Walkers Tree Services

Professional Arboricultural Services

Tree Survey & Condition Report

The Site:
Birch Hill Garden Estate
Joseph Lister Drive
Rochdale
OL12 9RN

Date: 31/05/2026

Ref: 130

Author: Mr. M Walker

Requested by:
Mr. Stephen Harley
EnvirocareMS



Arboricultural Association Technician Member

QTRA Registered User

LANTRA AWARDS Professional Tree Inspection

UK Law regarding tree ownership and duty of care.

Tree Owners have a legal duty of care. Under both the civil law and criminal law, an owner of land on which a tree stands has responsibilities for the health and safety of those on or near the land and has potential liabilities arising from the falling of a tree or branch. Civil law gives rise to duties and potential liabilities to pay damages in the event of a breach of those duties. The criminal law gives rise to the risk of prosecution in the event of a failure to discharge a duty under the Health and Safety at Work Act 1974. *National Tree Safety Group – Common sense risk management of trees – 2024.*

Trees cannot be considered to present a zero level of hazard. Tree safety relates to the tolerability of the risks they pose within their context. The purpose of this survey is to identify and record any visible, identifiable defects present in the trees on this site so that their significance can be assessed.
Trees function as adaptive, self-optimising structures capable of acclimating to changing environmental conditions. They are also naturally shedding organisms, periodically discarding dead, damaged, or structurally subordinate components as part of normal physiological and biomechanical processes. Nevertheless, external forces—whether arising from human activity or natural events—can exceed a tree's structural capacity, resulting in partial or whole-tree failure.
Following periods of high wind, it is necessary to re-inspect medium and large trees to identify any new structural damage. Such events may also affect adjacent trees and built structures, potentially altering local wind flow and increasing subsequent wind loading on remaining trees.

*

This document is a tree condition report for the purpose of generating a tree management schedule for the site specified on the front page of this document. The site visit or visits is the source of the data gathered, and the condition of the tree or trees is determined by the site visits. Supplementary historic data can be gathered, usually if disturbance to the tree root area is evident i.e., building works, ground works or ground excavations are apparent close to trees and tree anchor roots. Walkers Tree Services holds no liability for existing damage undetectable by primary visual observations. Historic damage to tree anchor roots and general subterranean mismanagement of trees that subsequently cause damage is not the liability of Walkers Tree Services.

The content is for the use of the client only.
If any questions arise, please do contact:
Mr. M Walker
Walkers Tree Services
86 Full View
Blackburn
Lancashire
BB2 4QF
Telephone: 07549 088163
Email: walkerstreeservices@gmail.com
Website: www.walkerstreeservices.com

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Contents

1. Introduction 4
1.1. The Instruction and function of this report. 4
2. Management plan & recommendations 5
2.1. Tree work recommendations and risk analysis. 5
3. Site visit & condition of trees 7
3.1. Time of survey 7
Fig.1: Site location. 7
Notes on the sites tree stock: 8
4. Tree preservation orders (TPO) & Conservation area (CA) 9
4.7. Local authority details. 10
4.8. Tree officer details. 10
4.9. Implementation of works. 10
4.10. Statutory wildlife obligations. 10
Appendix A: Tree Works Schedule. 11
Appendix B. Tree Location. 12
Appendix C: VTA Survey Schedule. 19
Appendix D: QTRA Survey Schedule. 27
Appendix E: BS5837 Tree Quality Chart. 28
Appendix F: Key for VTA Tree Survey & QTRA Tree Survey 29
Fig.2: Representation of Visual Tree Assessment (VTA) 38
Fig.3: QTRA Risk Management Framework 39
Appendix G: Quantified Tree Risk Assessment Practice Note. 40
Appendix H: Tree Preservation Order No. 259 48
References 49

1. Introduction

1.1. The Instruction and function of this report.

Walkers Tree Services was instructed by Mr. Stephen Harley Envirocare-MS to undertake a condition survey of the trees located on the Birch Hill Gardens estate Rochdale. The survey was carried out to assess both the structural and physiological condition of the trees, with reference to risk management and general maintenance requirements.
Following identification of potential risks, and evaluation of tree benefits versus associated hazards, appropriate remedial works may be recommended. Recommendations are intended to maintain the trees in a condition proportionate to their location and once implemented, will assist the tree owners in discharging their duty of care.

1.2. This report contains two tree survey schedules. The first is a ground-level Visual Tree Assessment (VTA), providing a detailed record of observations for all trees on site.
The second schedule presents a risk assessment using the Quantified Tree Risk Assessment (QTRA) framework, in which the risk of harm associated with any identified tree defect is calculated and recorded, with corresponding work recommendations provided.
The VTA schedule is included in Appendix C, and the QTRA schedule is included in Appendix D.

1.3. The primary work recommendations arising from the survey are set out in the following section: 2. Management Plan and Recommendations, risk assessments of hazard trees are also in this section. This is followed by details of the site visit and a summary of any legal protections or constraints relevant to the trees. The final section consists of the Appendices, which contain supporting information including survey schedules, maps, definitions, methodology notes, and additional technical data.

2. Management plan & recommendations

2.1. Tree work recommendations and risk analysis.

2.2. This section outlines the recommended tree works and associated risk analysis based on findings from the site survey.

Work Recommendations Tables
The sites work is presented below in the table of recommended works.
Green represents general maintenance works.
Orange indicate risk mitigation works.

General Maintenance includes:
Clearance of vegetation from buildings, streetlights, or other structures.
Crown lifting or pruning of low-hanging branches that may obstruct pedestrian and other traffic.

Risk mitigation measures are recommended where the potential risk of harm is assessed as disproportionate to the site's use, occupancy, or the broader environmental context. "Orange works" also include tree hazards that, although not exceeding the acceptable risk thresholds for their location, present both a discernible defect and a potential target. In such cases, mitigation is guided by the ALARP principle (As Low As Reasonably Practicable), ensuring that risk reduction is proportionate and not grossly disproportionate to the benefit obtained. Further details on ALARP are provided in Appendix F.

2.3. **Birch Hill Gardens estate tree works 2026/2027.**

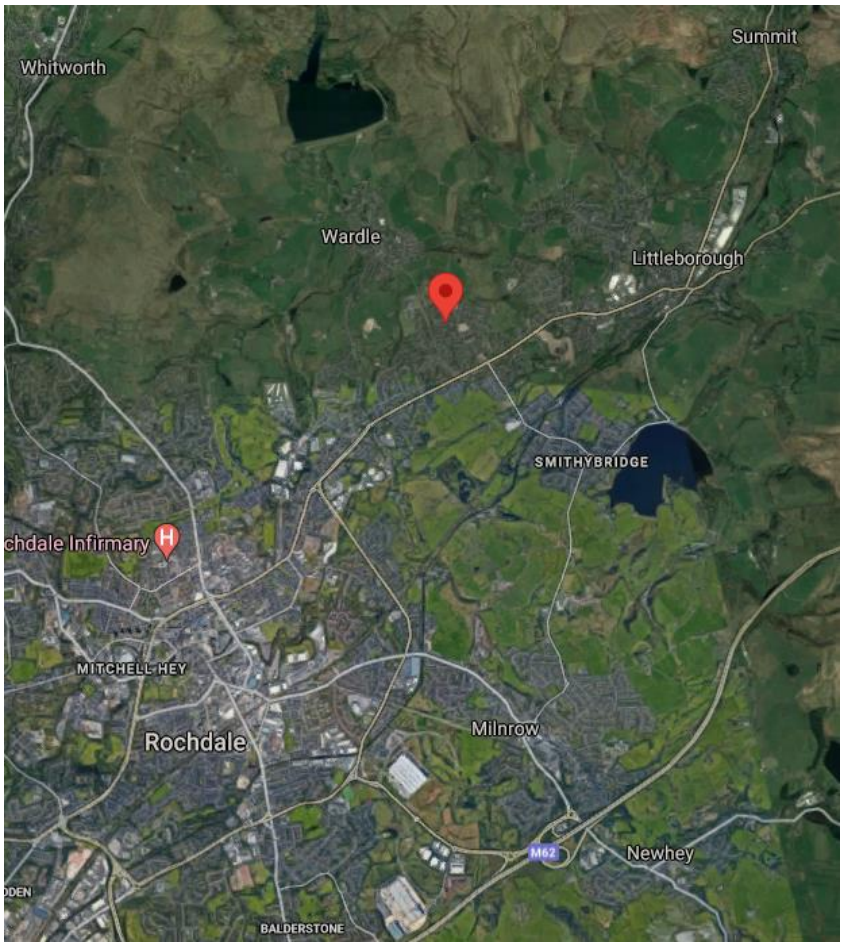
Recommended tree works		
Tree Number	**Tree Works Recommended**	**Priority Rating**
T12 Sycamore	Remove deadwood over drive	Medium – 6 months
T14 Sycamore	Remove deadwood from crown	Medium – 6 months
T34 Sycamore	Fell and remove from site	High – 30 days
T35 Cherry	Fell and remove dead tree from site	Medium – 6 months
T81 & T82 Sycamore	Opposite number 16 & 18 Oakhurst Drive – Crown raise to 4 meters from ground level and reduce branches growing toward properties by 2 meters.	Medium – 6 months

3. Site visit & condition of trees

3.1.Time of survey

3.2. The tree information and assessments were made and recorded on the 18/05/2026. The weather was dry and sunny wind was low. Visibility was good and access to all the trees was unhindered.

