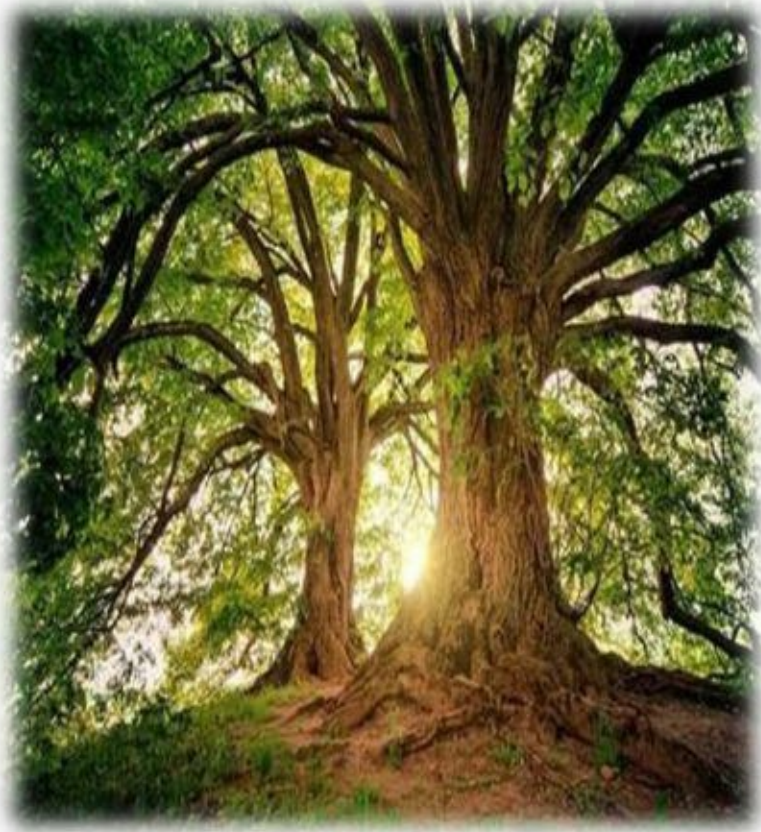


Tree Safety and Condition Survey

Jason Bellenger Tree Surveys



West Lodge

Clarence Street

Penzance

TR18 2PA

Cornwall

**November 26<sup>th</sup> ,2021**

Tree Safety and Condition Survey

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## Tree Safety and Condition Survey at West Lodge

### **1.0 Instructions**

- 1.1 I have been instructed by Mr and Mrs Adam to carry out an inspection of a large mature Holm Oak and report on the following:
- a) Condition and Safety of the tree.
  - b) Provide recommendations on the immediate and future management of the tree, based on my assessment and my personal experience as an Arboriculturalist.
- 1.2 I confirm that I hold the Technicians Certificate in Arboriculture (Arbor. A), a Technical Member of the Arboricultural Association, RFS (Royal Forestry Society) Certified, Lantra PTI certified and have some 30 years of working within the industry.

### **2.0 Report Limitations**

- 2.1 The inspection was primarily carried out from ground level using visual observation methods (VTA) and a sounding mallet. A more detailed investigation was then carried out using sonic tomography.
- 2.2 The tree has undergone safety and condition checks using the VTA (Visual Tree Assessment) system as popularised by eminent Arboriculturists such as Dr. David Lonsdale (ref. Principles of Tree hazard Management and Assessment 1999) and Mattheck & Breloer (ref. The Body Language of Trees 1999).
- 2.3 Trees are living organisms whose health and condition can change rapidly, the health, condition and safety of a tree should be checked on a regular basis, preferably at least once a year. The conclusions and recommendations in this report are only valid for one year. This period of validity may be reduced in the case of any change in conditions to or in proximity to the tree.
- 2.4 The conclusions and recommendations contained in this report are based on the tree at the time of inspection. It should be noted that even sound, healthy trees, can fail given sufficient severe weather conditions. Trees are naturally shedding organisms; branches can shed and fall unpredictably even in average weather conditions. As it is not possible to assess fully the condition of the bank
-

on which the tree has grown and developed, there may be issues with unknown stability. During heavy rainfall events and storm conditions; trees can become unstable through loss of friction between the soil and their roots or become naturally windthrown.

- 2.5 Tree roots can affect foundations, drains and other underground services. I have not been instructed to consider these factors in relation to this report and therefore should be considered as beyond the scope of this report.

### **3.0 Introduction**

- 3.1 I inspected the tree on November 26<sup>th</sup>, 2021. The weather was clear with good visibility, ideal conditions for the survey.
- 3.2 This survey has been commissioned by Mr. and Mrs. Adam following the identification of a bracket fungus at its base.
- 3.3 The tree has grown and developed at the edge of a raised bed, in an elevated position above the drive of West lodge. The tree would target the property and Council owned St.Erbyn's car park following its partial or complete failure.
- 3.4 West Lodge is located close to the centre of Penzance at approximately 45 metres above sea level and relatively sheltered from the prevailing south-westerly salt laden winds.
- 3.5 I can confirm the species of the tree as a mature Holm Oak, probably planted circa 1900. The tree has reached its potential height and crown spread for age and exposure.
- 3.6 There are no records of any previous inspections having been carried out

## 4.0 Condition Assessment

4.1 I attach tree location plan (Appendix 1) showing the location of the tree, built structures and frequented areas.

I attach a General Tree Assessment (Appendix 2), which presents the following information:

