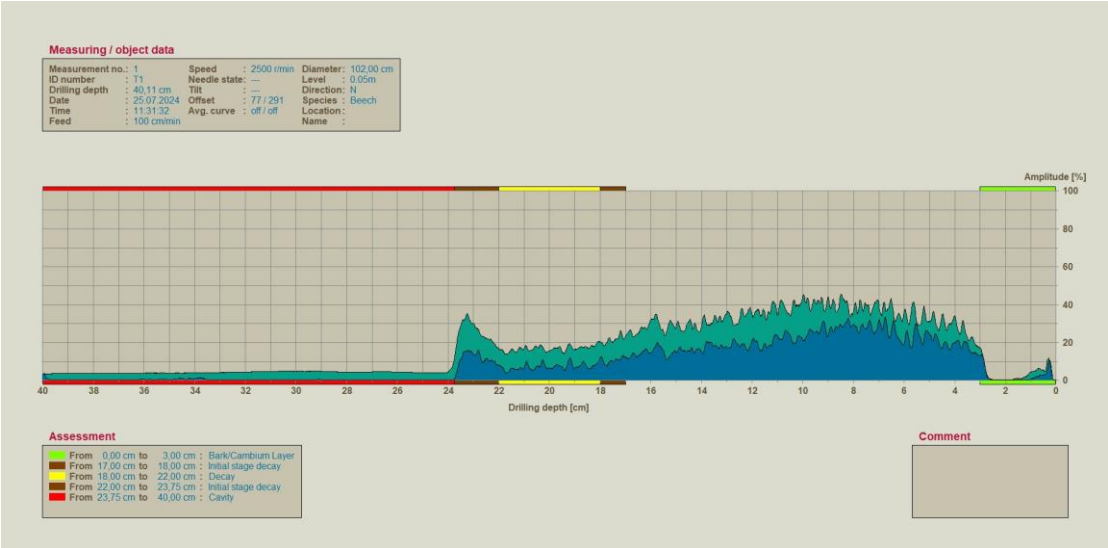
Branch Spread (m)
Radial crown spread in metres, measured for each of the four cardinal points of the compass from the centre of the trunk.

Age class
(NP) Newly planted – a tree within 3 years after planting
(Y) Young – a tree within its first one third of life expectancy
(EM) Early Mature – a tree within its second third of life expectancy
(M) Mature – a tree in its final one third of life expectancy
(OM) Over Mature – a tree having reached its maximum life span and is declining in health and size due to old age
(V) Veteran – a tree in the second or mature stage of its life and has important wildlife and habitat features including; hollowing or associated decay fungi, holes, wounds and large dead branches.
(A) Ancient – a tree in the ancient or third and final stage of their life that is of interest biologically, aesthetically or culturally because of its age, size and condition

Physiological Condition
GOOD – a tree in a healthy condition with no significant problems
FAIR – a tree generally in good health with some problems that can be remediated
POOR – a tree in poor health with significant problems that cannot be remediated
DEAD – a tree without sufficient live material to sustain life

Structural Condition
An assessment of the structural/safe condition of the tree categorised into:
GOOD – a tree in a safe condition with no significant defects
FAIR – a tree in a safe condition at present but with defects or with significant defects that can be remediated
POOR – a tree with significant defects that cannot be remediated.

