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24th July 2020

4 Manor Road Ltd.
Byne Cottage
Manley's Hill
Storrington,
West Sussex,
RH20 4BN

Dear Sir/Madam,

Copper Beech Tree at 4 Manor Road Teddington – Decay Investigation

I visited the site to carry out a decay Investigation on 23rd June 2020.

I used a Picus tomogram and an IML Resi-500 decay detection drill.

The tomogram is created using a specialist device and associated software. The measuring points are distributed around the stem to explore the shape of the stem. Nails are lightly driven through the bark, so sound is transmitted through the heartwood. Sensors are attached to each nail and each nail is tapped with a special hammer to send timed sound pulses through the tree stem. The nails are necessary because sound does not transmit well through the bark and there can be gaps beneath the bark that would prevent sound transmission. These nails are numbered with plastic tags so that they are measured in the correct sequence and these can be seen in the photographs.

The software generates the stem shape based on measurements from a digital calliper.

The tomogram images are created by modelling the velocity of sound transmission between all the measuring points around the stem. The brown and green areas of the tomogram show where the sound transmission is reasonable and the pink and blue areas indicate where the sound transmission took longer than expected and can indicate decay or a cavity but a crack that prevents sound transmission can appear as a cavity because it creates a 'sound shadow'.

Picus Tomography does not give accurate images of decay for the reasons stated above. Therefore, it is useful to test the results where decay is indicated by tomography with a more precise method. Usually the results are checked with decay detection drills and I used an IML Resi-500 drill. Drilling is a destructive method that may lead to more decay in future, so it is only used where it is necessary, on trees with decay. The Resi drill gives a recording of the energy required to drill (resistance) in green and the feed force (penetration force) in blue.

Tree Evaluation

I have attached a location plan from google earth to show the approximate position of the trees I examined in Appendix 1.

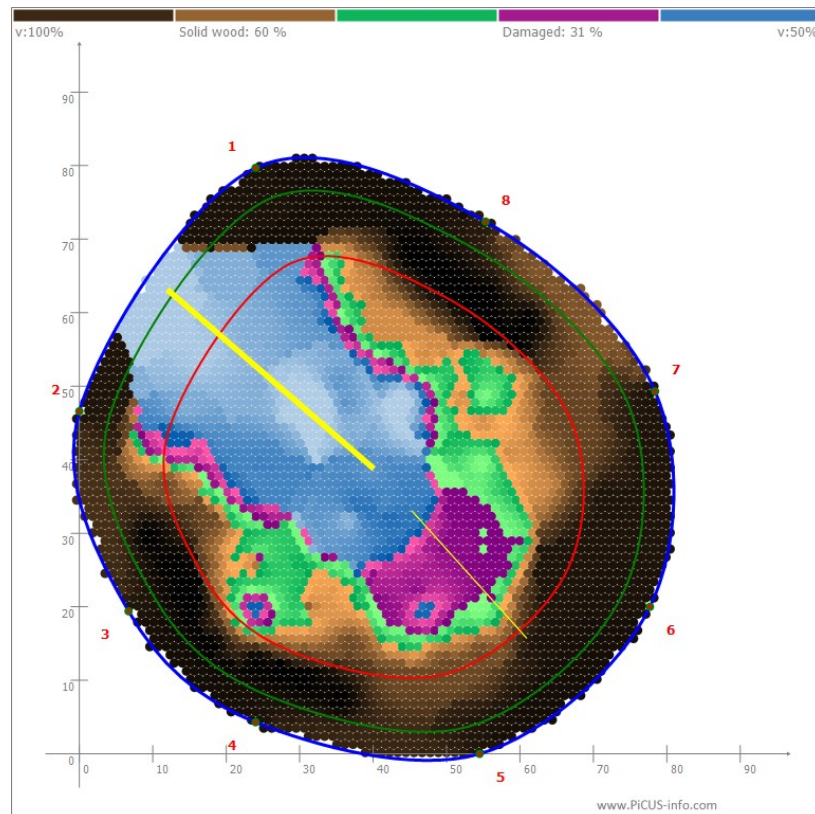
T1 Copper Beech

The tree has a basal cavity on the Northwest side of the tree adjacent to the boundary wall. There was a detached Ganoderma bracket fungus on the ground near the cavity (Species provisionally identified as *G. adspersum* or *G. applanatum*). The decay by these species can cause mechanical failure but the partially decayed wood retains considerable tensile strength.

The tree was tested with the Picus Tomogram at approximately 5cm above ground level. The tomogram image is inserted below.

The decay in the stem at these levels was tested with the Resi decay detection drill. The Resi traces are appended in Appendix 3.2.

The Tomogram shows that the 1/3 radius is approximately 13cm and the minimum perimeter of sound wood in the trunk needed to support this tree (using the calculated forces from) the tree dimensions is approximately 5 cm.



Tree T1: Tomogram at 5cm above ground level

Notes on tomogram images

- Yellow lines are where the software estimates crack positions that might give the observed decay pattern
- Red line is 2/3 stem radius.
- Green Line is calculated minimum perimeter thickness for this species and this size of tree.

The Resi Results show the following minimum sound wood in the perimeter of the tree trunk. These are more accurate than the Picus tomogram.

Table of Resi Results		
Level of Resi Test	Position on stem	Approximate perimeter of reasonable wood
5cm	MP01	18.5cm
5cm	MP04	11.5cm
5cm	MP05	11.4cm
5cm	MP06	9.5cm
5cm	MP07	9cm
5cm	MP08	12cm
5cm 45 Degrees	MP01	17cm
5cm 45 Degrees	MP02	14.8cm
5cm 45 Degrees	MP03	14.5cm
5cm 45 Degrees	MP05	11cm
5cm 45 Degrees	MP06	14.5cm

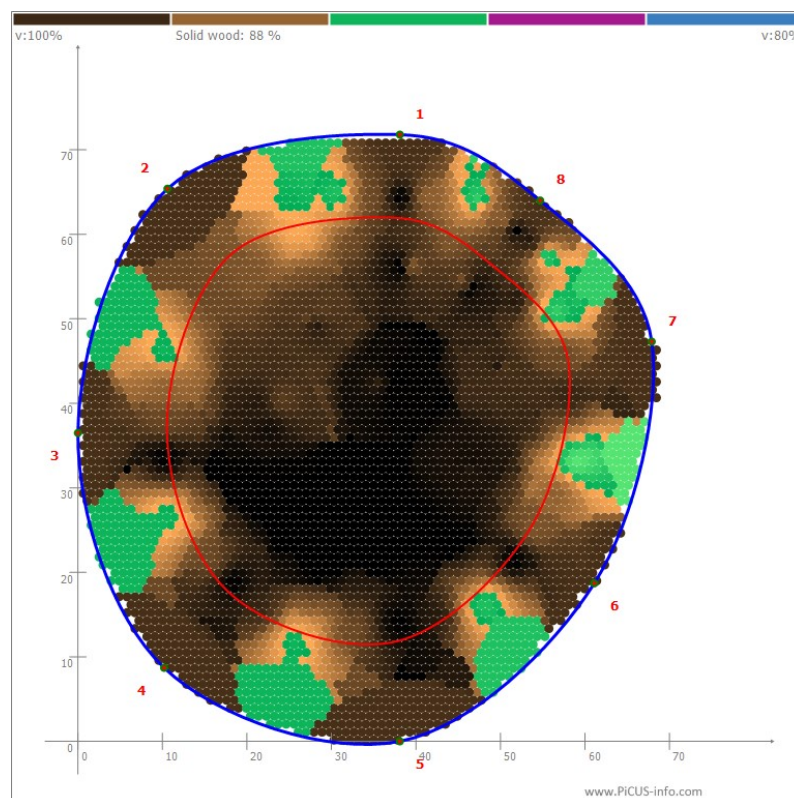
The perimeter of wood meets or exceeds the minimum (5cm). There is frequently a smaller perimeter of wood than the 1/3 radius (13cm) except MP01 and MP05 (45 degrees). The angled measurements are not necessarily perpendicular to the stem perimeter and so that might be why the diameters are larger. Importantly the 45 degree measurements do not indicate that the decay is more severe below ground level.