Fig.1: Site location.



3.3. The site is located northeast of Rochdale town. The site has been subject to a large-scale housing development. This development project has generally worked with and been constructed upon a pre-existing site layout.

Notes on the sites tree stock:

3.4. All observations were made om ground level. Tree tag numbers are for reference purposes only. As noted above, the Visual Tree Assessment (VTA) schedule is provided in Appendix C, while the Quantified Tree Risk Assessment (QTRA) schedule is presented in Appendix D.

3.5. The tree stock has been retained and protected throughout the development.
The mature tree stock on the site is of high amenity and aesthetic value, and it is a successful retention with the new housing development.

3.6. It was first reported that there were several areas where the development had had a detrimental effect on the tree stock, mainly the sycamore trees, whose susceptibility to root disturbance and the effect is oftentimes manifested in crown die back and/or specific limbs within a crown dying off after disturbance. This artifact of root disturbance is evident on Sycamore trees on site specifically in location 3.

The 2026 survey has seen the majority of the trees in good physiological condition, the three sycamore trees suffering dieback in the crown highlighted in the 2023 survey, this dysfunction appears to have arrested and remains in the upper portions of the trees, with the lower sections of the trees showing good physiological condition and thus retaining the trees being a viable recommendation. Also, the ash trees on site appear to be in upper class 2 condition. Their retention and monitoring also a reasonable recommendation

3.7. Recommendations to remove the deadwood from these trees T12 & T14 has been made.

3.8. T78, 79, 80, 81, 83 & 83 are the focus of constant resident complaints. These trees were inspected and found to have no significant defects or dysfunction that would warrant tree work on health and safety grounds.
General maintenance to allow more light into properties by crown raising the lower branches and laterally reducing the crown of the tree closest to the property may help alleviate resident's complaints. A recommendation for these works has been made.

3.9. The residual risk of harm is considered low under normal conditions.
It is acknowledged that the likelihood of branch or tree failure increases during periods of high winds.

4. Tree preservation orders (TPO) & Conservation area (CA)

4.1. The Birch Hill Clock Tower (the old hospital) is covered by a conservation area: **NAMED BIRCH HILL DEARNLEY CONSERVATION AREA**. Designated 2008

4.2. The TPO Map can be found in Appendix H: Tree Preservation Order No. 259 Map, the TPO schedule will be supplied separately.

4.3. A Tree Preservation Order is an order made by a local planning authority in England to protect specific trees, groups of trees or woodlands in the interests of public amenity. An Order prohibits the:

- cutting down
- topping
- lopping
- uprooting
- wilful damage
- wilful destruction

of trees without the local planning authority's written consent. If consent is given, it can be subject to conditions which have to be followed. In the Secretary of State's view, cutting roots is also a prohibited activity and requires the authority's consent.

4.4. Owners of protected trees must not carry out, or cause or permit the carrying out of, any of the prohibited activities without the written permission of the local authority.

4.5. Arboricultural advice from competent contractors and consultants, or the authority, will help to inform tree owners of their responsibilities and options. It is important that trees are inspected regularly, and necessary maintenance carried out to make sure they remain safe and healthy.

4.6. Trees in a conservation area that are not protected by an Order are protected by the provisions in section 211 of the Town and Country Planning Act 1990. These provisions require tree owners to notify the local planning authority, using a 'section 211 notice', 6 weeks before carrying out certain work on such trees, unless an exception applies. The work may go ahead before the end of the 6-week period if the local planning authority gives consent. This notice period gives the authority an opportunity to consider whether to make an Order on the tree.

4.7.Local authority details.

Rochdale Borough Council
https://www.rochdale.gov.uk/

4.8.Tree officer details.

Tree officer details have not been provided by the council.

4.9.Implementation of works.

Tree Works Disclaimer
All tree works should be carried out by professional arborists in accordance with BS3998: Recommendations for Tree Work. It is essential that the appointed contractor is suitably qualified, adequately insured, and undertakes the work in line with the specifications set out in the Work Schedule within this document. Walkers Tree Services accepts no liability for any damage, injury, or loss arising from works that are not undertaken in accordance with these recommendations.

4.10. Statutory wildlife obligations.

The Wildlife & Countryside Act 1981 is an important piece of wildlife legislation in Great Britain. Since the passing of the Wildlife and Countryside Act 1981 there have been various amendments to the text of the Act, most significantly through the Countryside and Rights of Way (CRoW) Act 2000 (in England and Wales) and the Nature Conservation (Scotland) Act 2004 (in Scotland). Any works done to the tree stock must take this legislation into account.

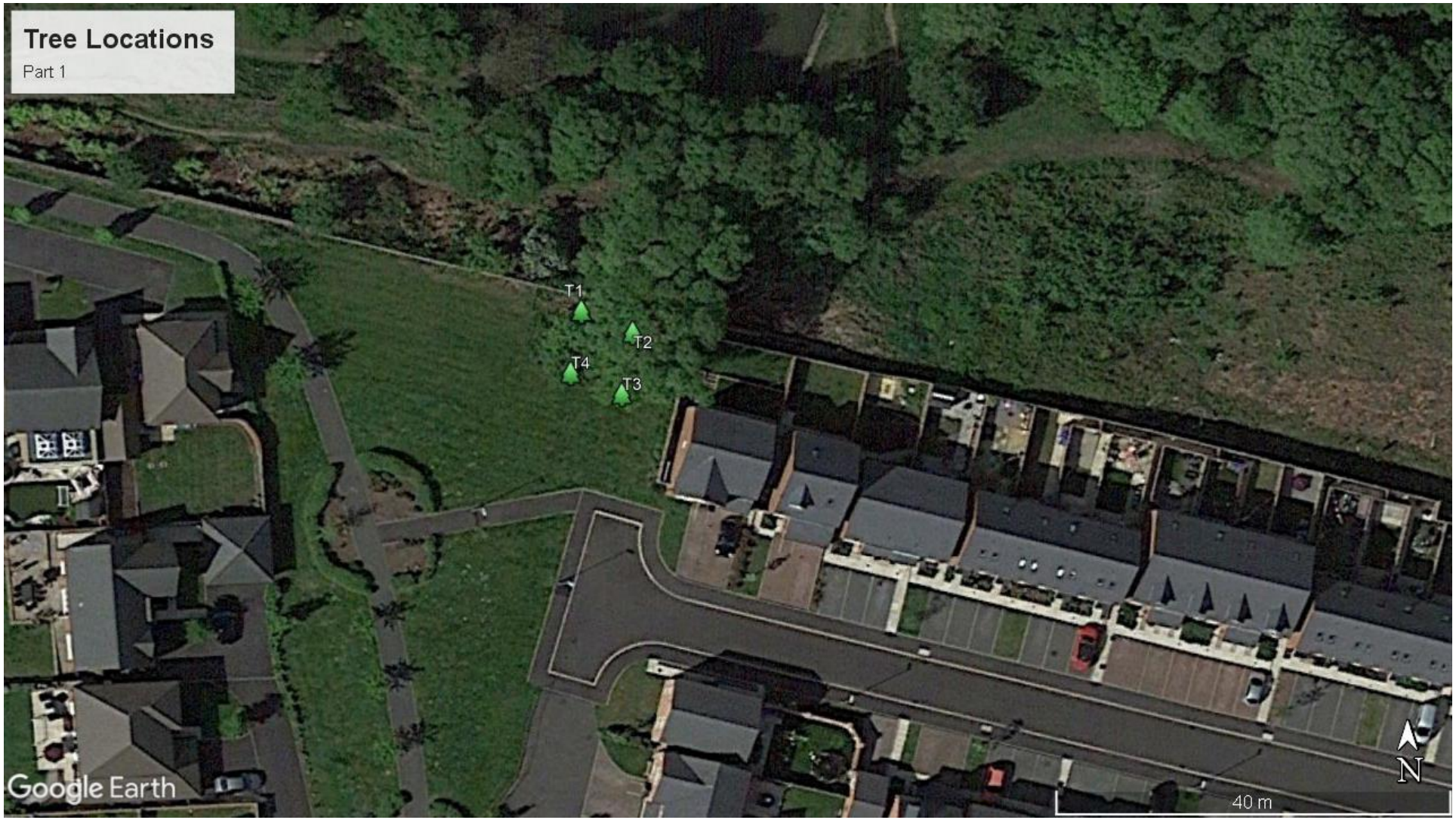
Appendix A: Tree Works Schedule.