Appendix 2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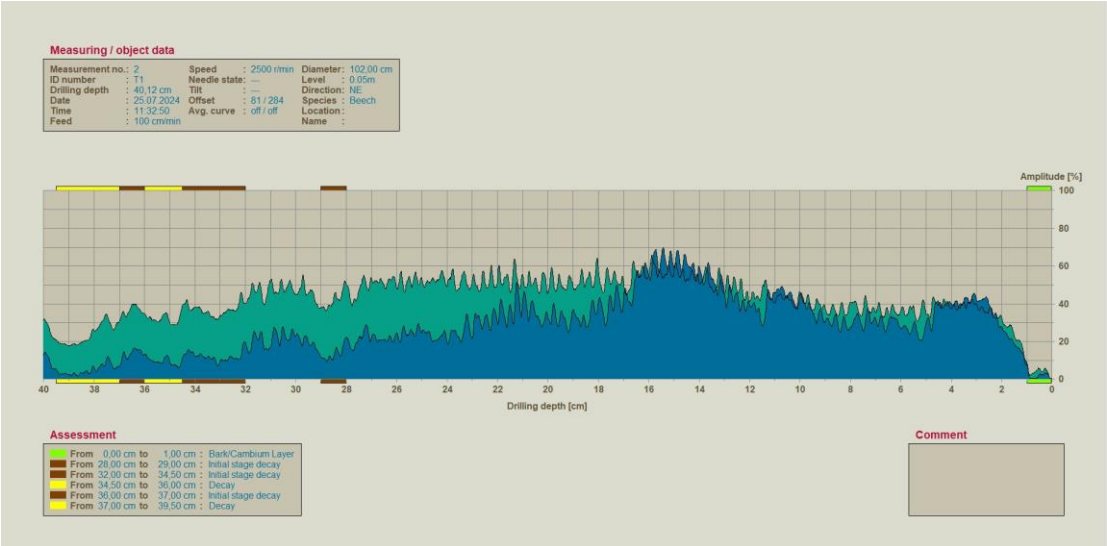
Speed : 2500 r/min
Needle state: ---
Tilt : ---
Offset : 77 / 291
Avg. curve : off / off
Diameter: 102,00 cm
Level : 0.05m
Direction: N
Species : Beech
Location :
Name :
Amplitude [%]
Drilling depth [cm]
Assessment
From 0,00 cm to 3,00 cm : Bark/Cambium Layer
From 17,00 cm to 18,00 cm : Initial stage decay
From 18,00 cm to 22,00 cm : Decay
From 22,00 cm to 23,75 cm : Initial stage decay
From 23,75 cm to 40,00 cm : Cavity
Comment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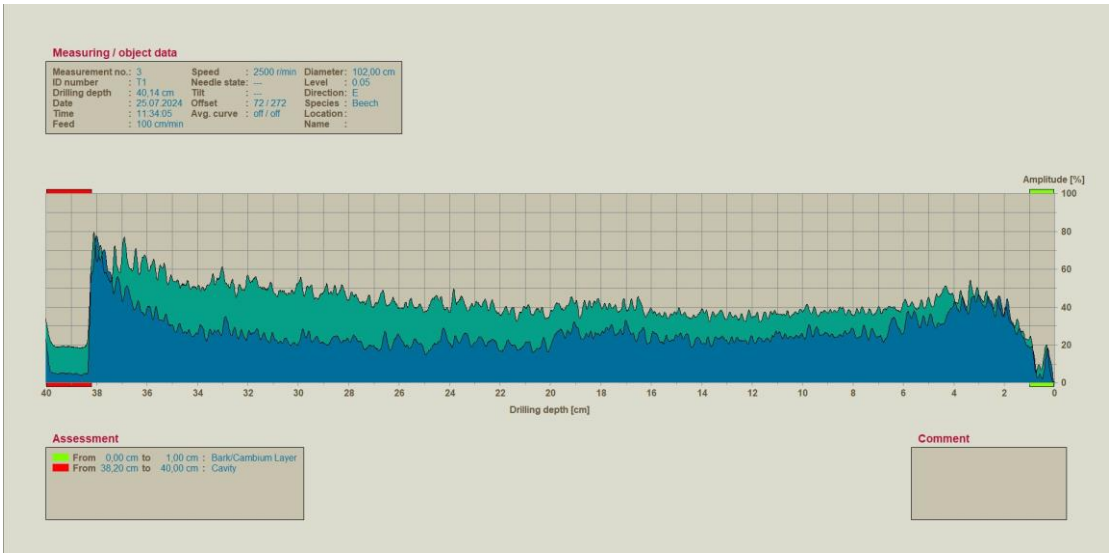
Date : 25.07.2024
Time : 11:32:50
Feed : 100 cm/min
Speed : 2500 r/min
Needle state: ---
Tilt : ---
Offset : 81 / 284
Avg. curve : off / off