The tree stem has sufficient perimeter of sound wood to support the stem, so I do not think there is a risk of stem failure at present.

If the tree is retained the decay should be assessed again in three years' time to monitor the spread of decay and the tree's stem-growth response. It is important to carry on the regular crown reduction work as the smaller tree size is important to reduce the perimeter of wood in the stem required to support the stem. I estimate the trees were pruned in early 2019 and depending on the growth rate T1 will need to be reduced again in 2022-2024. The tree should be pruned again before it reaches 14m in height, 7m crown radius (approximately).

T2 Copper Beech

There was no decay indicated at 8cm above ground level.



Tree T1: Tomogram at 8cm above ground level

Informative statements

Trees and shrubs are living organisms whose health and condition can change rapidly. The health, condition and safety of trees should be checked on a regular basis proportionate to their condition and any risks. The conclusions and recommendations in this report can only be valid for a reasonably foreseeable period, usually one year. These periods of validity may alter if there are any changes to a tree's environment from landscaping or construction for example.

The Wildlife and Countryside Act 1981 (as amended), the Conservation (natural habitats etc.) Regulations 1994, and the Countryside and Rights of Way Act 2000 provide protection for many species of animal that live within trees. This includes birds and bats. If any tree works affect protected species, then this could be a criminal offence. The absence of any protected species should be confirmed before undertaking any tree works.

I believe the trees are included in a Tree Preservation Order. If so, the Local Planning Authority must be consulted before carrying out any tree work and the appropriate procedures followed.

If you need any further information or assistance, please do not hesitate to contact me.

Yours sincerely,

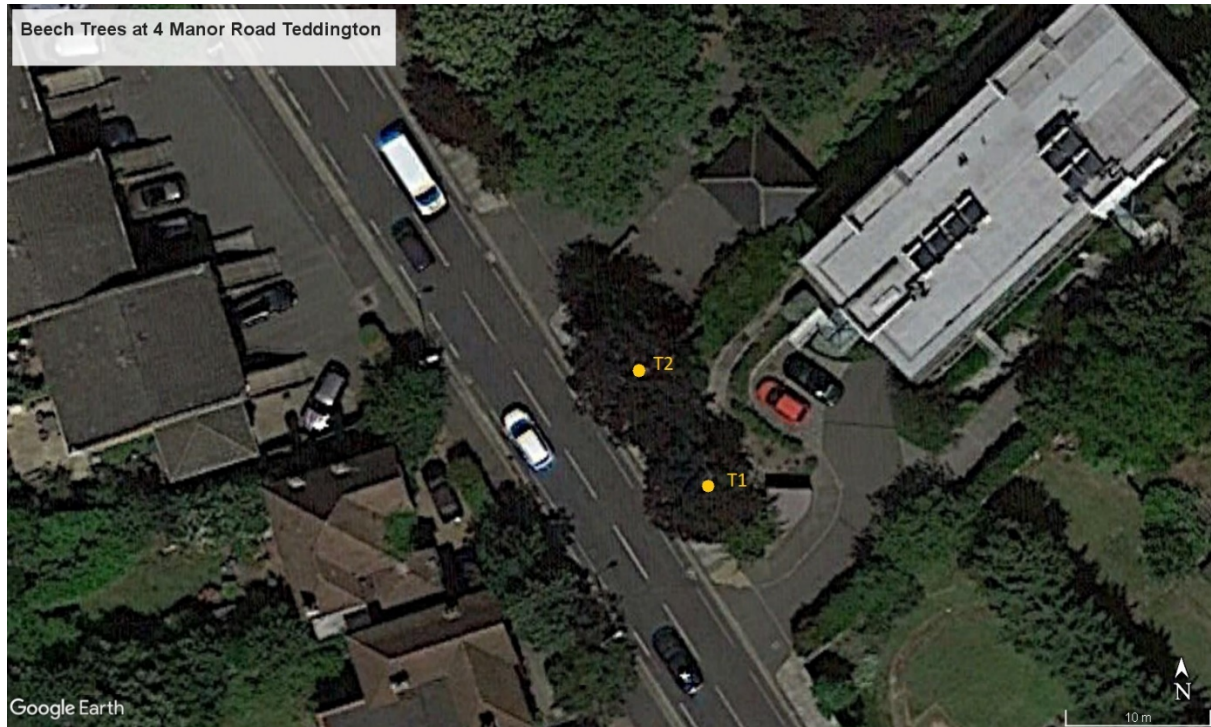


Peter Holloway BSc (Hons), FArborA, CEnv.

References:

- i. Principles of Tree Hazard Assessment and Management, David Lonsdale, The Stationery Office, 1999.**
- ii. Manual of Tree Statics & Tree Inspection, Lothar Wessolly & Martin Erb, Patzer Verlag 2016.**

Appendix 1: Google Earth Images with tree positions in yellow.