Tree work schedule	Birch Hill Gardens estate Rochdale OL12 9RN	**Walkers Professional Arboricultural Services.** **Tree condition report.** Ref: 130 Date Issued: 31/05/2026
	Tree risk mitigation works schedule 2026	

Tree works specification herein are to be completed and conform to - BS 3998:2010 Tree Work. Recommendations. And undertaken by professional arborist only

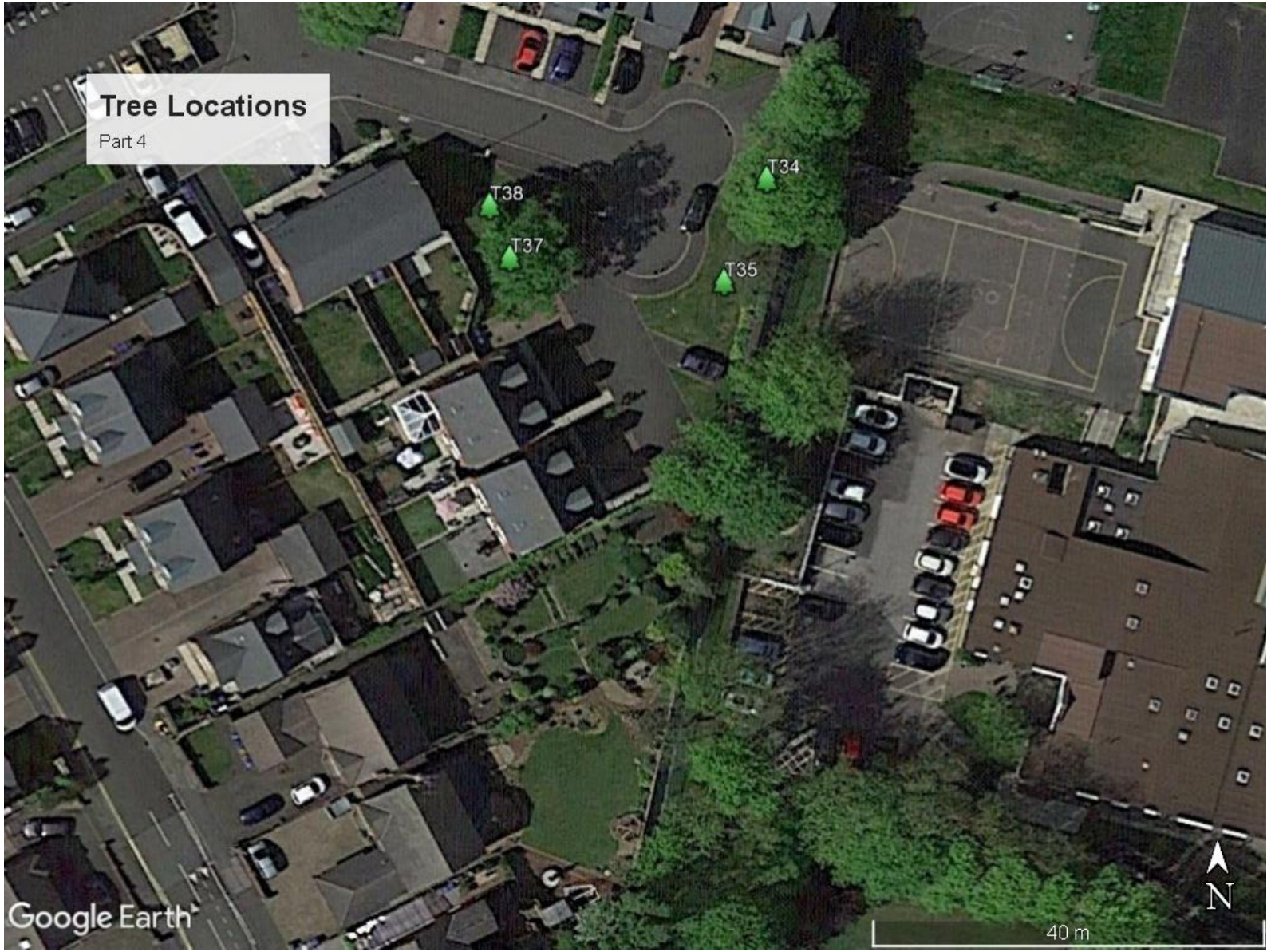
Tree Number	Works to undertake	Priority value	Date completed
T12 Sycamore	Remove deadwood over drive	Medium – 6 months	
T14 Sycamore	Remove deadwood from crown	Medium – 6 months	
T34 Sycamore	Fell and remove from site	High – 30 days	
T35 Cherry	Fell and remove from site	Medium – 6 months	
T81 & T82 Sycamore	Opposite number 16 & 18 Oakhurst Drive – Crown raise to 4 meters from ground level and reduce branches growing toward properties by 2 meters.	Medium – 6 months	

Appendix B. Tree Location.




Tree Locations
Part 2
T5
T6
T7
T8
T9
T10
T11
Google Earth
40 m
N


Tree Locations
Part 3
T12
T13
T14
T15
T16
T17
T18
T19
T20
T21
T22
T23
T24
T25
T26
T27
T28
T29
T30
T31
T32
T33
Google Earth
40 m
N


Tree Locations
Part 4
T38
T37
T34
T35
Google Earth
40 m
N


Tree Location
Part 5
T46
T45
T44
T43
T42
T41
T47
T40
T39
T48
T49
T58
T57
T56
T55
T54
T53
T52
T51
T50
T59
T61
T60
T64
T65
T66
T68
T67
T63
T74
T62
T69
T73
T70
T72
T71
G2
T77
T78
Google Earth
N


Tree Location
Part 6
T78
T81
T80
T79
T82
T83
T84
T12
T85
T86
T87
T88
T89
T90
T91
T76
T92
T93
T94
T95
T96
T97
T98
T99
N
Google Earth


Tree Location
Part 7
T122
T120
T123
T115
T121
T119
T125
T116
T118
T117
T113
T109
T107
T126
T129
T127
T112
T110
T106
T101
T100
T130
T128
T108
T105
T104
T103
T102
Google Earth
N

Appendix C: VTA Survey Schedule.

Tree Survey Ref: 130				Survey Date: 18 May 26					Birch Hill Gardens Rochdale						Surveyor & Conditions: Mr. MJ Walker			Walkers Professional Arboricultural Services
Tree Number	Tree Species	Number of Stems	DBH mm	Height - M's	Crown Spread M's	Age Class	Physiological Condition	Structural Condition	Fungi present	Target Context Value	QTRA Required?	ALARP Applied?	BS5837 Tree Quality	Remaining Contribution	Recommendations	Work to be Completed within	Reinspection	Notes
T1	Birch sp.	1	340	14	6	M	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T2	Birch sp.	1	450	14	6	M	Good	Good	No	Property	No	No	A2	>40	No work		1-year	
T3	Birch sp.	1	330	14	7	M	Good	Good	No	Property	No	No	A2	>40	No work		1-year	
T4	Birch sp.	1	640	14	5	M	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T5	Sycamore	1	430	10	6	M	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T6	Sycamore	1	340	10	4	M	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T7	Willow	7	100	6	2	Y	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T8	Willow	5	100	6	2	Y	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T9	Sycamore	1	400	11	5	M	Good	Good	No	Road	No	No	A2	>40	No work		1-year	
T10	Sycamore	1	450	17	7	M	Good	Good	No	Road	No	No	A2	>40	No work		1-year	

T11	Ash	1	380	14	7	M	Good	Good	No	Road	No	No	A2	>40	No work		1-year	
T12	Sycamore	1	640	12	7	M	Fair	Fair	No	Property	No	No	A2	>40	Remove deadwood		1-year	
T13	Beech	1	460	13	5	M	Good	Good	No	Property	No	No	A2	>40	No work		1-year	
T14	Sycamore	1	480	13	4	EM	Fair	Fair	No	Road	No	No	A2	>40	Remove deadwood		1-year	
T15	Sycamore	1	410	12	4	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T16	Lime sp.	1	350	12	4	EM	Good	Good	No	Property	No	No	A2	>40	No work		1-year	
T17	Lime sp.	1	400	12	4	EM	Good	Good	No	Property	No	No	A2	>40	No work		1-year	
T18	Sycamore	1	490	13	7	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T19	Birch sp.	1	260	15	4	M	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T20	Lime sp.	1	430	12	5	M	Good	Good	No	Property	No	No	A2	>40	No work		1-year	
T21	Sycamore	1	360	12	3	Y	Fair	Fair	No	Medium	No	No	A2	>40	No work		1-year	
T22	Sycamore	1	360	12	5	EM	Fair	Good	No	Medium	No	No	A2	>40	No work		1-year	
T23	Sycamore	1	340	12	4	EM	Fair	Fair	No	Low	No	No	C2	>40	No work		1-year	
T24	Sycamore	1	320	11	3	EM	Fair	Fair	No	Low	No	No	C2	>40	No work		1-year	
T25	Sycamore	1	430	10	5	M	Poor	Fair	No	Medium	No	No	A2	>40	No work		1-year	
T26	Sycamore	1	410	13	5	M	Good	Good	No	Medium	No	No	A2	>40	No work		1-year	
T27	Sycamore	1	340	10	4	EM	Good	Good	No	Medium	No	No	A2	>40	No work		1-year	
T28	Sycamore	1	410	10	4	EM	Good	Good	No	Medium	No	No	A2	>40	No work		1-year	
T29	Sycamore	1	380	10	4	EM	Good	Good	No	Medium	No	No	A2	>40	No work		1-year	
T30	Sycamore	1	450	12	4	EM	Good	Good	No	Medium	No	No	A2	>40	No work		1-year	