- Tree number as shown the on plan.
- Tree species (common and Latin)
- Height (estimated in metres or measured with clinometer if practical).
- DBH (Diameter of Stem at Breast Height – 1.5 meters)
- Crown spread (radius, estimated in metres).
- Maturity – **Young** – Less than  $\frac{1}{4}$  life expectancy (new planting or establishing tree)  
**Semi Mature** –  $\frac{1}{3}$  to  $\frac{2}{3}$  life expectancy completed. Has not reached potential height or crown spread.  
**Mature**-  $\frac{2}{3}$  life expectancy completed with limited potential for any significant increase in size.  
**Over Mature**-  $\frac{2}{3}$  life expectancy completed and declining.  
**Dead**- Trees with little or no functioning networks of living cells, moribund.
- Condition - **Good**- Healthy, Full Crown, Long Life expectancy, No obvious signs of failure.  
**Fair** - Generally Healthy, Minor Defects.  
**Poor**- Low Vigour, Short Life expectancy, Major Defects.  
**Dangerous**- Likely to fail imminently.
- Observations – Root area/Stem condition/Branch Structure/Leaf and bud
- Survey comment – As appropriate to tree safety, physiological health structural condition and target.
- Work – remedial surgery (if needed) to improve tree safety and condition or abate a nuisance.
- Work priority – As appropriate to threat level/ risk management.
- Date of next inspection as recommended.

- 4.2 **Root System Assessment** – The tree has grown with restricted rooting volume due to raised bed. The tarmac drive has risen in places due to the root system exploiting the substrate below and pressure from root expansion/incremental growth.
- 4.3 **Buttress/root collar Assessment** – Two brackets of *Ganoderma applanatum* identified at base and 0.4m on western quarter (image 2). Sounding (resonance test) indicated internal decay. As it was difficult to assess the advancement of the decay using VTA methods, a further investigation using a Tomograph was carried out (see Appendix 4).
- 4.4 **Main Stem Assessment** – leaning 25 degrees from upright Northwest. Sounding (resonance test) indicated no internal decay above 1m. No fungal fruiting bodies observed on upper stem.



Image 1- Holm Oak (*Quercus ilex*)



Image 2 – Shows *Ganoderma applanatum* brackets

- 4.5 **Scaffold and Secondary Branch Assessment** – Crown breaks at circa 8m into two main scaffolds, union in good condition. Minor deadwood throughout crown but no significant defects noted.
- 4.6 **Twigs, Buds and leaves Assessment** – Crown hangs low over drive and is biased North/Northwest. Physiological indications show good vigour with good extension growth noted.

## 5.0 Conclusions and Recommendations

- 5.1 The results of the Tomograph Assessment indicated that the tree is adapting to the changes in wood strength by laying down new wood, hence it has a Low chance of stem failure (at 350mm) in its current condition.
- 5.2 Bracket fungus *Ganoderma applanatum* is a heartwood decay pathogen and frequently found on Holm Oak of this age class. Characteristically, the fungus produces a woody bracket forming a single bracket or overlapping in tiers, generally dark matt brown with a white underside. When the action of this fungus reaches an advanced stage an excessive amount of decay can result in the failure of the stem. However, the rate of decay can be slow and take many years to advance leaving the strength of the residual wall within acceptable tolerances for many years.
- 5.3 Following my assessment of the tree, I have concluded is in good physiological health and acceptable structural condition. However, following discussion with Mr and Mrs Adam, considering their concerns regarding the size of the tree and the species ability to tolerate pruning, I feel a crown reduction appropriate. A sympathetic crown reduction and lifting would help reduce shading of the south facing aspect of the dwelling and help to alleviate the Adam's concerns. [REDACTED]
- [REDACTED]
- 5.4 The crown reduction and crown lifting should be carried out as described in Appendix 3 (Pruning reference photos in appendix 5).
- 5.5 The crown reduction should be carried out to British Standard 3998:2010 Recommendations for tree works and exactly as described in the Tree Survey Action Analysis (Appendix 3). This work should avoid disturbing or destroying the nesting sites of wild birds or the roost sites of bats under the 'Wildlife & Countryside Act 1981', the 'Countryside and Rights of Way Act 2000' and the 'Conservation of Habitats & Species Regulations 2010' (as amended).

- 5.6 I recommend that a Tomograph Assessment of the stem (T1) should be carried out again in five years to assess the progression of the decay.

This survey is for the sole use of the above-named client and refers to only those trees identified within, use by any other person(s) in attempting to apply its contents for any other purpose renders the report invalid for that purpose.

**Signed.**



**Date.** 26/11/2021

Jason Bellenger Tech. Cert. (Arbor. A.); RFS cert.



*The authority of this report ceases when any site conditions change or pruning or other works unspecified in the report are carried out to, or affecting, the subject tree(s). The statements made in this report do not take into account the effects of extremes of climate, vandalism or accident, whether physical, chemical or fire.*

*Jason Bellenger Tree Surveys cannot therefore accept any liability in connection with these factors, nor where prescribed work is not carried out in a correct and professional manor in accordance with good practice.*