Appendix 2: Tree Photographs



Photo 1: Photo of T1, Copper Beech



**Photo 2: T1 Copper Beech
Detached Ganoderma bracket and decay cavity**



Photo 3: Photo of T2, Copper Beech

Appendix 3.1 Picus Tomogram Report for T1

Picus: Richmond Teddington

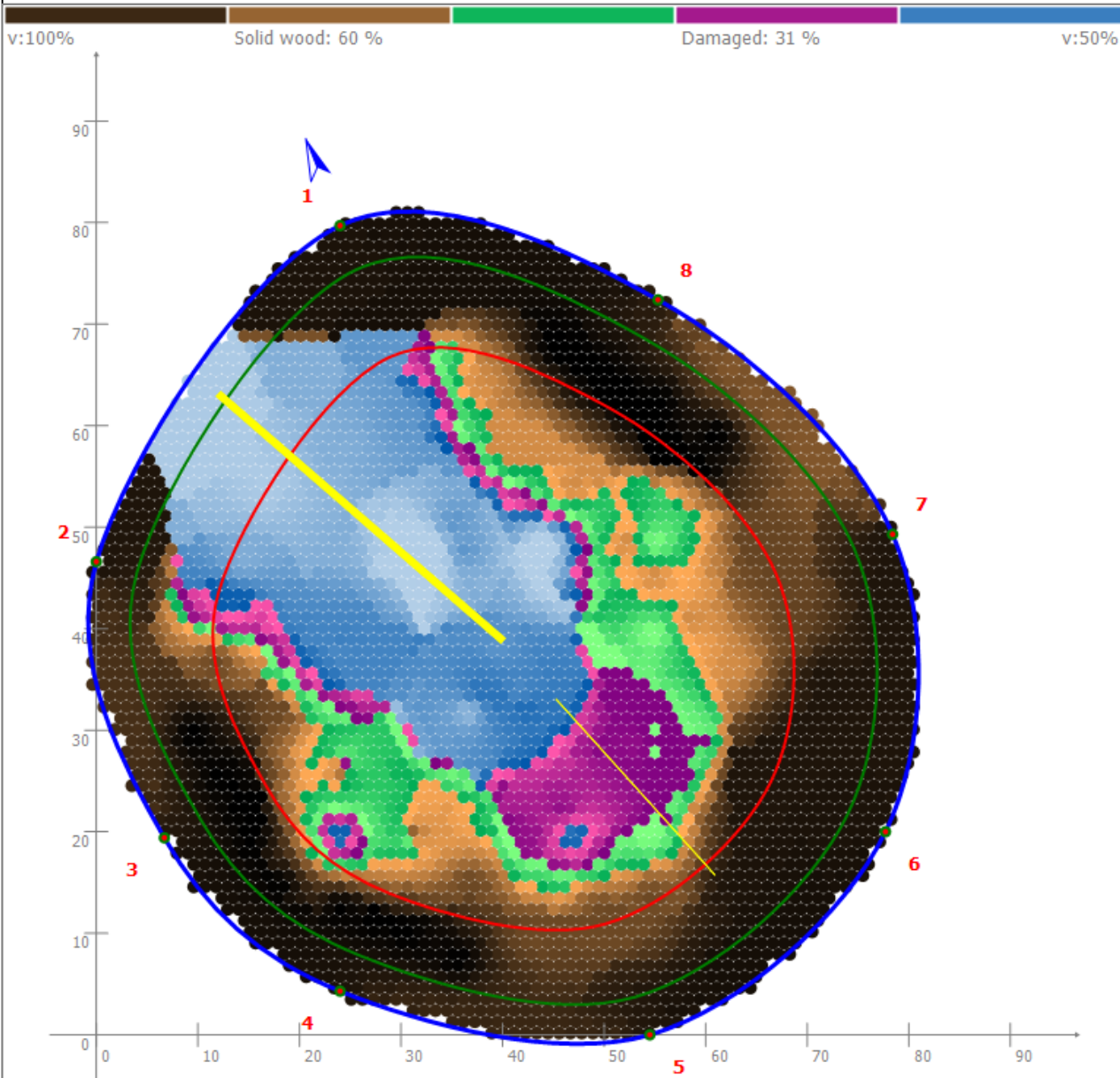


Client:
4 Manor Road Limited

Tree Expert:
Peter Holloway
Rootcause Limited 3-4 Church Street
EN9 1DX Waltham Abbey United Kingdom

Tel: +447862245496
Fax:
Domain:
email: peter@rootcause.co.uk

Tree species:	Copper beech	Tree height [m]:	9
Town:	Richmond	North at measuring point:	1
Neighbourhood:	Teddington	Crown spread [m]:	10
Road:	Manor Road	Position of measuring point 1:	0
		Trunk circumference (130cm height)[cm]:	180
Number of tree:	2	Tomography level at height [cm]:	5
Measure date:	6/23/2020 4:02:00 PM		



Comments:

Tree is South East corner by waste store.

Tree has basal decay and a Ganoderma species bracket. *G. applanatum* or *G. adspersum*.



Appendix 3.1 Picus Tomogram Report for T2

Picus: Richmond Teddington



Client:

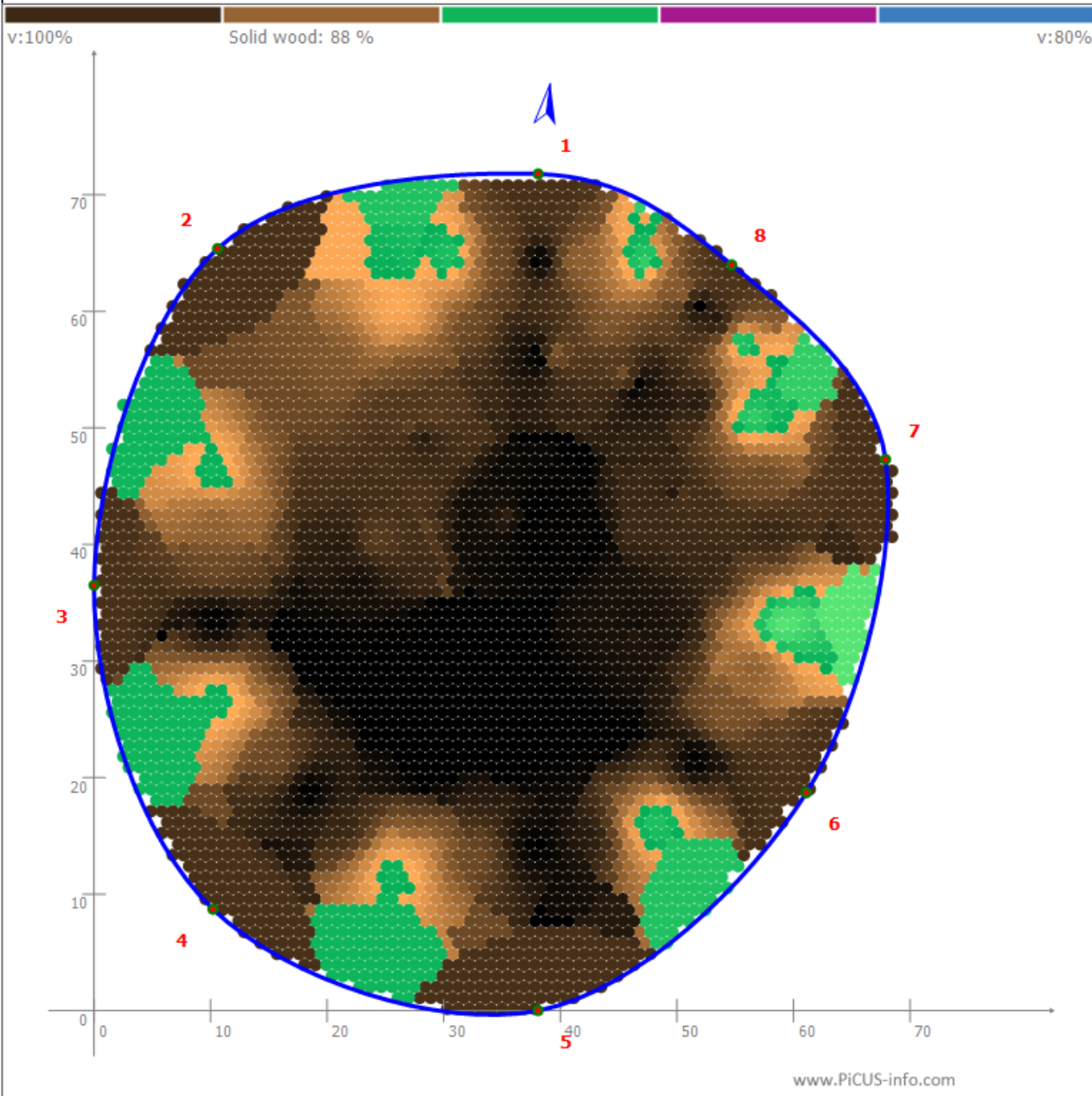
4 Manor Road Limited

Tree Expert:

Peter Holloway
Rootcause Limited 3-4 Church Street
EN9 1DX Waltham Abbey United Kingdom

Tel: +447862245496
Fax:
Domain:
email: peter@rootcause.co.uk

Tree species:	Copper beech	Tree height [m]:	12
Town:	Richmond	North at measuring point:	1
Neighbourhood:	Teddington	Crown spread [m]:	11
Road:	Manor Road	Position of measuring point 1:	0
		Trunk circumference (130cm height)[cm]:	192
Number of tree:	2	Tomography level at height [cm]:	8
Measure date:	6/23/2020 5:01:00 PM		



Comments:

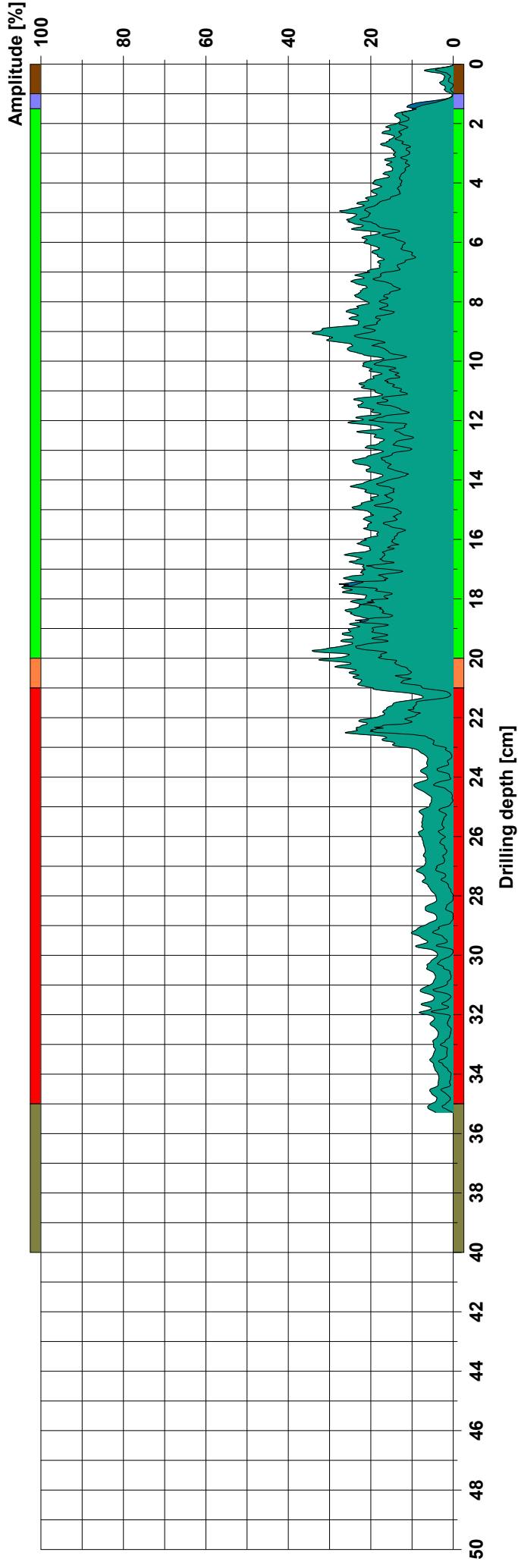
Tree in North West Corner of site.



**Appendix 3.2:
Resi Results for T1**

Measuring / object data

Measurement no.:	77	Speed	: 2500 r/min	Diameter:	
ID number	: 4 Manor Rd Cu Beech S MP01	Needle state:	---	Level	:
Drilling depth	: 35,29 cm	Tilt	---	Direction:	
Date	: 23.06.2020	Offset	: 58 / 321	Species	:
Time	: 16:22:57	Avg. curve	: off / off	Location:	
Feed	: 50 cm/min	Name	:		



Assessment

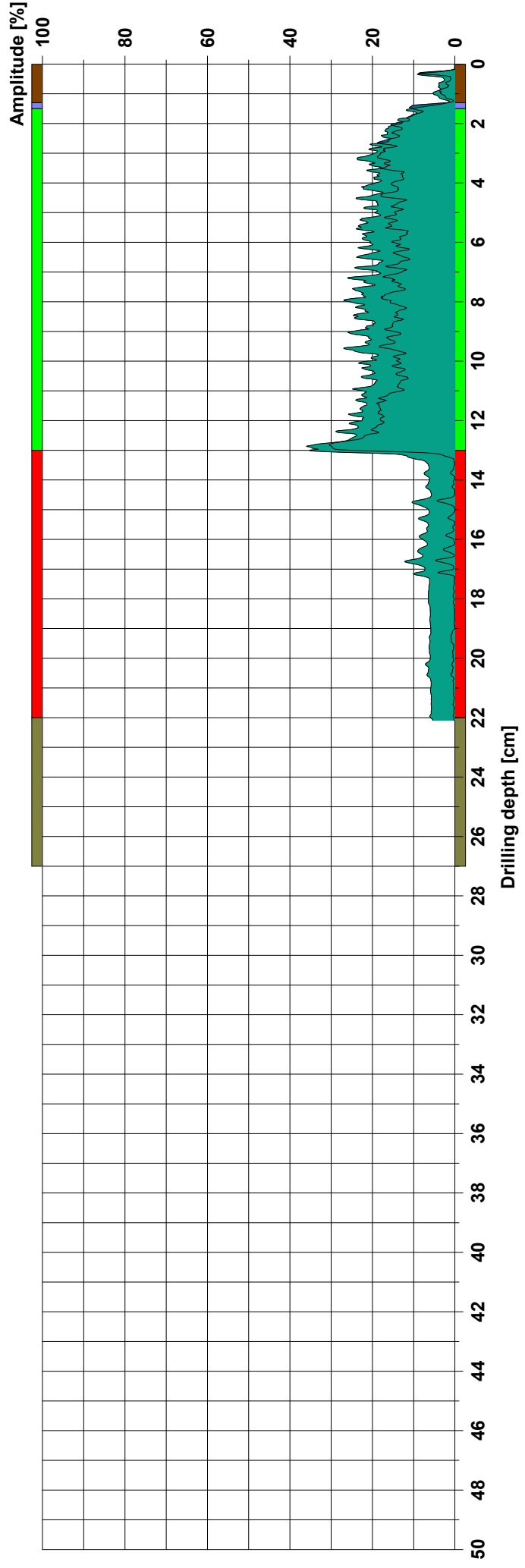
From	0,00 cm to	1,00 cm	: Bark
From	1,50 cm to	20,00 cm	: Sound wood
From	20,00 cm to	21,00 cm	: Partial Decay
From	21,00 cm to	35,00 cm	: Decay
From	35,00 cm to	40,00 cm	: Automatic retraction
From	1,00 cm to	1,50 cm	: Assumed Sapwood

Comment

18.5 cm thickness of reasonable wood

Measuring / object data

Measurement no.:	82	Speed	: 2500 r/min	Diameter:	
ID number	: 4 Manor Rd Cu Beech S MP04	Needle state:	---	Level	:
Drilling depth	: 22,09 cm	Tilt	---	Direction:	
Date	: 23.06.2020	Offset	: 54 / 277	Species	:
Time	: 16:29:53	Avg. curve	: off / off	Location:	
Feed	: 50 cm/min	Name	:		