T31	Sycamore	1	400	14	6	EM	Good	Good	No	Medium	No	No	A2	>40	No work		1-year	
T32	Sycamore	1	290	11	4	Y	Good	Good	No	Medium	No	No	A2	>40	No work		1-year	
T33	Sycamore	1	440	12	5	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T34	Sycamore	1	530	13	8	M	Good	Poor	Yes	Property	Yes	No	C1	<10	Fell			Kretzschmaria at base of stem and on stem at large.
T35	Cherry	1	310	6	5	EM	Dead	Dead	No	Low	Yes	No	C1	<10	Fell			
T37	Lime sp.	1	560	14	7	M	Good	Good	No	Property	No	No	A2	>40	No work		1-year	
T38	Conifer sp.	1	210	7	2	y	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T39	Ash	1	680	14	7	M	Fair	Fair	No	Property	No	No	C1	>40	No work		1-year	
T40	Birch sp.	1	380	15	8	EM	Good	Good	No	Road	No	No	A2	>40	No work		1-year	
T41	Rowan sp.	1	380	15	7	M	Good	Good	No	Road	No	No	A2	>40	No work		1-year	
T42	Sycamore	1	380	15	5	EM	Good	Good	No	Road	No	No	A2	>40	No work		1-year	
T43	Sycamore	1	700	14	8	M	Good	Good	No	Road	No	No	A2	>40	No work		1-year	
T44	Beech	1	280	8	4	Y	Good	Good	No	Road	No	No	A2	>40	No work		1-year	
T45	Sycamore	1	410	15	4	EM	Good	Good	No	Road	No	No	A2	>40	No work		1-year	
T46	Sycamore	1	350	15	4	EM	Good	Good	No	Road	No	No	A2	>40	No work		1-year	
T47	Ash	1	510	14	5	M	Good	Good	No	Medium	No	No	A2	>40	No work		1-year	
T48	Sycamore	1	550	15	5	M	Good	Good	No	Medium	No	No	A2	>40	No work		1-year	
T49	Sycamore	1	440	15	7	M	Good	Good	No	Medium	No	No	A2	>40	No work		1-year	

T50	Ash	1	580	15	7	M	Good	Good	No	Medium	No	No	A2	>40	No work		1-year	
T51	Sycamore	1	460	15	5	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T52	Sycamore	1	360	15	3	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T53	Sycamore	1	360	15	5	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T54	Sycamore	1	360	15	4	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T55	Ash	1	430	14	5	EM	Fair	Good	No	Low	No	No	A2	>40	No work		1-year	
T56	Sycamore	1	350	13	6	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T57	Sycamore	1	230	12	4	Y	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T58	Lime sp.	1	360	10	7	EM	Good	Good	No	Road	No	No	A2	>40	No work		1-year	
T59	Lime sp.	1	520	13	8	M	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T60	Lime sp.	1	470	16	10	M	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T61	Horse Chestnut	1	570	16	10	M	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T62	Sycamore	1	340	15	4	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T63	Sycamore	1	360	14	4	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T64	Ash	1	380	16	5	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T65	Ash	1	430	16	6	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T66	Rowan sp.	1	310	8	6	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T67	Ash	1	570	16	10	M	Good	Good	No	Low	No	No	A2	>40	No work		1-year	

T68	Sycamore	1	360	13	6	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T69	Sycamore	1	160	9	2	Y	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T70	Rowan sp.	1	230	9	4	EM	Good	Fair	No	Low	No	No	C1	>40	No work		1-year	
T71	Sycamore	1	360	11	5	EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T72	Birch sp.	1	430	18	7	M	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T73	Lime sp.	1	500	17	8	M	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T74	Birch sp.	1	470	14	8	M	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
G2	Mixed Sp.	10+				EM	Good	Good	No	Low	No	No	A2	>40	No work		1-year	
T75	Lime sp.	1	460	17	9	M	Good	Good	No	Road	No	No	A2	>40	No work		1-year	
T76	Cherry	1	400	5	8	M	Fair	Good	No	Low	No	No	A2	>40	No work		1-year	
T77	Birch sp.	3	320	13	12	M	Good	Good	No	Property	No	No	A2	>40	No work		1-year	
			370															
			350															
T78	Sycamore	1	630	12	13	M	Good	Good	No	Road	No	No	A1	40	No work		1-year	
T79	Sycamore	1	470	14	8	M	Good	Good	No	Low	No	No	A2	40	No work		1-year	
T80	Sycamore	1	590	14	6	M	Good	Good	No	Carpark	No	No	A2	40	No work		1-year	
T81	Sycamore	1	570	12	7	M	Good	Good	No	Footpath	No	No	A2	40	No work		1-year	
T82	Sycamore	1	440	14	5	M	Good	Good	No	Low	No	No	A2	40	No work		1-year	
T83	Sycamore	1	660	15	11	M	Good	Good	No	Property	No	No	A1	40	No work		1-year	

T84	Lime sp.	1	540	13	10	M	Good	Good	No	Property	No	No	B1	20	No work		1-year	
T85	Sycamore	1	680	13	12	M	Good	Good	No	Road	No	No	A1	40	No work		1-year	
T86	Lime sp.	1	450	14	11	M	Good	Good	No	Property	No	No	A1	40	No work		1-year	
T87	Elm	1	440	13	6	M	Good	Good	No	Property	No	No	A1	40	No work		1-year	
T88	Lime sp.	1	490	13	7	M	Good	Good	No	Property	No	No	A1	40	No work		1-year	
T89	Sycamore	1	420	12	5	M	Good	Good	No	Property	No	No	A1	40	No work		1-year	
T90	Sycamore	1	490	12	6	M	Good	Good	No	Property	No	No	A1	40	No work		1-year	
T91	Sycamore	1	760	12	10	M	Good	Good	No	Property	No	No	A1	40	No work		1-year	
T92	Sycamore	1	690	12	12	M	Good	Good	No	Road	No	No	A1	40	No work		1-year	
T93	Birch sp.	2	160	9	4	Y	Good	Good	No	Road	No	No	B1	40	No work		1-year	
			200															
T94	Sycamore	1	760	12	10	M	Good	Good	No	Property	No	No	A1	40	No work		1-year	
T95	Sycamore	1	890	13	12	M	Good	Fair	No	Property	No	No	B1	20	No work		1-year	
T96															Removed			
T97	Sycamore	1	540	11	10	M	Fair	Fair	No	Property	No	No	C1	10	No work		1-year	
T98	Horse Chestnut	1	560	11	8	M	Good	Poor	No	Property	No	No	C1	10	No work		1-year	
T99	Horse Chestnut	1	600	12	10	M	Good	Good	No	Car park	No	No	A1	10	No work		1-year	

T100	Norway Maple	1	510	14	8	EM	Good	Good	No	Low	No	No	A1	40	No work		1-year	
T101	Norway Maple	1	370	14	5	EM	Good	Good	No	Low	No	No	A2	40	No work		1-year	
T102	Norway Maple	1	400	14	5	EM	Fair	Good	No	Road	No	No	A2	40	No work		1-year	
T103	Norway Maple	1	360	14	6	EM	Good	Good	No	Road	No	No	A2	40	No work		1-year	
T104	Norway Maple	1	350	8	5	EM	Good	Good	No	Low	No	No	A2	40	No work		1-year	
T105	Lime sp.	1	470	16	7	M	Good	Good	No	Road	No	No	A2	40	No work		1-year	
T106	Norway Maple	1	350	12	5	EM	Good	Good	No	Road	No	No	A2	40	No work		1-year	
T107	Horse Chestnut	1	490	16	7	EM	Good	Good	No	Low	No	No	A2	40	No work		1-year	
T108	Lime sp.	1	350	12	5	EM	Good	Good	No	Road	No	No	A2	40	No work		1-year	
T109	Norway Maple	1	500	16	6	M	Good	Good	No	Low	No	No	A2	40	No work		1-year	
T110	Norway Maple	1	440	16	8	EM	Good	Good	No	Road	No	No	A2	40	No work		1-year	
T112	Norway Maple	1	340	14	5	EM	Good	Good	No	Low	No	No	A2	40	No work		1-year	
T113	Norway Maple	1	370	14	6	EM	Good	Good	No	Road	No	No	A2	40	No work		1-year	
T114	Norway Maple	1	350	12	6	EM	Good	Good	No	Low	No	No	A2	40	No work		1-year	
T115	Rowan Sp.	5	640	14	14	M	Good	Good	No	Property	No	No	A1	40	No work		1-year	
			460															
			250															
			340															
			310															

T116	Norway Maple	1	600	15	9	M	Good	Good	No	Road	No	No	A2	40	No work		1-year	
T118	Norway Maple	1	470	14	9	M	Good	Good	No	Road	No	No	A2	40	No work		1-year	
T119	Sycamore	1	560	14	8	M	Good	Good	No	Road	No	No	A2	40	No work		1-year	
T120	Norway Maple	1	510	13	9	M	Good	Good	No	Low	No	No	A2	40	No work		1-year	
T121	Norway Maple	1	430	13	7	M	Good	Good	No	Low	No	No	A2	40	No work		1-year	
T122	Rowan Sp.	1	270	12	4	M	Good	Good	No	Low	No	No	A2	40	No work		1-year	
T123	Norway Maple	1	580	12	8	M	Good	Good	No	Drive	No	No	A2	40	No work		1-year	
T124	Norway Maple	1	580	14	9	M	Good	Good	No	Drive	No	No	A2	40	No work		1-year	
T125	Lime sp.	1	560	12	10	M	Good	Good	No	Road	No	No	A1	40	No work		1-year	
T126	Beech	1	400	12	6	M	Good	Good	No	Low	No	No	A1	40	No work		1-year	
T127	Horse Chestnut	1	320	12	5	EM	Good	Good	No	Low	No	No	C1	10	No work		1-year	
T128	Sycamore	1	530	13	9	M	Good	Good	No	Low	No	No	A1	40	No work		1-year	
T129	Sycamore	1	460	13	9	M	Good	Good	No	Property	No	No	A1	40	No work		1-year	
T130	Lime sp.	1	510	14	9	M	Good	Good	No	Low	No	No	A1	40	No work		1-year	

Appendix D: QTRA Survey Schedule.