Diameter: 102,00 cm
Level : 0.05m
Direction: NE
Species : Beech
Location :
Name :
Amplitude [%]
Drilling depth [cm]
Assessment
From 0,00 cm to 1,00 cm : Bark/Cambium Layer
From 28,00 cm to 29,00 cm : Initial stage decay
From 32,00 cm to 34,50 cm : Initial stage decay
From 34,50 cm to 36,00 cm : Decay
From 36,00 cm to 37,00 cm : Initial stage decay
From 37,00 cm to 39,50 cm : Decay
Comment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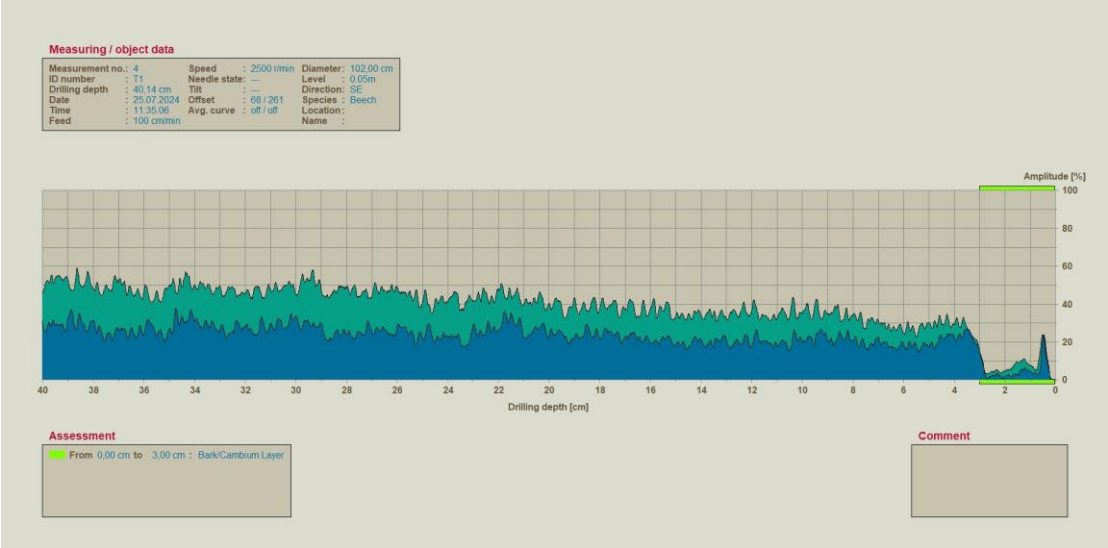
Speed : 2500 r/min
Needle state: ---
Tilt : ---
Offset : 72 / 272
Avg. curve : off / off
Diameter: 102,00 cm
Level : 0.05
Direction: E
Species : Beech
Location :
Name :
Amplitude [%]
Drilling depth [cm]
Assessment
From 0,00 cm to 1,00 cm : Bark/Cambium Layer
From 38,20 cm to 40,00 cm : Cavity
Comment