## 6.0 References

- Arboricultural Association (2015) *Industry Code of Practice for Arboriculture*. The Arboricultural Association, Stonehouse Gloucestershire UK
- British Standards Institute (2010) BS 3998:2010: *Tree work- Recommendations*. British Standards institution, UK
- Brown,G.E.(2009) *The Pruning of Trees, Shrubs and Conifers. Second Edition*. Published by Timber Press, USA
- Fay, M, Dowson, d. and Helliwell, R. (2016) *Tree Surveys: a Guide to Good practice*, Arboricultural Association Guidance Notes No. 7. Arboricultural Association. UK
- Lonsdale,D.(2015) *Principles of Tree Hazzard Management*. Arboricultural Association; The stationary office, London
- Mattheck,C and Breloer,H.(2001) *The Body Language Of Trees , A Handbook For Failure Analysis. Sixth edition*. The Stationary Office, London
- Mattheck,C and Breloer,H.(2007) *Updated Field Guide for Visual Tree Assessment*. Karlsruhe Research Centre
- Roberts, Jackson & Smith. (2006) *Tree Roots in the Built Environment* Arboricultural Association, Stonehouse Gloucestershire, UK
- Shigo,A.(2006) *Modern Arboriculture Touch Trees*. Shigo and Trees associates LLC USA
- Strouts R.G and Winter T.G(2000) *Diagnosis of Ill-health in Trees. Second Edition*. The Stationary Office, London
- Watson,B.(2016) *Trees Their Use ,Management, Cultivation and Biology*. The Corwood Press Ltd; Wiltshire UK
- Watson,G & Green,T (2011) *Fungi On Trees: An Arborists Field Guide*. Arboricultural Association, Stonehouse Gloucestershire, UK
- Weber,K and Mattheck,C (2003) *Manual of Wood Decays*, The Arboricultural Association, Stonehouse Gloucestershire UK

West Lodge  
Clarence Street  
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### General Tree Assessment (Detailed)

#### Tree Safety and Condition Survey 2021

**Tree ID: T1**      Holm Oak  
*Quercus ilex*

**Tag:** No tag      **Assessor:** Jason Bellenger Tech. Cer  
**TPO:** No      **Date:** 26-Nov-21

**Survey Comment:** Growing from raised bed in a elevated position above drive. Leaning Northwest at 25 degrees from upright. Crown biased North/Northwest. Likely to target council car parking in the event of partial or complete failure. Restricted soil volumes available to the tree but has adapted well to position. Crown breaks @ circa 8m into 2 main scaffolds, union at this point in good condition. Minor deadwood throughout crown, but no significant defects noted. Good vigour and extension growth. Main crown hangs low over drive. 2 fruiting bodies of Ganoderma applanatum identified @ base and 0.4m on western quarter, sounding base reveals decay internally. Tomograph taken .

Details	Height	Spread	Stems	Ø	Maturity	Bat	Con Area	Prev Insp	Next Due	Condition
	17 m	7 m	1	950 mm	Mature	No	Yes	N/A	26-Nov-22	Fair
Observations	Root	Stem			Branch	Leaf/Bud				
	No visual defects	Fungus or decay			Minor dead wood Old pruning wounds Low hanging branches Stubs	Normal				
Work	Category	Action			Priority					
	See Comment	See Comment			1 year					

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## Tree Survey Action Analysis

### Tree Safety and Condition Survey 2021

#### Tree: T1

TagNo: No tag

Holm Oak

*Quercus ilex*

#### Action Recommendations:

See Comment

See Comment

Priority

1 year

Tree Surgery work : Remove first primary branch to North west back to main stem then remove second order branch to left 1.5m up (looking south) back to main stem (*see Image 1*). Crown lift remaining low branches to achieve 5m clearance over drive and car park. (*see Images 2 and 3*) .Reduce crown height by 3m to leave 14m and radial crown spread to northwest by 2m to leave 5m radial crown spread (*Image 4*).

# ArborSonic 3D Measurements Report

west lodge (1)

27/11/2021 12:31

Tree species: Quercus ilex (Holm Oak)

<b>Tree location</b>	West Lodge, TR18 2PA
<b>Measurement date</b>	Friday, November 26, 2021 10:40 AM
<b>Tree identifier</b>	T1
<b>Project identifier</b>	West Lodge01
<b>Trunk diameter at 4 feet</b>	940mm
<b>Status report</b>	
<b>Root status</b>	Intact
<b>Root collar status</b>	Decayed
<b>Trunk status</b>	Decayed
<b>Crown collar status</b>	Intact
<b>Crown status</b>	One-sided
<b>Other state</b>	Tree in good physiological condition. Tree in impaired structural condition- Fruiting bodies of <i>Ganoderma applanatum</i> at base.
<b>Proposed treatment</b>	
<b>Root treatment</b>	Not necessary
<b>Root collar treatment</b>	Not necessary
<b>Trunk treatment</b>	Not necessary
<b>Crown collar treatment</b>	Not necessary
<b>Crown treatment</b>	Not necessary
<b>Other treatment</b>	

## Biomechanics

<b>Wind</b>	
Wind model:	EN1991
Terrain:	City
Base wind velocity:	26.0 m/s
Dry air temp.:	8 °C
<b>Crown</b>	
Crown model:	Drawn
Area:	187.81 m <sup>2</sup>
Top height:	16.62 m
Center height:	8.74 m
Bottom height:	0.9 m
<b>Trunk</b>	
Degree of lean:	79 °
Direction of lean:	Northwest (315 °)
<b>Tree</b>	
Wind load:	26831 N
Center height:	9.02 m
Drag factor:	0.25

Appendix 4

Yield strength:	23.9 MPa
-----------------	----------

Layer name	Height	Decayed area	Safety factor	Risk rating
Layer #1	35 cm	51 %	408 %	Low risk