SITE: Birch Hill Gardens estate OL12 9RN											SURVEYOR:			Mr. Walker
CLIENT: Envirocare-MS											ASSESSMENT DATE:			18/05/2026
BRIEF: Assessing mature tree stock that is within the influence of people and property found during survey											JOB REFERENCE:			130
TREE NO.	SPECIES	DBH - mm	HIGHT (M)	CROWN SPREAD (M)	AGE RANGE	VITALITY	COMMENTS	MANAGEMENT	RISK ASSESSMENT OF	TARGET RANGE	SIZE RANGE	PROB RANGE	REDUCED MASS	RISK OF HARM	PRIORITY
T34	Sycamore	1	530	13	M	Fair	Large tree with significant stem decay column and heavy infection and spread of *Kretzschmaria ustulina at base and up stem of tree*	Fell	stem	2	1	2		1/400	Urgent -High
T12	Sycamore	1	480	13	M	Fair	Dead portions tree adjacent highway and driveway	Remove deadwood	Upper portions of crown for failure	3	2	3		1/100K	RoH Acceptable if risk ALARP.
T14	Sycamore	1	480	13	M	Fair	Dead portions tree adjacent highway and footpath	Remove deadwood	Upper portions of crown for failure	3	2	3		1/100K	RoH Acceptable if risk ALARP.

Appendix E: BS5837 Tree Quality Chart.

Table 1 **Cascade chart for tree quality assessment**

Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see Note)				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	• Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) • Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline • Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality *NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see **4.5.7**.*			See Table 2
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**	
Trees to be considered for retention				
Category A **Trees of high quality** with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	See Table 2
Category B **Trees of moderate quality** with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value	See Table 2
Category C **Trees of low quality** with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value	See Table 2

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Appendix F: Key for VTA Tree Survey & QTRA Tree Survey

The VTA survey schedule has a number of headings along the x axis, these are:
1. Tree number, 2. Tree species, 3. Number of Stems, 4. DBH mm, 5. Height m, 6. Crown Spread m, 7. Age Class, 8. Physiological Condition, 9. Structural Condition, 10. Fungi present, 11. Target Value Context, 12. QTRA Required, 13. BS5837 Tree Quality, 14. Remaining Contribution, 15. Recommendations, 16. Works Competition Timeframe, 17. Resurvey Timeframe, 18. Notes.

1. Tree Number: This is the unique numerical identifier assigned to a specific tree. Each tree on a given site is designated a whole number for identification purposes. This number remains consistent throughout the survey and corresponds to the survey maps, where the tree's approximate location is plotted on the site map.

2. Tree Species. The common name of the tree is used in the survey schedule; the trees scientific name may be used elsewhere in the survey if necessary. Scientific names are always written using *italic font.*

3. Number of Stems: This records the total number of stems a tree has. Documenting this physiological characteristic can assist in identifying trees, especially when multiple trees of the same species are located close together. Additionally, twin stems may indicate a structural defect, and noting such defects is a crucial aspect of the survey.

4. DBH. DBH stands for Diameter at Breast Height. It is a standard measurement used in tree surveying and forestry to determine the diameter of a tree stem. DBH is measured at 1.37 meters above the ground on the uphill side of the tree. This measurement is important for assessing tree size, growth, and health.

5. Height. Height refers to the vertical distance measured in meters, from the base of the tree, at ground level, to its highest point. It is an important measurement for assessing tree growth, biomass, ecological value, and potential hazards. Tree height is often used alongside DBH to determine tree volume, age, and overall tree population health.

6. Crown Spread. Tree crown spread refers to the horizontal width of a tree's crown, measuring the extent of its branches. It helps assess the tree's overall health, growth, and impact on its surroundings. Tree crown spread is measured using two perpendicular measurements:

- The widest point of the canopy is measured.
- A second measurement is taken at a right angle to the first.
- The average of these two measurements is often used as the tree's crown spread.

7. Age Class. Description of the approximate age of the tree.

- Y = Young tree not yet reaching 1/3rd of the species expected final height.
- EM = Early Mature tree that has achieved 1/3rd to 2/3rds of the species expected final height.
- M = Mature tree that is close to its expected final height and crown size.

- LM = Late Mature tree having achieved its expected height and volume expectant of species, whose growth has slowed and can be expected to begin to decline in vigour.
- V = Veteran tree in its final stage of life characterized by a decline in the volume of the crown and root system; these trees necessarily exhibit biological aesthetic or cultural value.
- Dead = Dead tree regardless of age.

8. Physiological Condition. This category refers to the overall health and vitality of the tree, assessing its ability to grow, resist disease, and respond to environmental stress. It is a key factor in tree management, risk assessment and conservation planning.
Assessing the physiological condition is central in risk assessment for potential tree failure.

Key Aspects of Physiological Condition Assessment:

Foliage Health
- Colour, density, and size of leaves
- Presence of chlorosis (yellowing), necrosis (browning), or defoliation

Branch Structure & Growth
- Presence of deadwood or dieback in the canopy
- Signs of epicormic growth (stress-related shoots)
- Vigorous new growth vs. stagnation

Stem & Bark Condition
- Cracks, cavities, fungal growth, or bark loss
- Signs of decay, pests, or disease (e.g., fungal brackets, oozing sap)

Root Health
- Stability and exposure of roots
- Presence of girdling roots (roots wrapping around the base, restricting growth)
- Signs of root decay or fungal infections

Pest & Disease Presence
- Insects (e.g., borers, aphids, scale)
- Fungal infections (e.g., powdery mildew, root rot)
- Bacterial or viral diseases affecting leaves, stems, or roots

Physiological Condition Categories:
Good – Healthy, vigorous growth with no significant issues.
Fair – Some minor stress signs but no major decline.
Poor – Significant decline, visible decay, or structural weakness.
Dead/Dying – No signs of new growth, extensive decay, or structural failure.

9. Structural Condition. Structural Condition refers to the physical integrity and stability of the tree, assessing its potential for failure due to defects, decay, or poor form. It is a critical factor in risk assessment, tree management, and conservation planning.

Key Factors in Structural Condition Assessment:

Stem Stability & Defects
Presence of cracks, cavities, or hollows
Leaning or signs of movement at the base

Splits or included bark at branch unions

Branch Structure & Attachments

- Weak or poor branch attachments (e.g., codominant stems with tight unions)
- Presence of large, dead, or broken branches
- Excessive end weight or imbalance in canopy distribution

Root System & Stability

- Exposure of roots or evidence of root damage
- Presence of root decay or fungal fruiting bodies
- Soil heaving or movement near the base

Decay, Disease & Pests

- Fungal growth (e.g., brackets, mushrooms) indicating internal decay
- Presence of wood-boring insects or significant pest damage
- Signs of basal decay or weakening of structural roots

Response Growth & Compensatory Mechanisms

- Presence of reaction wood (e.g., thickened growth on stressed areas)
- Epicormic shoots, which may indicate stress or decline
- Ability of the tree to compartmentalize wounds

Structural Condition Categories:
Good – Strong stem and branch structure, no significant defects.
Fair – Some minor defects but no immediate risk of failure.
Poor – Structural weaknesses that may pose a risk.

10. Fungi Present. This records the presence of any fungal growth on or around the tree. Fungi can be an indicator of decay, disease, or structural weakness. Identifying and documenting fungal presence is essential for assessing the tree's overall health and stability and is determined by primary visual observations.
Fungus identification has a significant effect on tree risk assessment and is central to management decisions in order to prevent injury, property damage and to ensure public safety and tree stock sustainability.