Appendix 2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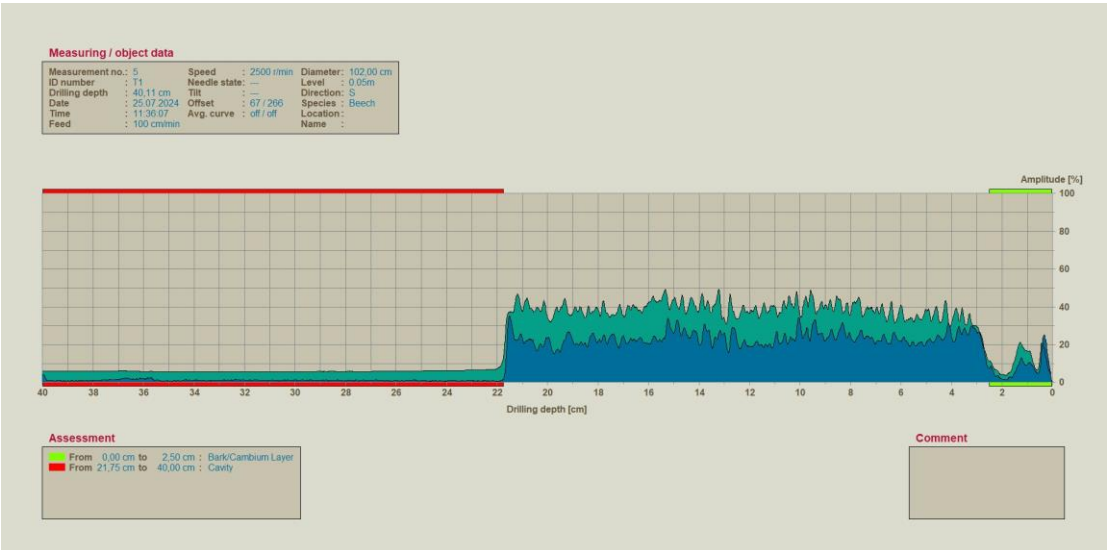
Date : 25.07.2024
Time : 11:35:06
Feed : 100 cm/min
Speed : 2500 r/min
Needle state: ---
Tilt : ---
Offset : 68 / 261
Avg. curve : off / off
Diameter: 102,00 cm
Level : 0.05m
Direction: SE
Species : Beech
Location :
Name :
Amplitude [%]
Drilling depth [cm]
Assessment
From 0,00 cm to 3,00 cm : Bark/Cambium Layer
Comment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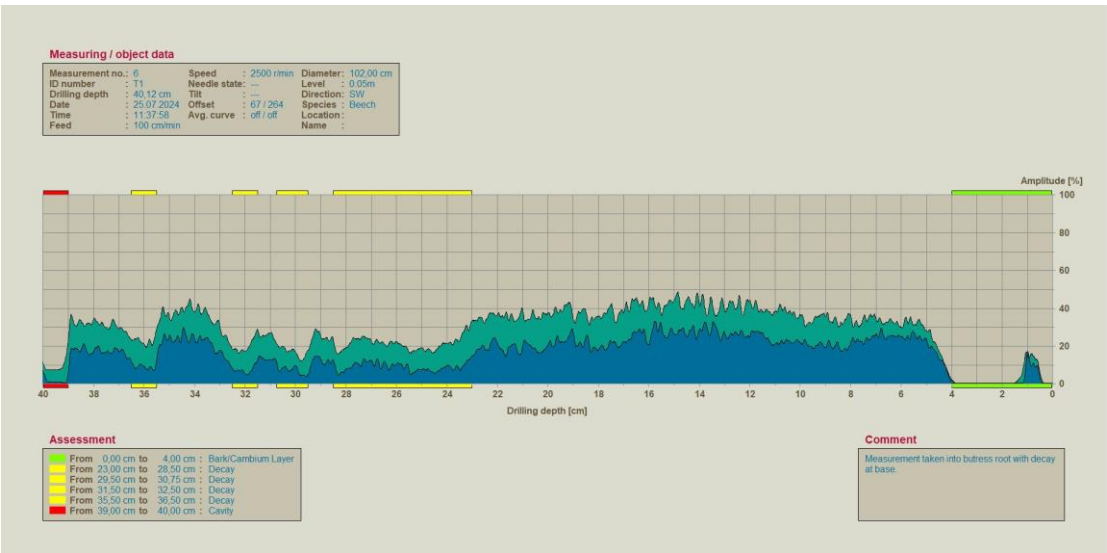
Needle state: ---
Tilt : ---
Offset : 67 / 266
Avg. curve : off / off
Diameter: 102,00 cm
Level : 0.05m
Direction: S
Species : Beech
Location :
Name :
Amplitude [%]