Assessment

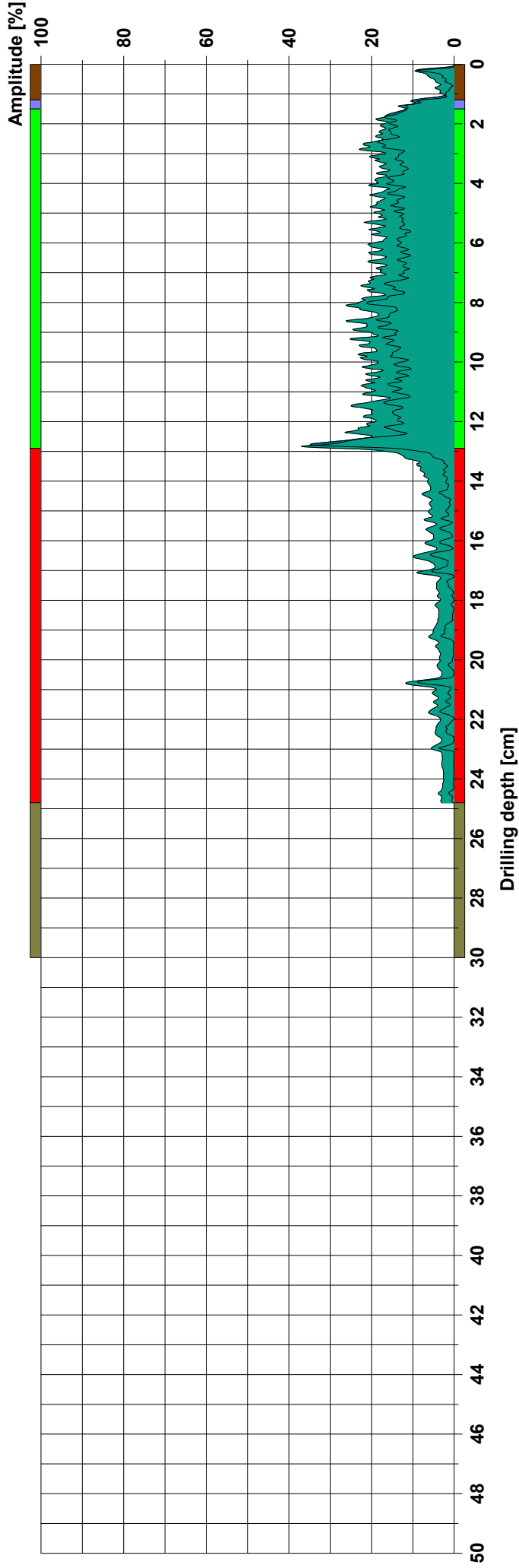
From	0,00 cm to	1,30 cm	: Bark
From	1,30 cm to	1,50 cm	: Assumed Sapwood
From	1,50 cm to	13,00 cm	: Sound wood
From	13,00 cm to	22,00 cm	: Decay
From	22,00 cm to	27,00 cm	: Automatic retraction

Comment

11.5cm sound wood

Measuring / object data

Measurement no.:	81	Speed	: 2500 r/min	Diameter:	
ID number	: 4 Manor Rd Cu Beech S MP05	Needle state:	---	Level	:
Drilling depth	: 24,81 cm	Tilt	---	Direction:	
Date	: 23.06.2020	Offset	: 55 / 277	Species	:
Time	: 16:28:36	Avg. curve	: off / off	Location:	
Feed	: 50 cm/min	Name	:		



Assessment

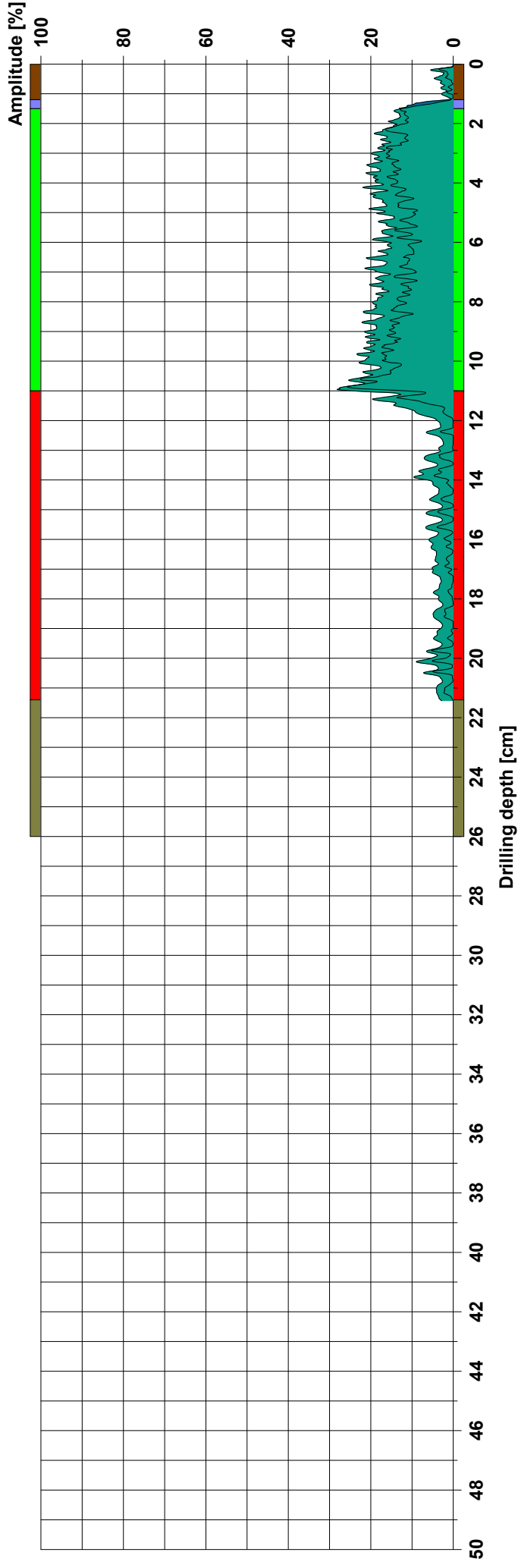
From	0,00 cm to	1,20 cm	: Bark
From	1,20 cm to	1,50 cm	: Assumed Sapwood
From	1,50 cm to	12,90 cm	: Sound wood
From	12,90 cm to	24,80 cm	: Decay
From	24,80 cm to	30,00 cm	: Automatic retraction

Comment

11.4cm reasonable wood

Measuring / object data

Measurement no.:	80	Speed	: 2500 r/min	Diameter:	
ID number	: 4 Manor Rd Cu Beech S MP06	Needle state:	---	Level	:
Drilling depth	: 21,43 cm	Tilt	---	Direction:	
Date	: 23.06.2020	Offset	: 55 / 277	Species	:
Time	: 16:27:24	Avg. curve	: off / off	Location:	
Feed	: 50 cm/min	Name	:		



Assessment

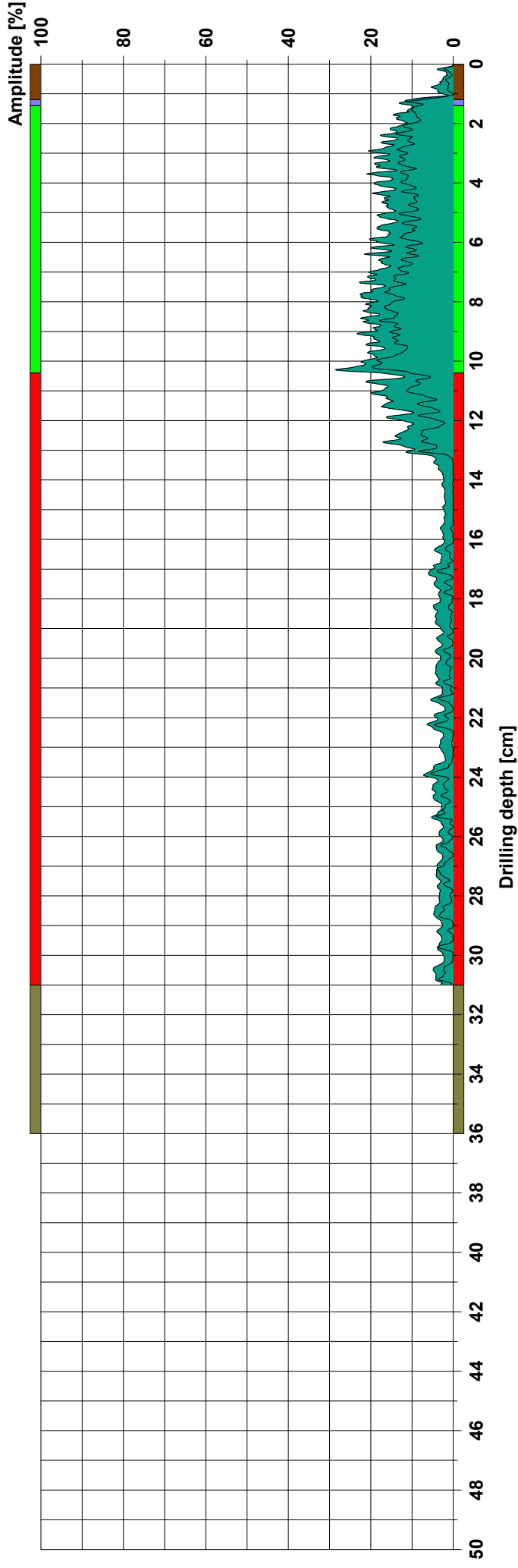
From	0,00 cm to	1,20 cm	: Bark
From	1,20 cm to	1,50 cm	: Assumed Sapwood
From	1,50 cm to	11,00 cm	: Sound wood
From	11,00 cm to	21,40 cm	: Decay
From	21,40 cm to	26,00 cm	: Automatic retraction