**Safety factor:** 408 %

**Layer #1**

Sensor Geometry

Height	35 cm
Scheme	Irregular
Sensor count	10

Sensor position data

L1 - 1	15 cm
2 - 1	34 cm
L2 - 1	43 cm
3 - 1	53 cm
L3 - 1	60 cm
4 - 1	80 cm
L4 - 1	93 cm
5 - 1	105 cm
L5 - 1	113 cm
6 - 1	110 cm
L6 - 1	102 cm
7 - 1	95 cm
L7 - 1	94 cm
8 - 1	88 cm
L8 - 1	77 cm
9 - 1	61 cm
L9 - 1	47 cm
10 - 1	33 cm
L10 - 1	17 cm
L1 - 6	108 cm
2 - 6	102 cm
L2 - 6	95 cm
3 - 6	81 cm
L3 - 6	69 cm
4 - 6	58 cm
L4 - 6	49 cm
5 - 6	38 cm
L5 - 6	24 cm
L6 - 6	20 cm
7 - 6	35 cm
L7 - 6	50 cm
8 - 6	64 cm
L8 - 6	72 cm
9 - 6	82 cm

Appendix 4

L9 - 6	87 cm
10 - 6	91 cm
L10 - 6	96 cm
Penetration depth	2 cm
Bark thickness	1 cm

Time Data ( $\mu$ s)

	1 1 5 $\pm$ 0	21 1 $\pm$ 1 0	2 5 3 $\pm$ 0	2 9 5 $\pm$ 1	34 5 $\pm$ 0	48 1 $\pm$ 4	58 2 $\pm$ 0	69 8 $\pm$ 6	94 8 $\pm$ 0	96 0 $\pm$ 2	73 6 $\pm$ 0	52 9 $\pm$ 1	43 3 $\pm$ 0	48 2 $\pm$ 0	34 1 $\pm$ 0	35 7 $\pm$ 0	29 0 $\pm$ 0	22 2 $\pm$ 0	12 1 $\pm$ 0
11 6 $\pm$ 0		11 5 $\pm$ 0	1 9 5 $\pm$ 0	2 3 7 $\pm$ 0	35 6 $\pm$ 0	49 4 $\pm$ 2	55 7 $\pm$ 0	63 9 $\pm$ 3	81 7 $\pm$ 0	95 7 $\pm$ 16	80 7 $\pm$ 0	59 1 $\pm$ 1	55 1 $\pm$ 0	51 3 $\pm$ 4	47 2 $\pm$ 0	39 4 $\pm$ 4	34 7 $\pm$ 0	27 9 $\pm$ 0	21 7 $\pm$ 0
21 1 $\pm$ 0	1 1 6 $\pm$ 0		1 0 9 $\pm$ 0	1 7 9 $\pm$ 0	29 9 $\pm$ 0	41 8 $\pm$ 0	55 2 $\pm$ 0	63 3 $\pm$ 0	78 7 $\pm$ 0	93 6 $\pm$ 0	84 5 $\pm$ 0	65 4 $\pm$ 0	61 1 $\pm$ 0	57 4 $\pm$ 0	51 1 $\pm$ 0	46 1 $\pm$ 0	39 2 $\pm$ 0	33 6 $\pm$ 0	27 4 $\pm$ 0
28 7 $\pm$ 0	1 9 5 $\pm$ 0	99 $\pm$ 0		1 0 0 $\pm$ 0	24 8 $\pm$ 0	41 2 $\pm$ 1	43 6 $\pm$ 0	61 0 $\pm$ 2	65 3 $\pm$ 0	93 5 $\pm$ 2	95 3 $\pm$ 0	73 3 $\pm$ 7	64 4 $\pm$ 0	63 0 $\pm$ 1	53 5 $\pm$ 0	50 8 $\pm$ 0	41 8 $\pm$ 0	39 0 $\pm$ 0	31 6 $\pm$ 0
29 5 $\pm$ 1	2 3 7 $\pm$ 0	17 8 $\pm$ 1	9 9 $\pm$ 0		16 9 $\pm$ 0	31 7 $\pm$ 3	38 9 $\pm$ 0	45 3 $\pm$ 4	64 1 $\pm$ 0	67 2 $\pm$ 4	10 22 $\pm$ 0	97 0 $\pm$ 8	76 5 $\pm$ 0	63 4 $\pm$ 8	57 2 $\pm$ 0	49 5 $\pm$ 4	44 3 $\pm$ 0	37 5 $\pm$ 2	35 2 $\pm$ 0
31 4 $\pm$ 2	3 5 8 $\pm$ 0	29 9 $\pm$ 0	2 4 8 $\pm$ 0	1 6 9 $\pm$ 0		16 9 $\pm$ 0	26 6 $\pm$ 0	36 6 $\pm$ 2	39 7 $\pm$ 0	67 1 $\pm$ 5	68 3 $\pm$ 0	11 10 $\pm$ 4	10 66 $\pm$ 0	79 6 $\pm$ 0	91 7 $\pm$ 0	51 4 $\pm$ 7	72 6 $\pm$ 0	37 8 $\pm$ 1	47 0 $\pm$ 0
56 4 $\pm$ 2	3 9 0 $\pm$ 0	42 0 $\pm$ 4	3 6 9 $\pm$ 0	3 1 7 $\pm$ 2	16 9 $\pm$ 0		11 7 $\pm$ 0	21 4 $\pm$ 1	33 1 $\pm$ 0	34 0 $\pm$ 2	65 8 $\pm$ 0	69 3 $\pm$ 4	10 99 $\pm$ 0	11 62 $\pm$ 1 1	93 3 $\pm$ 0	12 00 $\pm$ 3	78 5 $\pm$ 0	95 6 $\pm$ 27	61 0 $\pm$ 0
84 2 $\pm$ 0	5 5 2 $\pm$ 0	46 7 $\pm$ 1	4 3 4 $\pm$ 0	3 8 0 $\pm$ 2	26 5 $\pm$ 0	11 6 $\pm$ 0		11 7 $\pm$ 0	22 1 $\pm$ 0	29 7 $\pm$ 1	44 9 $\pm$ 0	64 5 $\pm$ 2	82 9 $\pm$ 0	10 88 $\pm$ 4	10 90 $\pm$ 0	10 71 $\pm$ 8	11 17 $\pm$ 0	10 56 $\pm$ 2	83 2 $\pm$ 0
70 8 $\pm$ 4	7 6 9 $\pm$	54 0 $\pm$ 4	5 0 1 $\pm$	4 4 7 $\pm$	33 0 $\pm$ 0	21 3 $\pm$ 1	11 6 $\pm$ 0		12 4 $\pm$ 0	22 9 $\pm$ 1	37 5 $\pm$ 0	55 7 $\pm$ 24	66 8 $\pm$ 0	96 4 $\pm$ 3	10 24 $\pm$ 0	10 18 $\pm$ 6	10 88 $\pm$ 0	10 33 $\pm$ 6	91 5 $\pm$ 0