Drilling depth [cm]
Assessment
From 0,00 cm to 2,50 cm : Bark/Cambium Layer
From 21,75 cm to 40,00 cm : Cavity
Comment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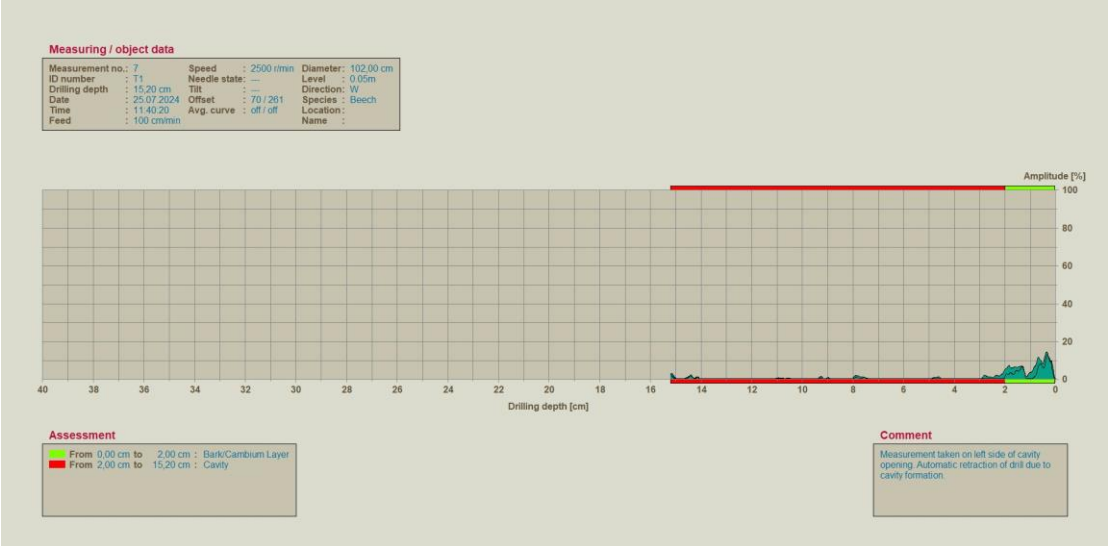
Tilt : ---
Offset : 67 / 264
Avg. curve : off / off
Diameter: 102,00 cm
Level : 0.05m
Direction: SW
Species : Beech
Location :
Name :
Amplitude [%]
Drilling depth [cm]
Assessment
From 0,00 cm to 4,00 cm : Bark/Cambium Layer
From 23,00 cm to 28,50 cm : Decay
From 29,50 cm to 30,75 cm : Decay
From 31,50 cm to 32,50 cm : Decay
From 35,50 cm to 36,50 cm : Decay
From 39,00 cm to 40,00 cm : Cavity
Comment
Measurement taken into butress root with decay at base.