Comment

9.5cm reasonable wood

Measuring / object data

Measurement no.:	79	Speed	: 2500 r/min	Diameter:	
ID number	: 4 Manor Rd Cu Beech S MP07	Needle state:	---	Level	:
Drilling depth	: 30,97 cm	Tilt	---	Direction:	
Date	: 23.06.2020	Offset	: 55 / 282	Species	:
Time	: 16:26:00	Avg. curve	: off / off	Location:	
Feed	: 50 cm/min	Name	:		



Assessment

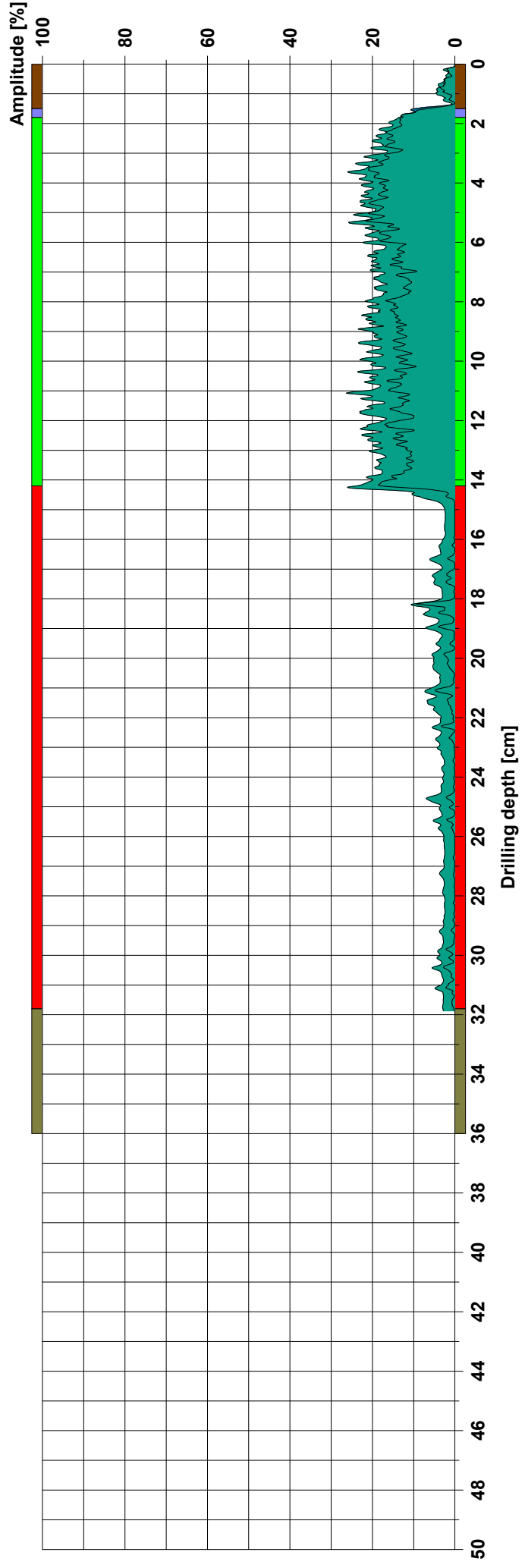
	From 0,00 cm to 1,20 cm	: Bark
	From 1,20 cm to 1,40 cm	: Assumed Sapwood
	From 1,40 cm to 10,40 cm	: Sound wood
	From 10,40 cm to 31,00 cm	: Decay
	From 31,00 cm to 36,00 cm	: Automatic retraction

Comment

9cm reasonable wood

Measuring / object data

Measurement no.:	78	Speed	: 2500 r/min	Diameter:	
ID number	: 4 Manor Rd Cu Beech S MP08	Needle state:	---	Level	:
Drilling depth	: 31,87 cm	Tilt	---	Direction:	
Date	: 23.06.2020	Offset	: 54 / 289	Species	:
Time	: 16:24:29	Avg. curve	: off / off	Location:	
Feed	: 50 cm/min	Name	:		



Assessment

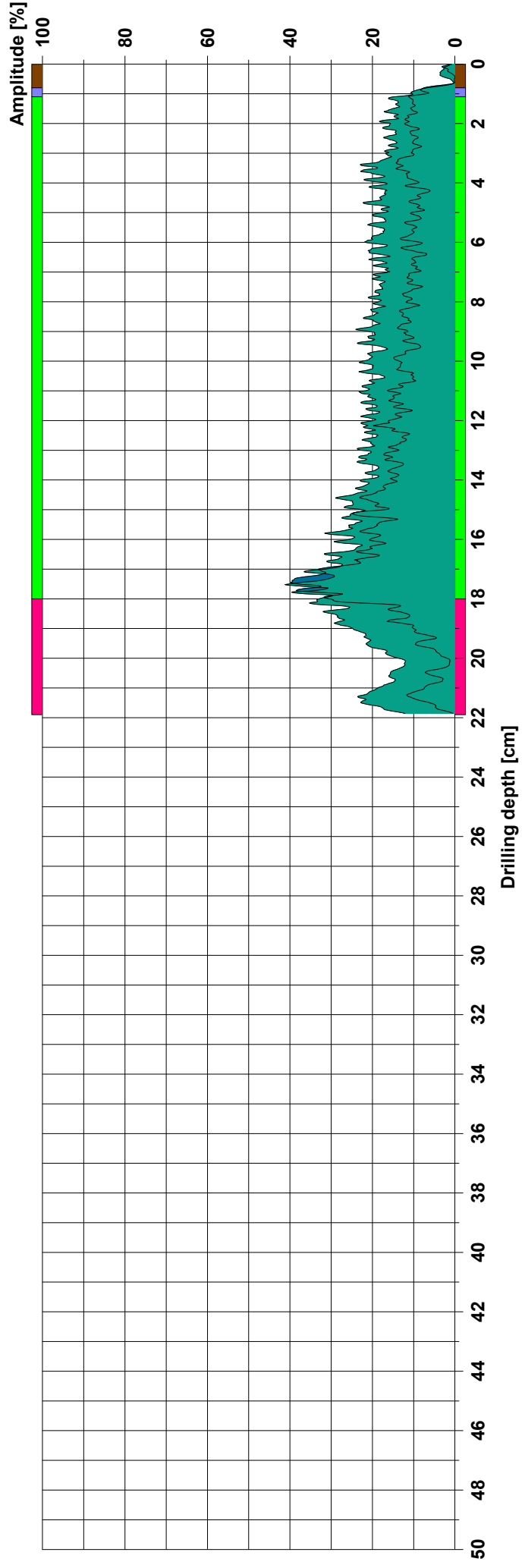
From	0,00 cm to	1,50 cm	: Bark
From	1,50 cm to	1,80 cm	: Assumed Sapwood
From	1,80 cm to	14,20 cm	: Sound wood
From	14,20 cm to	31,80 cm	: Decay
From	31,80 cm to	36,00 cm	: Automatic retraction