Appendix 4

12	2	27	3	1	42	52	82	93	10	88	70	35	43	28	34	15	20	12	
2±	1	3±	1	9	8±	5±	6±	9±	16	2±	7±	2±	2±	8±	2±	7±	8±	1±	
0	7	0	5	6	0	2	0	7	±0	5	0	1	0	0	0	0	0	0	
	±		±	±															
	0		0	0															

Tomograms (m/s)

	21	22	20	22	22	16	13	15	13	11	12	18	22	20	23	20	21	21	23
	76	59	92	80	04	89	81	49	27	30	26	60	29	18	36	92	87	45	60
21		28	21	23	17	18	16	14	13	11	12	14	18	20	19	20	20	20	17
76		12	25	57	54	44	80	73	46	71	67	70	66	19	95	64	24	39	17
22	28		18	20	16	16	16	16	14	10	10	15	17	18	19	19	20	20	19
59	12		92	99	31	55	20	23	04	98	82	20	54	25	24	49	65	65	51
20	21	18		28	15	15	17	15	15	11	99	11	15	15	18	18	19	21	18
92	25	92		31	42	36	12	70	47	10	8	44	73	97	16	40	54	22	47
22	23	20	28		11	13	15	16	14	12	84	87	11	15	13	17	18	19	23
80	57	99	31		09	52	23	27	23	89	7	1	55	00	97	12	33	21	31
22	17	16	15	11		17	17	17	18	12	11	71	77	99	88	11	10	16	13
04	54	31	42	09		78	33	67	61	36	03	5	3	4	8	02	06	32	98
16	18	16	15	13	17		20	19	19	20	11	11	83	79	91	71	89	84	13
89	44	55	36	52	78		91	91	22	75	97	25	1	2	1	8	0	3	86
13	16	16	17	15	17	20		22	20	21	15	12	10	87	82	87	80	85	10
81	80	20	12	23	33	91		87	22	63	81	31	74	7	6	1	4	3	55
15	14	16	15	16	17	19	22		22	22	17	13	13	10	88	87	87	91	10
49	73	23	70	27	67	91	87		24	69	44	35	27	06	6	1	5	5	37
13	13	14	15	14	18	19	20	22		31	23	15	13	13	11	10	98	94	99
27	46	04	47	23	61	22	22	24		12	27	70	14	62	06	23	7	0	8
11	11	10	11	12	12	20	21	22	31		21	17	14	10	13	11	11	10	10
30	71	98	10	89	36	75	63	69	12		75	67	62	82	06	22	82	38	02
12	12	10	99	84	11	11	15	17	23	21		16	17	14	12	16	13	15	12
26	67	82	8	7	03	97	81	44	27	75		48	26	64	79	48	51	53	37
18	14	15	11	87	71	11	12	13	15	17	16		21	18	19	20	20	20	20
60	70	20	44	1	5	25	31	35	70	67	48		35	94	39	79	58	08	12
22	18	17	15	11	77	83	10	13	13	14	17	21		21	17	21	20	23	19
29	66	54	73	55	3	1	74	27	14	62	26	35		10	59	69	86	88	61
20	20	18	15	15	99	79	87	10	13	10	14	18	21		19	20	21	21	24
18	19	25	97	00	4	2	7	06	62	82	64	94	10		50	86	38	02	87
23	19	19	18	13	88	91	82	88	11	13	12	19	17	19		26	21	21	20
36	95	24	16	97	8	1	6	6	06	06	79	39	59	50		20	85	83	92
20	20	19	18	17	11	71	87	87	10	11	16	20	21	20	26		22	20	27
92	64	49	40	12	02	8	1	1	23	22	48	79	69	86	20		55	35	52
21	20	20	19	18	10	89	80	87	98	11	13	20	20	21	21	22		22	20
87	24	65	54	33	06	0	4	5	7	82	51	58	86	38	85	55		41	61
21	20	20	21	19	16	84	85	91	94	10	15	20	23	21	21	20	22		22
45	39	65	22	21	32	3	3	5	0	38	53	08	88	02	83	35	41		92
23	17	19	18	23	13	13	10	10	99	10	12	20	19	24	20	27	20	22	
60	17	51	47	31	98	86	55	37	8	02	37	12	61	87	92	52	61	92	