Appendix 2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Measurement no.: 7
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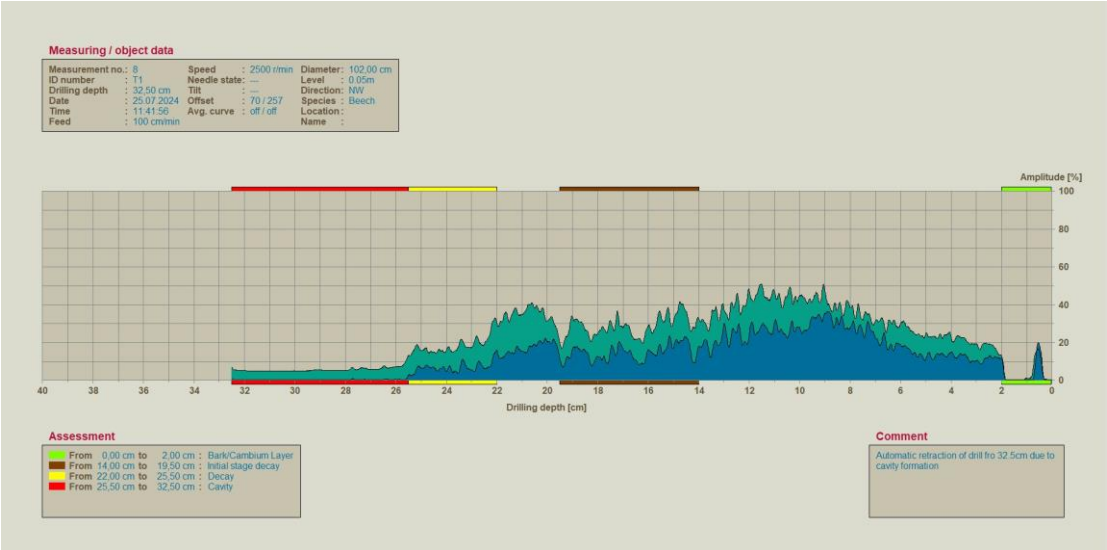
Drilling depth : 15,20 cm
Date : 25.07.2024
Time : 11:40:20
Feed : 100 cm/min
Speed : 2500 r/min
Needle state: ---
Tilt : ---
Offset : 70 / 261
Avg. curve : off / off
Diameter: 102,00 cm
Level : 0.05m
Direction: W
Species : Beech
Location :
Name :
Amplitude [%]
100
80
60
40
20
0
40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
Drilling depth [cm]
Assessment
From 0,00 cm to 2,00 cm : Bark/Cambium Layer
From 2,00 cm to 15,20 cm : Cavity
Comment
Measurement taken on left side of cavity opening. Automatic retraction of drill due to cavity formation.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ID number : T1
Drilling depth : 32,50 cm
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Time : 11:41:56
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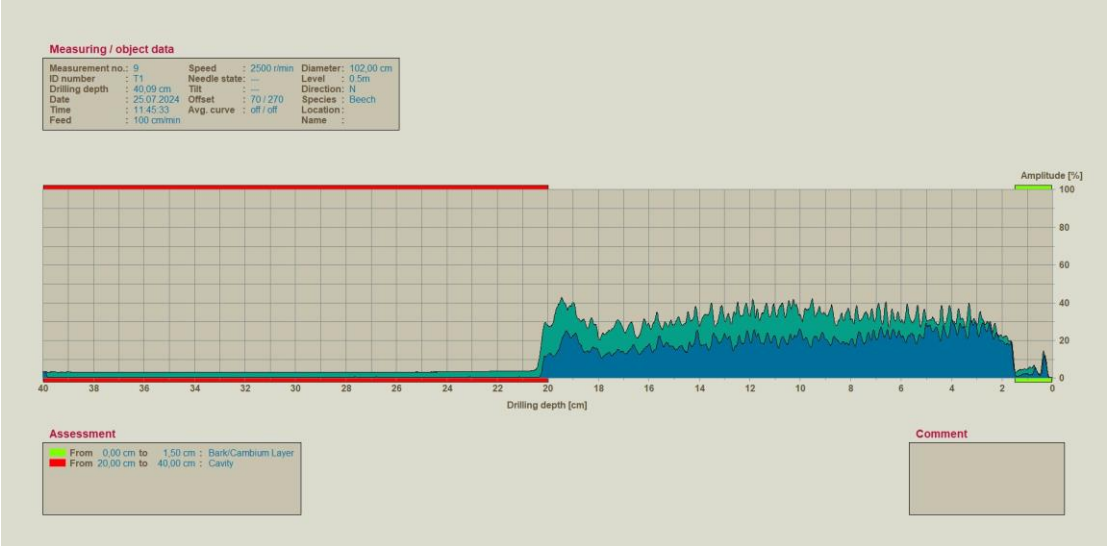
Speed : 2500 r/min
Needle state: ---
Tilt : ---
Offset : 70 / 257
Avg. curve : off / off
Diameter: 102,00 cm
Level : 0.05m
Direction: NW
Species : Beech
Location :
Name :
Amplitude [%]
100
80
60
40
20
0
40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
Drilling depth [cm]
Assessment
From 0,00 cm to 2,00 cm : Bark/Cambium Layer
From 14,00 cm to 19,50 cm : Initial stage decay
From 22,00 cm to 25,50 cm : Decay
From 25,50 cm to 32,50 cm : Cavity
Comment
Automatic retraction of drill fro 32.5cm due to cavity formation