Comment

Approximately 12cm reasonable wood

Measuring / object data

Measurement no.:	83	Speed	: 2500 r/min	Diameter:	
ID number	: 4 Manor Rd Cu Beech S 45DEG MP01	Needle state:	---	Level	:
Drilling depth	: 21,86 cm	Tilt	---	Direction:	
Date	: 23.06.2020	Offset	: 43 / 276	Species	:
Time	: 17:25:22	Avg. curve	: off / off	Location	:
Feed	: 50 cm/min	Name	:		



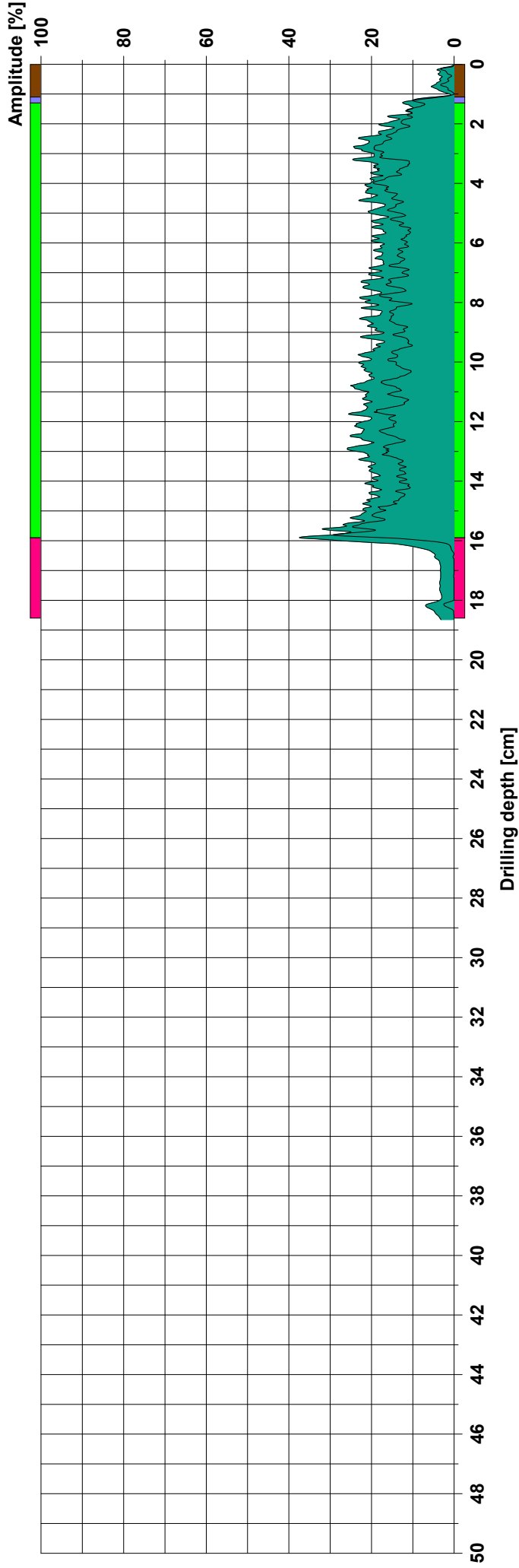
Assessment

From	0,00 cm to	0,80 cm	: Bark
From	0,80 cm to	1,10 cm	: Assumed Sapwood
From	1,10 cm to	18,00 cm	: Sound wood
From	18,00 cm to	21,90 cm	: Soil or Decay

Comment

Measuring / object data

Measurement no.:	84	Speed	: 2500 r/min	Diameter:	
ID number	: 4 Manor Rd Cu Beech S 45DEG MP02	Needle state:	---	Level	:
Drilling depth	: 18,65 cm	Tilt	---	Direction:	
Date	: 23.06.2020	Offset	: 44 / 273	Species	:
Time	: 17:26:14	Avg. curve	: off / off	Location	:
Feed	: 50 cm/min	Name	:		



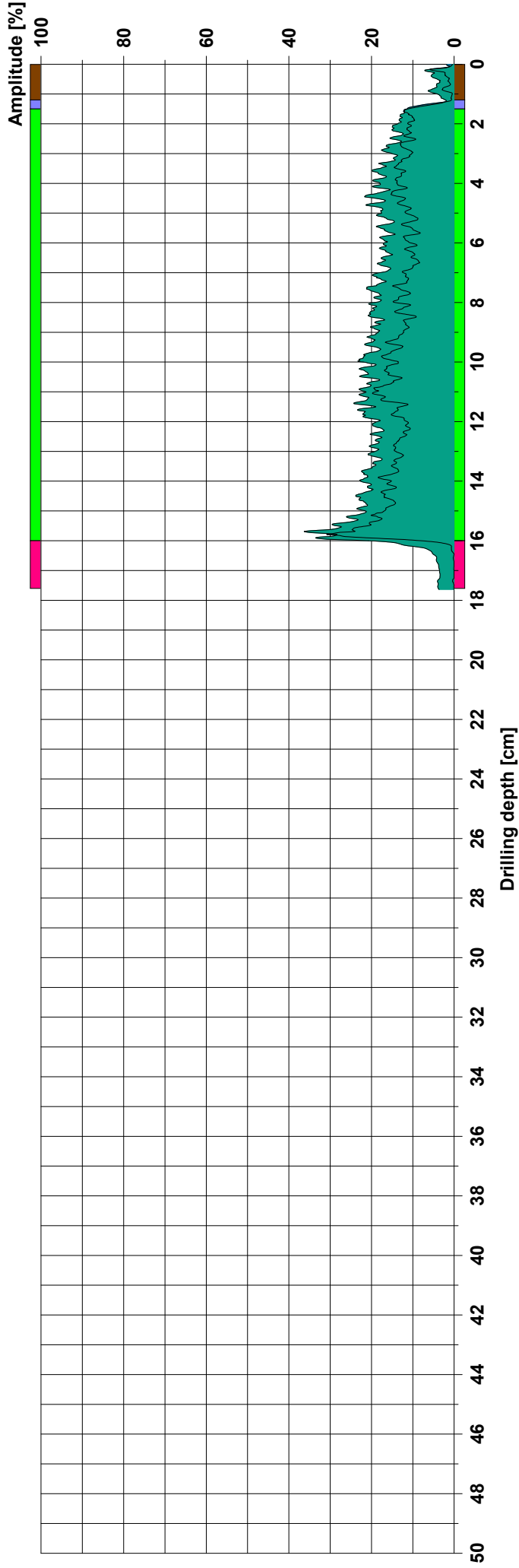
Assessment

■	From 0,00 cm to 1,10 cm	: Bark
■	From 1,10 cm to 1,30 cm	: Assumed Sapwood
■	From 1,30 cm to 15,90 cm	: Sound wood
■	From 15,90 cm to 18,60 cm	: Soil or Decay