T1 - Holm Oak

Appendix 4



*Arborsonic set up looking South (Sensors @ 3500mm)*

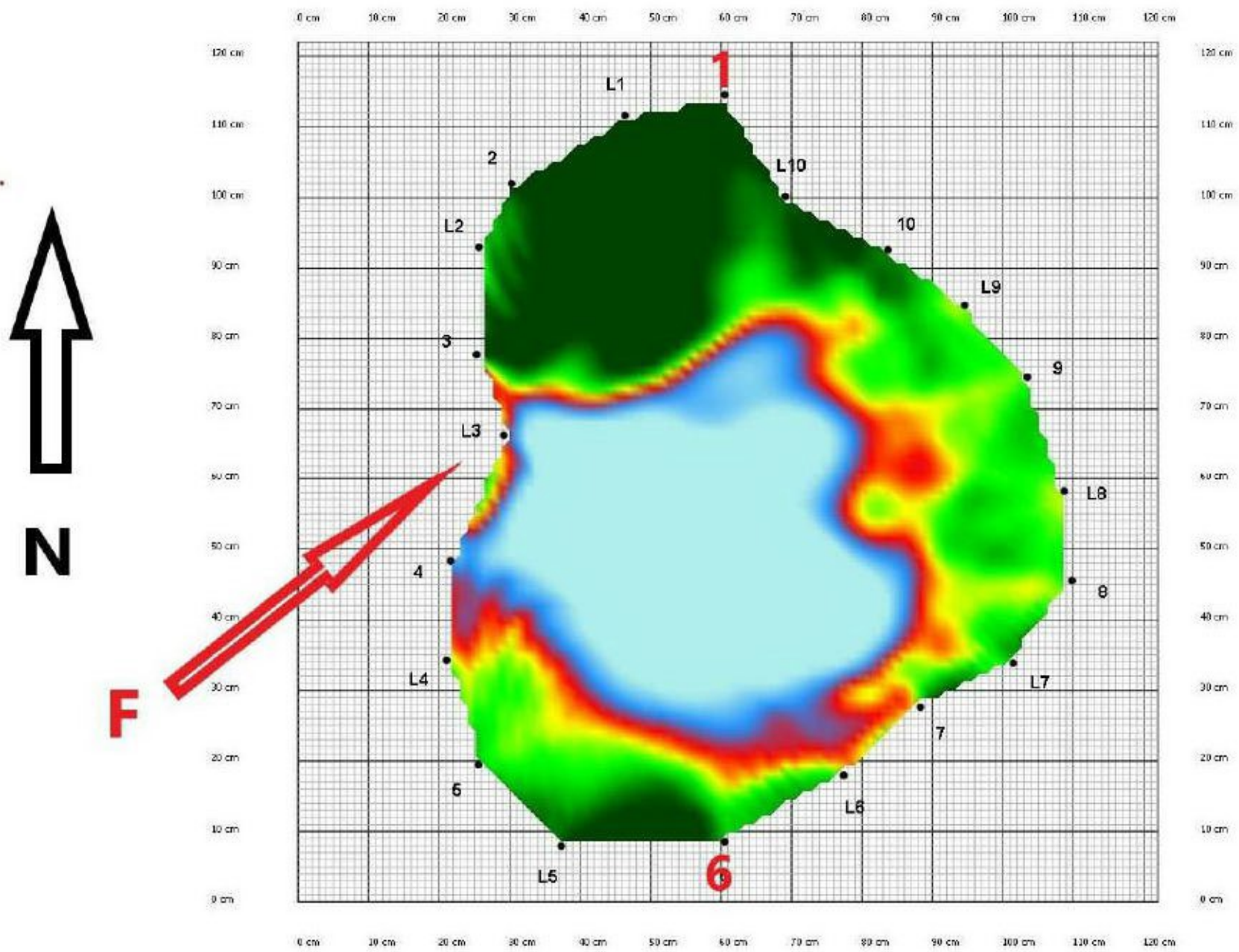


*Arborsonic set up looking North (Sensors @ 3500mm)*



*Arborsonic set up between fruiting bodies @ 3500mm- Sensors 1&6 indicated*

Appendix 4



Sonic Tomogram image-Layer @350mm . 'F' – indicates position of fruiting bodies



Crown area calculation

Tree Sensor Geometry Time Data Tomograms Biomechanics Image Container Report

**Wind**  
 Wind model: EN 1991  
 Terrain: City  
 Base wind velocity: 26.0 m/s  
 Dry air temp.: 8 °C

**Crown**  
 Crown model: Drawn  
 Area: 187.81 m<sup>2</sup>  
 Top height: 16.62 m  
 Center height: 8.74 m  
 Bottom height: 0.9 m

**Trunk**  
 Draw tilt angle  
 Degree of lean: 79 °  
 Direction of lean: Northwest

**Tree**  
 Wind load: 26831 N  
 Weighted center height: 9.02 m  
 Drag factor: 0.25  
 Yield strength: 23.9 MPa

Layer name	Height	Decay...	Safety ...	Risk...
Layer #1	35 cm	51 %	408 %	Low risk

**Details of the selected layer**

Safety factor: 408 %  
 Risk rating: Low risk  
 Decayed area: 51 %  
 Avg. TR: 0.29  
 Tree weight above layer: 8462 kg  
 M: 232498 Nm

**Safety Factor: 408 %**  
**Low risk**

Safety factor is only applicable for the trunk at the measured layer heights. The model requires an intact ring of tree material along the trunk; in any case of splitting (caused by wound, fungus, etc.) the safety factor is not applicable!