Appendix 2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Drilling depth : 40,09 cm
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Time : 11:45:33
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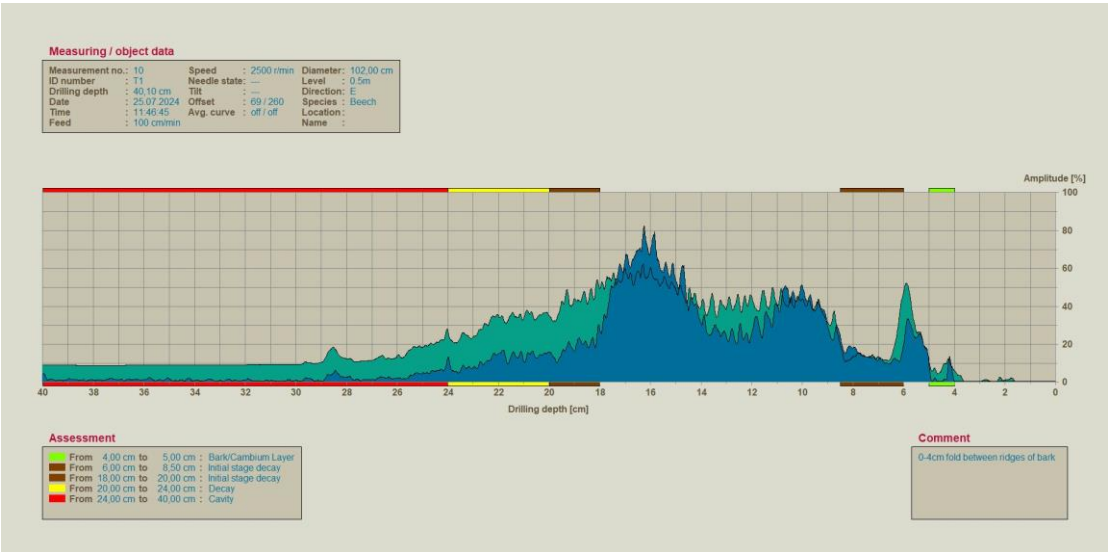
Speed : 2500 r/min
Needle state: ---
Tilt : ---
Offset : 70 / 270
Avg. curve : off / off
Diameter: 102,00 cm
Level : 0.5m
Direction: N
Species : Beech
Location :
Name :
Amplitude [%]
100
80
60
40
20
0
40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
Drilling depth [cm]
Assessment
From 0,00 cm to 1,50 cm : Bark/Cambium Layer
From 20,00 cm to 40,00 cm : Cavity
Comment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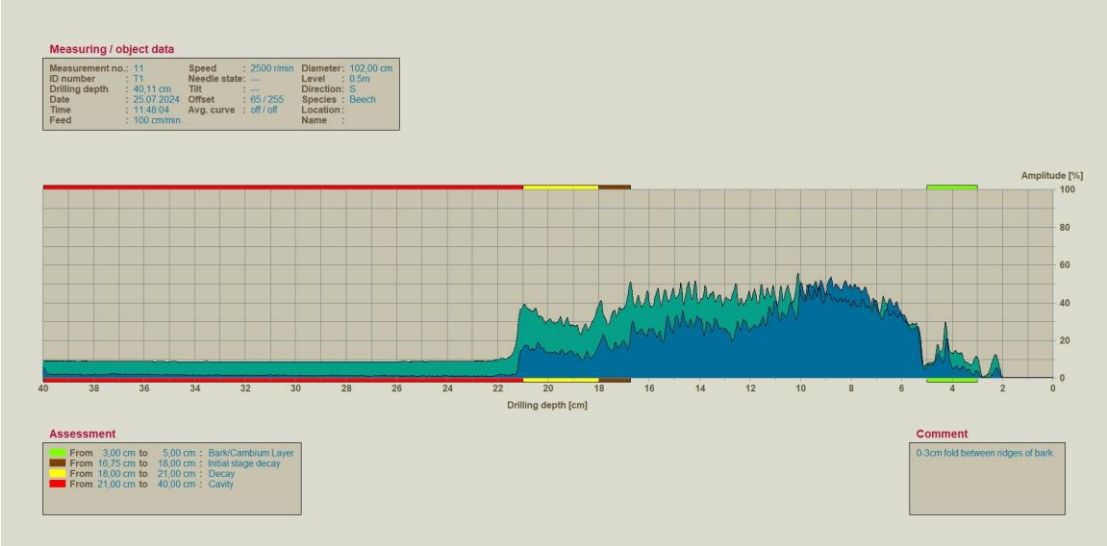
ID number : T1
Drilling depth : 40,10 cm
Date : 25.07.2024
Time : 11:46:45
Feed : 100 cm/min
Speed : 2500 r/min
Needle state: ---
Tilt : ---
Offset : 69 / 260
Avg. curve : off / off
Diameter: 102,00 cm
Level : 0.5m
Direction: E
Species : Beech
Location :
Name :
Amplitude [%]
100
80
60
40
20
0
40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
Drilling depth [cm]
Assessment
From 4,00 cm to 5,00 cm : Bark/Cambium Layer
From 6,00 cm to 8,50 cm : Initial stage decay
From 18,00 cm to 20,00 cm : Initial stage decay
From 20,00 cm to 24,00 cm : Decay
From 24,00 cm to 40,00 cm : Cavity
Comment
0-4cm fold between ridges of bark