11. Target Context Value. This is the value of a target within the range of influence of the tree being surveyed. The value is directly taken from the Quantified Tree Risk Assessment method. The specific target will be named in this section.
Assessing land-use (Targets) and the nature of the land-use beneath or adjacent to a tree will usually inform the level and extent of risk assessment to be carried out. In the assessment of Targets, six ranges of value are available. The table below sets out these ranges for vehicular frequency, human occupation and the monetary value of damage to property. Each tree will be evaluated to ascertain which target range is most descriptive of the trees surrounding. Targets ranges are used in this survey to both calculate a particular risk and also inform the zoning of a site by usage or value. A tree will be given a Target Value based on its location and adjacent land-use and or property value.

Targets

Target Range	Property Value (repair or replacement)	Human (not in vehicles)		Vehicle Traffic (number per day)	Ranges of Value (probability of occupation or fraction of £2 000 000)
1	£2 000 000 - >£200 000	**Occupation:** **Pedestrians & cyclists:**	Constant – 2.5 hours/day 720/hour – 73/hour	26 000 – 2 700 @ 110kph (68mph) 32 000 – 3 300 @ 80kph (50mph) 47 000 – 4 800 @ 50kph (32mph)	1/1 – >1/10
2	£200 000 - >£20 000	**Occupation:** **Pedestrians & cyclists:**	2.4 hours/day – 15 min/day 72/hour – 8/hour	2 600 – 270 @ 110kph (68mph) 3 200 – 330 @ 80kph (50mph) 4 700 – 480 @ 50kph (32mph)	1/10 – >1/100
3	£20 000 - >£2 000	**Occupation:** **Pedestrians & cyclists:**	14 min/day – 2 min/day 7/hour – 2/hour	260 – 27 @ 110kph (68mph) 320 – 33 @ 80kph (50mph) 470 – 48 @ 50kph (32mph)	1/100 – >1/1 000
4	£2 000 - >£200	**Occupation:** **Pedestrians & cyclists:**	1 min/day – 2 min/week 1/hour – 3/day	26 – 4 @ 110kph (68mph) 32 – 4 @ 80kph (50mph) 47 – 6 @ 50kph (32mph)	1/1 000 – >1/10 000
5	£200 - >£20	**Occupation:** **Pedestrians & cyclists:**	1 min/week – 1 min/month 2/day – 2/week	3 – 1 @ 110kph (68mph) 3 – 1 @ 80kph (50mph) 5 – 1 @ 50kph (32mph)	1/10 000 – >1/100 000
6	£20 - £2	**Occupation:** **Pedestrians & cyclists:**	<1 min/month – 0.5 min/year 1/week – 6/year	None	1/100 000 – 1/1 000 000

12. QTRA Required? This refers to the second survey schedule in this document.
And is a further detailed risk assessment to evaluate a tree hazard with a risk of harm. The QTRA Survey Schedule is found in Appendix D.

13. BS5837 Tree Quality. This refers to the British Standard for assessing trees in relation to construction and development projects. It categorizes trees based on their condition, life expectancy, and value to help guide planning decisions. Its inclusion in this survey is to provide a qualitive value to trees as they are surveyed. This can help in such cases where, for example, a tree may be included in a large group tree preservation order, but its form is poor and effect on neighbouring trees is detrimental. Or where a tree is a particularly fine example of the species, it is a quick way to provide solid data on a trees qualitive value. The table from BS 5837 is presented in Appendix E.

BS 5837 Tree Quality Categories:
Trees are classified into four categories (A, B, C, U) based on their retention value:
Category A (High Quality – Retention Strongly Recommended)
Trees of good structure and health with a long-life expectancy (40+ years).
Provide significant amenity, ecological, or cultural value.
Should be prioritized for retention in development plans.

Category B (Moderate Quality – Retention Desirable)
Trees of good to moderate condition with a reasonable life expectancy (20+ years).

May have defects but still contribute to the landscape.
Worthy of retention but not as high priority as Category A.

Category C (Low Quality – Retention Optional)
Trees of limited value due to poor form, minor defects, or short lifespan (10+ years).
Often young or smaller trees with potential for replacement.
Retention is not a priority, and removal may be acceptable.

Category U (Unsuitable for Retention – Removal Recommended)
Trees that are dead, dying, or in irreversible decline.
Have serious structural or physiological defects that pose a risk.
Likely to fail within <10 years, making retention impractical.

14. Remaining Contribution. This value is directly related to the BS 5837 output. Category A trees have a 40+ expected remaining contribution, B trees have a 20+ years remaining contribution and category C trees have 10+ year remaining contribution. Category U have less than 10 years remaining contribution.

15. Recommendations. The findings of the survey will result in the trees being placed in one of two categories, although not written explicitly under a survey heading the categories are:

- Work required
- Work not required.

If a tree is assessed and does not require work it will be recorded in the survey with the work recommendation field left blank, and no further mention of the tree, other than its resurvey date, is provided.
If a tree is assessed and work is required, then the work options will usually be one or more of the following 3 categories:

- **Necessary work** - *Mitigating risk of harm from a tree hazard – by default this ranges from Urgent to High priority work.*
- **Statutory tree maintenance** - *Achieving statutory branch height clearances over footpaths and roads – by default this is High Priority work*
- **Functional maintenance** – *Clearing tree parts from buildings and utilities to avoid damages also maintaining clearances for other ground works (like grass cutting).*

16. Work Completion Timeframe. A timeframe that is provided in which the work recommended must be completed within. This timeframe reflects the importance and urgency of the work recommendations.

17. Resurvey Timeframe. A timeframe that is provided in which the tree is recommended to be re-surveyed within. This timeframe reflects the condition and location of the tree. Trees in high target value areas can be surveyed often as opposed to trees in low target value areas that would require surveying less frequently.

18. Notes. The notes section is reserved for any further written notes that need to be made regarding the trees condition.

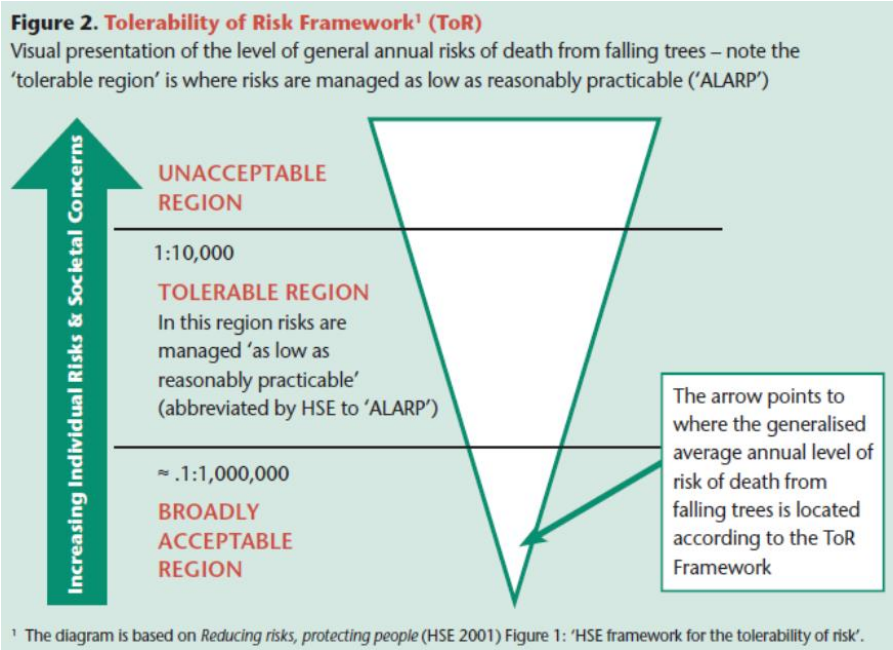
ALARP.
Although this heading is not in the main survey schedule the concept of ALARP is central to the way that tree risk mitigation is managed.

ALARP is short for "as low as reasonably practicable".
At the core of this framework is the concept of "reasonably practicable"; this involves weighing a risk against the trouble, time and money needed to control it. Thus, ALARP describes the level to which we expect to see workplace (workplace includes managed trees) risks controlled.
The concept of "reasonably practicable" lies at the heart of the British health and safety system. It is a key part of the general duties of the Health and Safety at Work Act 1974 - *www.hse.gov.uk/enforce/expert/alarpglance*

Reproduced on page 1 of this document is the introduction to section 5 Trees and the law written by the National Tee Safety Group. It provides a brief explanation of tree owners legal duty of care under civil and criminal law. With the Occupiers' Liability Act 1957 or 1984 codifying a tree owners' civil duty of care for the safety of those who may come into the vicinity of a tree.

The Health and Safety at Work etc. Act 1974 imposes responsibilities on duty holders for the safety of employees and others affected by their activities. This includes tree owners and managers, as they are the people best placed to assess the risk and take the necessary action to reduce it to a reasonable level. The HSWA obliges them to reduce the risk as low as reasonably practicable (ALARP). The law does not require the creation of a 'risk-free' environment - *National Tree Safety Group Section 6.0.*

ALARP belongs within a broader risk assessment framework, the Tolerability of Risk Framework (ToR). Below are two visual representations of ToR, the first one with the generalised average annual level of risk of death from falling trees highlighted.