Image Editor Layer Map  
 Image Container

Editor

Safety factor Calculation

**Conclusions** - Based upon this assessment the tree has a basic safety factor of 408% which is above the minimal requirement of 150%, as such the tree is assumed to offer a **low risk of stem failure** at 0.35 m, assuming an upper wind speed of 33m/s (118.8 km/h or 73.8 mph or Beaufort Force 12) are likely to be experienced on site in the next year. The decay has the potential to overcome the remaining stem section in the longterm and will require periodic appraisal to enable comparison with this baseline information. Ideally the stem should be reassessed in this way in 5 years. The tree as a whole should be visually inspected every 12 months.

**Glossary of Terms.**

**Sonic Tomography (SOT):** Sonic tomographs detect defects (e.g., hollows or wood rot) in a non-invasive way by generating a two-dimensional map of the sound velocity transmitted across a tree’s section, mirroring the integrity of the inspected wood. It works on the principle that sound waves passing through decay move more slowly than sound waves traversing solid wood. The system sends sound waves from a number of points around a tree trunk to the same number of receiving points, the relative speed of the sound can be calculated, and a two-dimensional image is generated. Using the differences in the transit times between sensors, the analysis software constructs a two-dimensional picture, which show zones of differing sound transmission properties within the stem. The software uses pre-set colours, for example, areas with high “sonic speed” in green whereas low sonic values are shown in blue-white. Other colours of yellow & red represent various levels of rotting zones based on sonic speed measurements in the respective areas. Sonic Tomography gives valuable density information about the trees. The density strongly correlates with the soundness of the wood. This is very useful to assess the stability of the tree. In some situations, the sonic investigation is interfered with by the internal structure of the wood.

**Safety Factor.** Safety factor is the ratio of the wood strength from the species database as shown at “Strength” and this computed maximal stress, multiplied by a correction factor of 70%. The formula is:  $(SF=0.7 \text{ Strength} / \text{MaxStress})$ . The rationale behind this approach is that given all the parameters above the software tries to estimate the stress in the wood and if this exceeds the maximum limit the material can resist, then the trunk would break. This is based upon several key elements including:

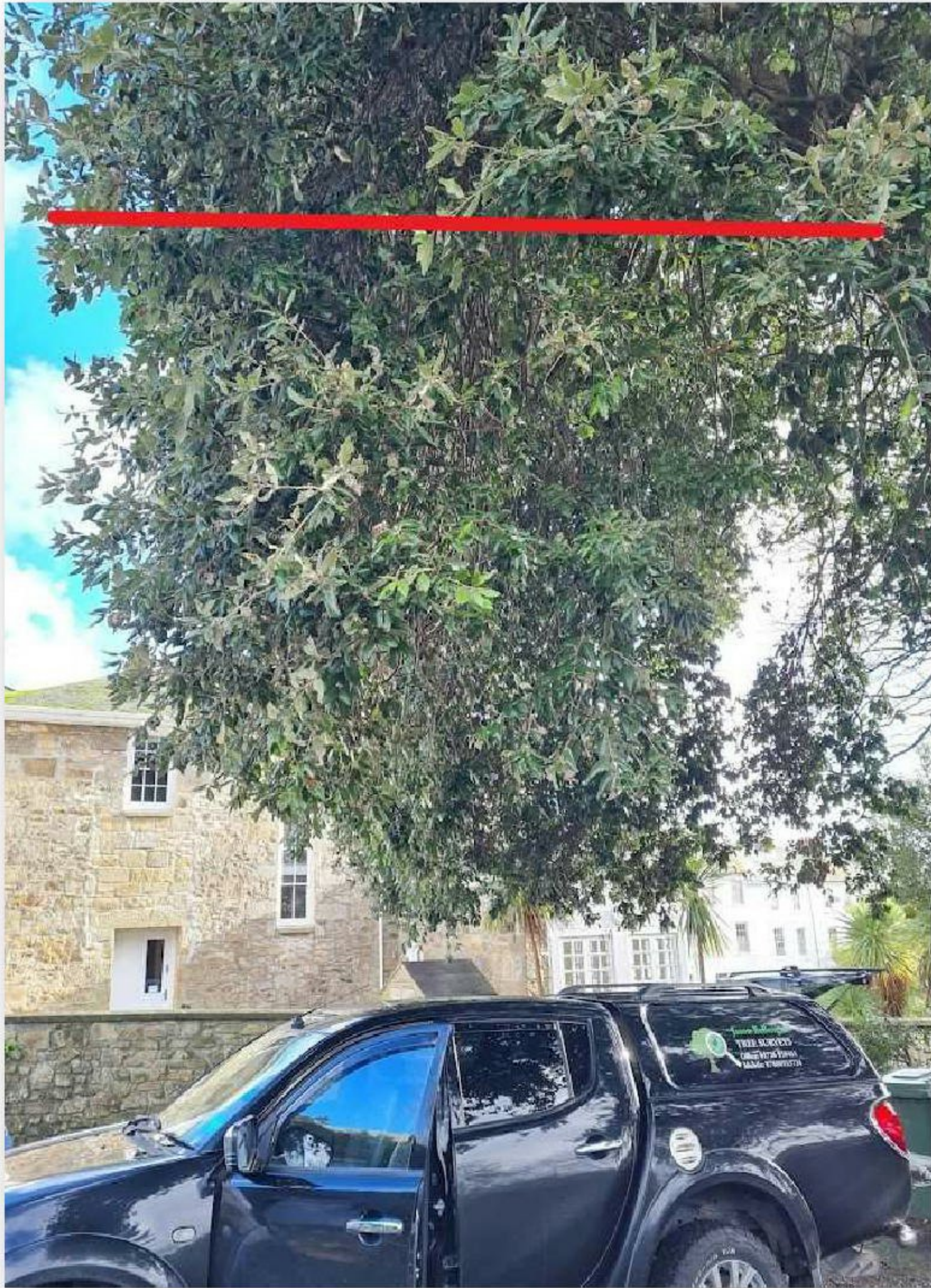
<b>Safety Factor</b>	<b>below 50%</b>	<b>50% - 100%</b>	<b>100% - 150%</b>	<b>above 150%</b>
<b>Risk Rating</b>	<b>Extreme Risk</b>	<b>High Risk</b>	<b>Moderate Risk</b>	<b>Low Risk</b>