Appendix 2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Speed : 2500 r/min
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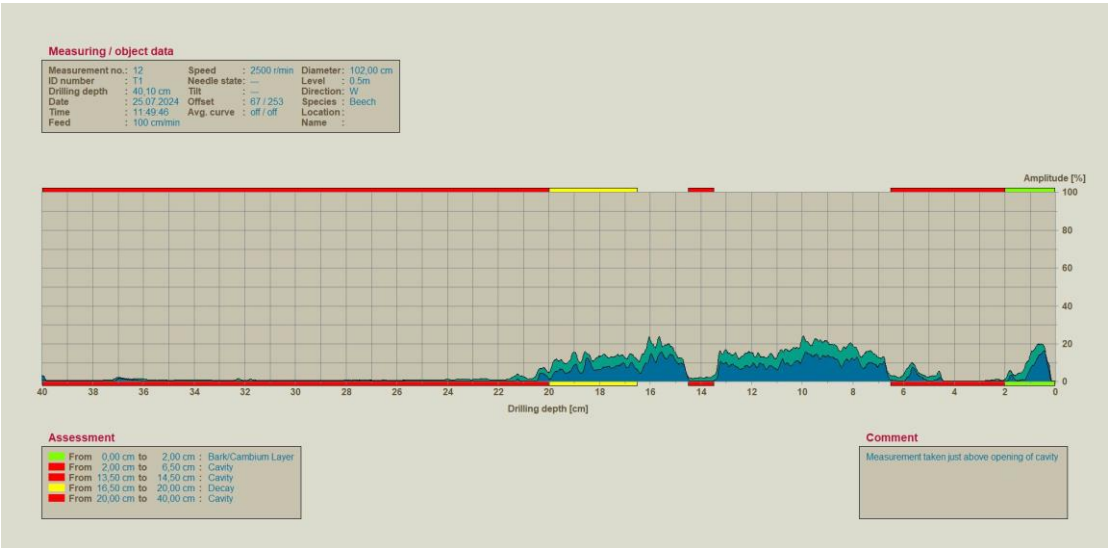
Avg. curve : off / off
Diameter: 102,00 cm
Level : 0.5m
Direction: S
Species : Beech
Location :
Name :
Amplitude [%]
100
80
60
40
20
0
40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
Drilling depth [cm]
Assessment
From 3,00 cm to 5,00 cm : Bark/Cambium Layer
From 16,75 cm to 18,00 cm : Initial stage decay
From 18,00 cm to 21,00 cm : Decay
From 21,00 cm to 40,00 cm : Cavity
Comment
0-3cm fold between ridges of bark.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Time : 11:49:46
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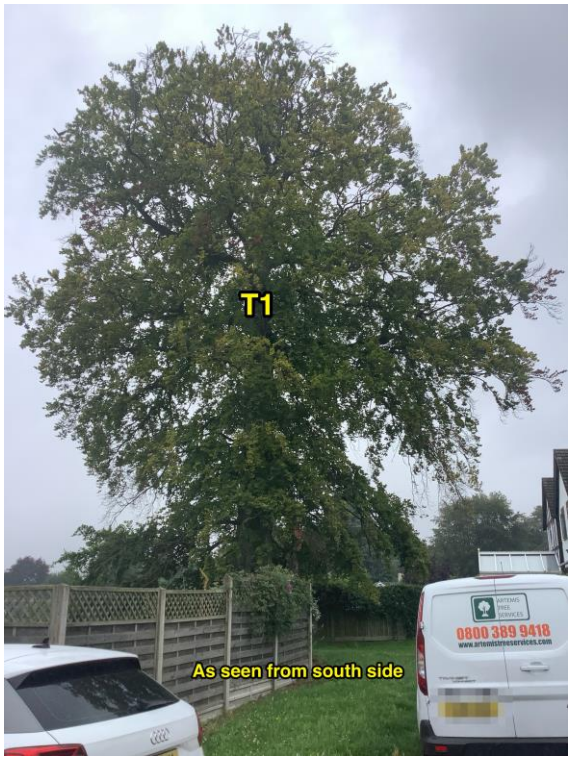
Speed : 2500 r/min
Needle state: ---
Tilt : ---
Offset : 67 / 253
Avg. curve : off / off
Diameter: 102,00 cm
Level : 0.5m
Direction: W
Species : Beech
Location :
Name :
Amplitude [%]
100
80
60
40
20
0
40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
Drilling depth [cm]
Assessment
From 0,00 cm to 2,00 cm : Bark/Cambium Layer
From 2,00 cm to 6,50 cm : Cavity
From 13,50 cm to 14,50 cm : Cavity
From 16,50 cm to 20,00 cm : Decay
From 20,00 cm to 40,00 cm : Cavity
Comment
Measurement taken just above opening of cavity

Appendix 2


T1
As seen from south side


Cavity opening


Decay on underside of buttress root to SW


Young fungal fruiting bodies (Possible Perreniporia fraxinea)

Appendix 3

Document record

Document	Editor	Date
DD-31320	Oliver Coleman	26/07/2024