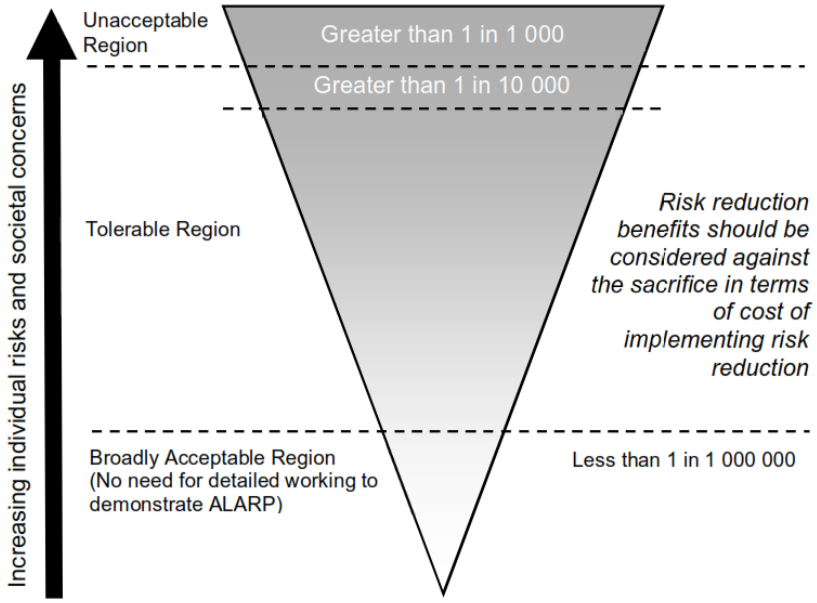


In summary, ALARP in tree surveying is used in risk management and decision-making

processes, particularly in health and safety contexts. Applied within this survey, ALARP helps ensure that risks associated with trees are managed to a level that is as low as reasonably practicable, balancing safety, cost, feasibility and the benefit that trees provide.

Tree Management under the Tolerability of Risk and the ALARP Principle.

Scheduling remedial works (e.g., pruning, bracing, or removal) for a tree with an identified hazard is generally regarded as acting within the ALARP framework. This aligns with the duty holder's legal obligations to proactively manage risks through assessment and prioritised interventions, ensuring they remain tolerable or broadly acceptable under the Tolerability of Risk (TOR) model. For instance, if an inspection reveals defects like structural weaknesses or decay, recommending and scheduling works demonstrates reasonable prudence, provided the timing and scope are proportionate to the risk level (e.g., imminent threats prioritized over lower ones). This process avoids unnecessary tree loss while maintaining safety, as outlined in NTSG's decision-making flow (e.g., identifying risks, evaluating benefits vs. hazards, and implementing controls).



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Tree Survey Methodology:

4.11. The height of the tree is measured from ground level. The height is measured using laser device from several locations to get an accurate measurement.

4.12. Tree stem diameter is measured at 1.37 (approximately) meters above ground level; noted if otherwise. This measurement is written as DBH (Diameter at Breast Height). Only trees with a diameter of 200mm and above are recorded in the tree survey schedule as individuals.

4.13. The method used to assess the trees condition, both physiologically and structurally, is the Visual Tree Assessment (VTA). This is a detailed assessment that is focused and stepwise. Fig1 is a diagrammatic representation of the procedure. See Fig1 below.

4.14. The condition of the tree root area, the area as defined in section 4.6.1 of BS5837:2012, is surveyed to determine if roots have been disturbed by excavation, compaction, or obvious water level changes.

- *4.6.1 For single stemmed trees, the RPA (see 3.7) should be calculated as an area equivalent to a circle with a radius 12 times the stem diameter.*
- *3.7 root protection area (RPA) layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability.*

4.15. Tree physiological condition has been determined by observing the upper tree portions, the crown, for low bud density, low leaf density, leaf discolouration, the amount of dead wood and growth patterns that are stress indicators. The stem and stem base are also checked for fungal pathogens and peeling bark.

4.16. The structural condition of the tree is determined by checking the trees structural components for any defect or dysfunction, i.e., the visible portions of the branch unions (primary, secondary, and tertiary branch unions) for cracks, cavities, compression unions and included bark. The tree stem for cavities, cracks and localized tree growth types that indicate dysfunction, such as internal decay that can result in loss of structural integrity. The whole tree is checked for cracks, necrotic areas, cavities, and fungal pathogens.

4.17. It is by contrasting the surveyed tree parts with their corresponding ideal species type that conclusions have been drawn, and it is against a backdrop of familiarity of these species (30+ years in the Aboricultural industry) that conclusions about the condition of the trees from its visible portions are drawn.

Tree hazards and risks

4.18.

A tree will be classed as a hazard if there are targets and a tree related defect. Targets are people, vehicles, infrastructure and property, and tree related defects is a tree or tree part that has the capacity to cause harm and damage due to deviations from normal tree physiology / structure, this is risk.
If trees have been found to have significant structural and physiological defects and dysfunction, then the tree or tree part will be assessed using the Quantified Tree Risk Assessment (QTRA) method.
See Fig 2 below for the QTRA Risk Management Framework.
QTRA provides a method of quantifying risk of harm from trees with defects and targets.
The output of the QTRA is an annualised risk of harm that a tree poses. The method will be used to calculate the risk of harm and to determine where the tree is positioned with regard to tolerability of risk.
The broadly acceptable level of risk of harm from any tree is 1/1,000,000. If the odds of harm are lower than this, we begin to be in the tolerability of risk area then considerations regarding risks being ALARP begin.
The output/result of the calculation is recorded in the QTRA Tree Survey schedule and is found in Appendix D and QTRA Practice Notes can be found in Appendix G.

4.19.

It is a requirement of the QTRA method that all parties accept the premises of the method. The onus is on the tree owner or manager to make the final decision on the level of tolerability of risk and if any work is undertaken to mitigate those risks.

Justification of works.

4.20.

If work is recommended, then the justification for the works will follow from the site observations regarding statutory regulation, QTRA output and the maintenance of tree clearance from structures.
Trees found to have structural defects, may require remedial works to be able to safely retain the trees.
This report concludes with the Schedule of Work that lists any recommended tree works.

Fig.2: Representation of Visual Tree Assessment (VTA)