- Expected wind speed will not breach 33m/s or 72 mph.
- Drag factor is the drag coefficient of the crown, taken from the tree species database.
- Strength is the yield strength of the trunk wood, also taken from the species database.
- Wind force is the calculated force acting on the crown centre at the given wind speed and crown size.
- Tree weight above layer (@350mm) is the estimated total weight of tree that is above the selected layer.
- The torque resulting from the wind and gravity forces.
- Max stress is the maximal stress resulting from the torque and mass of the tree, taking into consideration the tomogram. The Layer(@350mm) section shows the details for the selected layer. Decayed area is the percentage of the decayed region on the selected layer compared to the total layer area.

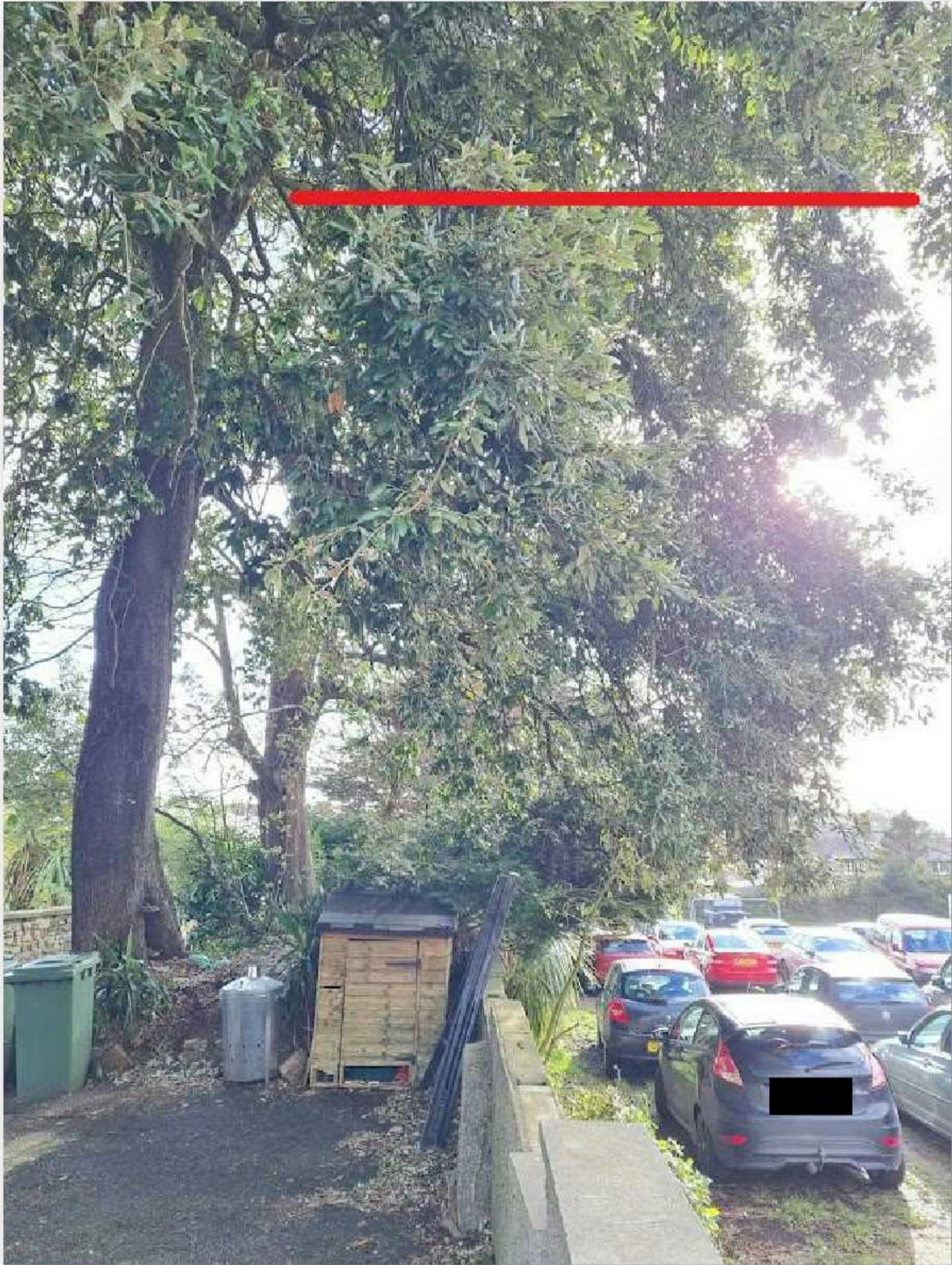
## Appendix 5 -Tree pruning Reference Photographs



*Image 1- Red line shows removal of first primary branch and branch above*



***Image 2- Red line shows crown lift over drive by 5m***



***Image 3- - Red line shows crown lift over drive/car park by 5m***





***Image 4- Red line indicates crown height reduction by 3m to leave 14m and radial crown spread by 2m to leave 5m radial crown spread (Northwest side).***