Comment

Measuring / object data

Measurement no.:	85	Speed	: 2500 r/min	Diameter:	
ID number	: 4 Manor Rd Cu Beech S 45DEG MP03	Needle state:	---	Level	:
Drilling depth	: 17,64 cm	Tilt	---	Direction:	
Date	: 23.06.2020	Offset	: 43 / 278	Species	:
Time	: 17:27:10	Avg. curve	: off / off	Location	:
Feed	: 50 cm/min			Name	:



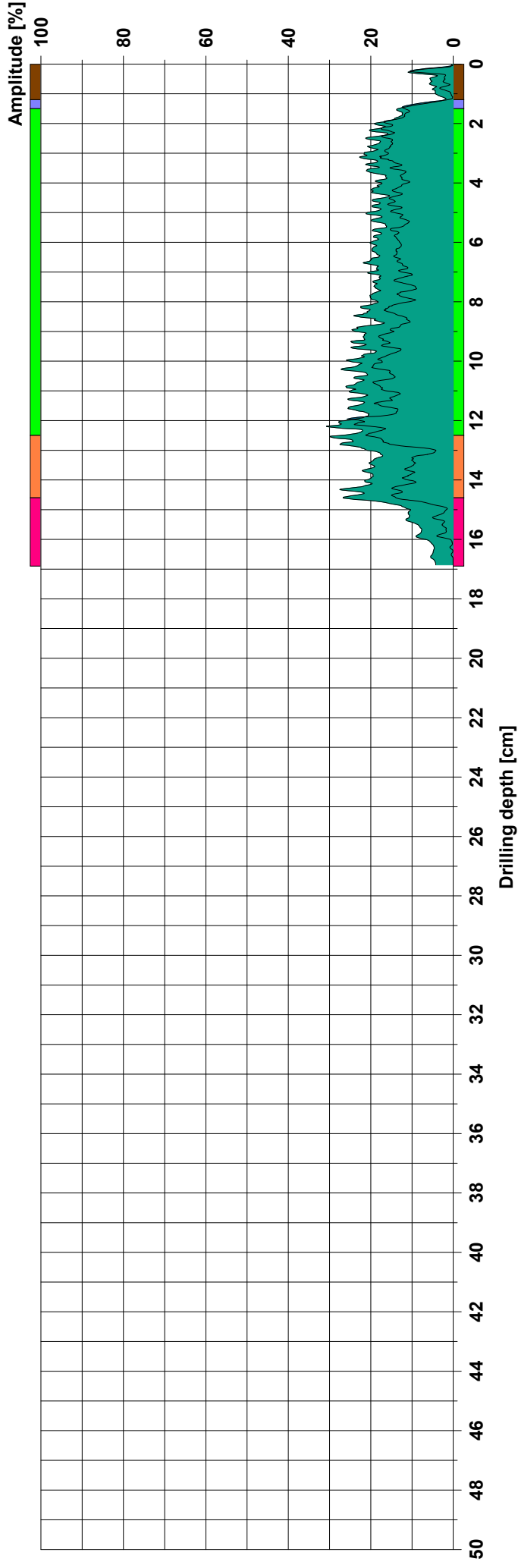
Assessment

From	0,00 cm to	1,20 cm	: Bark
From	1,20 cm to	1,50 cm	: Assumed Sapwood
From	1,50 cm to	16,00 cm	: Sound wood
From	16,00 cm to	17,60 cm	: Soil or Decay

Comment

Measuring / object data

Measurement no.:	86	Speed	: 2500 r/min	Diameter:	
ID number	: 4 Manor Rd Cu Beech S 45DEG MP05	Needle state:	---	Level	:
Drilling depth	: 16,86 cm	Tilt	---	Direction:	
Date	: 23.06.2020	Offset	: 43 / 278	Species	:
Time	: 17:28:18	Avg. curve	: off / off	Location	:
Feed	: 50 cm/min			Name	:



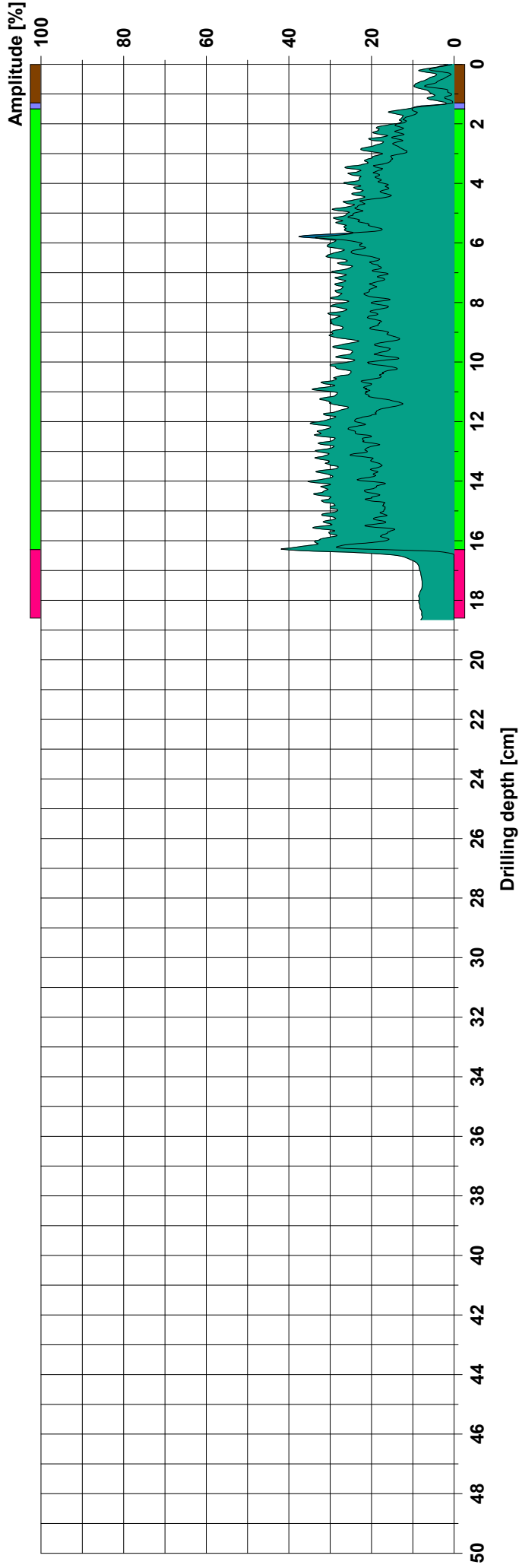
Assessment

From	0,00 cm to	1,20 cm	: Bark
From	1,20 cm to	1,50 cm	: Assumed Sapwood
From	1,50 cm to	12,50 cm	: Sound wood
From	12,50 cm to	14,60 cm	: Partial Decay
From	14,60 cm to	16,90 cm	: Soil or Decay

Comment

Measuring / object data

Measurement no.:	87	Speed	: 2500 r/min	Diameter:	
ID number	: 4 Manor Rd Cu Beech S 45DEG MP06	Needle state:	---	Level	:
Drilling depth	: 18,65 cm	Tilt	---	Direction:	
Date	: 23.06.2020	Offset	: 43 / 279	Species	:
Time	: 17:29:05	Avg. curve	: off / off	Location	:
Feed	: 50 cm/min	Name	:		



Assessment

From	0,00 cm to	1,30 cm	: Bark
From	1,30 cm to	1,50 cm	: Assumed Sapwood
From	1,50 cm to	16,30 cm	: Sound wood
From	16,30 cm to	18,60 cm	: Soil or Decay

Comment