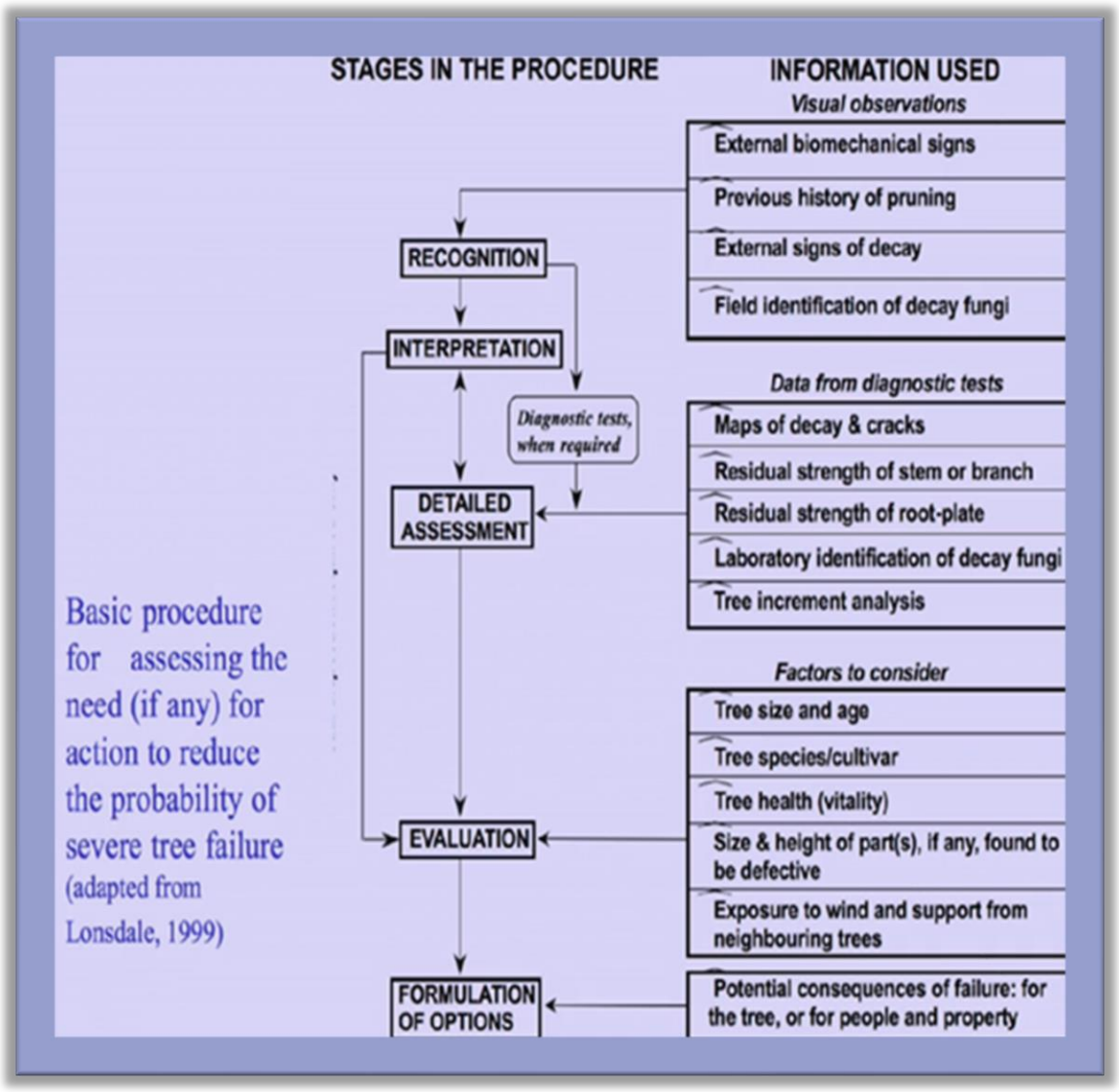
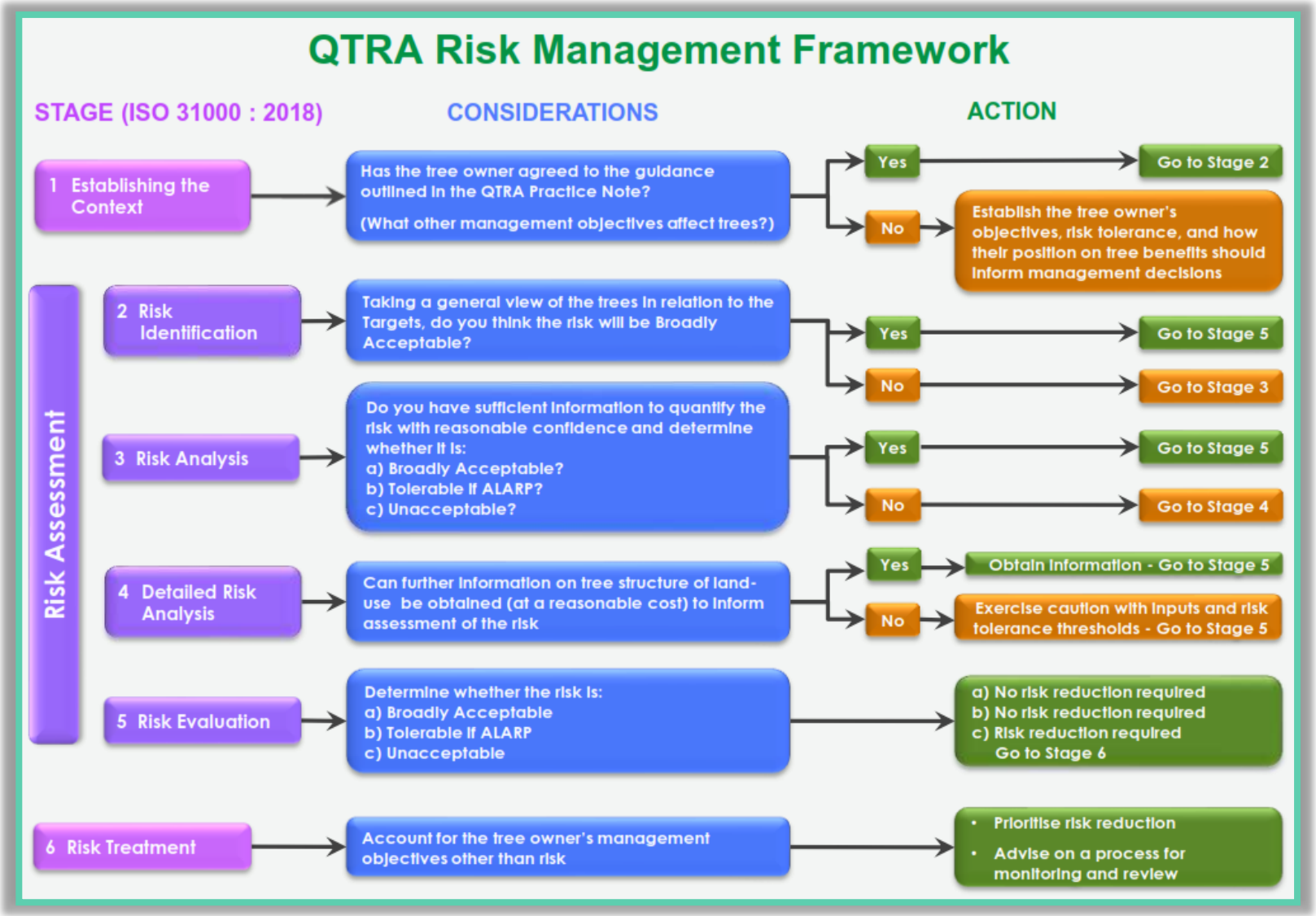


Fig.3: QTRA Risk Management Framework



Appendix G: Quantified Tree Risk Assessment Practice Note.

Quantified Tree Risk Assessment Practice Note

"When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind"

William Thomson, Lord Kelvin, Popular Lectures and Addresses [1891-1894]

1. INTRODUCTION

Every day we encounter risks in all of our activities, and the way we manage those risks is to make choices. We weigh up the costs and benefits of the risk to determine whether it is acceptable, unacceptable, or tolerable. For example, if you want to travel by car you must accept that even with all the extensive risk control measures, such as seat-belts, speed limits, airbags, and crash barriers, there is still a significant risk of death. This is an everyday risk that is taken for granted and tolerated by millions of people in return for the benefits of convenient travel. Managing trees should take a similarly balanced approach.

A risk from falling trees exists only if there is both potential for tree failure and potential for harm to result. The job of the risk assessor is to consider the likelihood and consequences of tree failure. The outcome of this assessment can then inform consideration of the risk by the tree manager, who may also be the owner.

Using a comprehensive range of values[1], Quantified Tree Risk Assessment (QTRA) enables the tree assessor to identify and analyse the risk from tree failure in three key stages. 1) to consider land-use in terms of vulnerability to impact and likelihood of occupation, 2) to consider the consequences of an impact, taking account of the size of the tree or branch concerned, and 3) to estimate the probability that the tree or branch will fail onto the land-use in question. Estimating the values of these components, the assessor can use the QTRA manual calculator or software application to calculate an annual Risk of Harm from a particular tree. To inform management decisions, the risks from different hazards can then be both ranked and compared, and considered against broadly acceptable and tolerable levels of risk.

A Proportionate Approach to Risks from Trees

The risks from falling trees are usually very low and high risks will usually be encountered only in areas with either high levels of human occupation or with valuable property. Where levels of human occupation and value of property are sufficiently low, the assessment of trees for structural weakness will not usually be necessary. Even when land-use indicates that the assessment of trees is appropriate, it is seldom proportionate to assess and evaluate the risk for each individual tree in a population. Often, all that is required is a brief consideration of the trees to identify gross signs of structural weakness or declining health. Doing all that is reasonably practicable does not mean that all trees have to be individually examined on a regular basis (HSE 2013).

The QTRA method enables a range of approaches from the broad assessment of large collections of trees to, where necessary, the detailed assessment of an individual tree.

Risk of Harm

The QTRA output is termed the Risk of Harm and is a combined measure of the likelihood and consequences of tree failure, considered against the baseline of a lost human life within the coming year.

ALARP (As Low As Reasonably Practicable)

Determining that risks have been reduced to As Low As Reasonably Practicable (HSE 2001) involves an evaluation of both the risk and the sacrifice or cost involved in reducing that risk. If it can be demonstrated that there is gross disproportion between them, the risk being insignificant in relation to the sacrifice or cost, then to reduce the risk further is not 'reasonably practicable'.

Costs and Benefits of Risk Control

Trees confer many benefits to people and the wider environment. When managing any risk, it is essential to maintain a balance between the costs and benefits of risk reduction, which should be considered in the determination of ALARP. It is not only the financial cost of controlling the risk that should be considered, but also the loss of tree-related benefits, and the risk to workers and the public from the risk control measure itself.

[1] See Tables 1, 2 & 3.

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When considering risks from falling trees, the cost of risk control will usually be too high when it is clearly 'disproportionate' to the reduction in risk. In the context of QTRA, the issue of 'gross disproportion'[2], where decisions are heavily biased in favour of safety, is only likely to be considered where there are risks of 1/10 000 or greater.

Acceptable and Tolerable Risks

The Tolerability of Risk framework (ToR) (HSE 2001) is a widely accepted approach to reaching decisions on whether risks are broadly acceptable, unacceptable, or tolerable. Graphically represented in Figure 1, ToR can be summarised as having a Broadly Acceptable Region where the upper limit is an annual risk of death 1/1 000 000, an Unacceptable Region for which the lower limit is 1/1 000, and between these a Tolerable Region within which the tolerability of a risk will be dependent upon the costs and benefits of risk reduction. In the Tolerable Region, we must ask whether the benefits of risk control are sufficient to justify their cost.

In respect of trees, some risks cross the Broadly Acceptable 1/1 000 000 boundary, but remain tolerable. This is because any further reduction would involve a disproportionate cost in terms of the lost environmental, visual, and other benefits, in addition to the financial cost of controlling the risk.

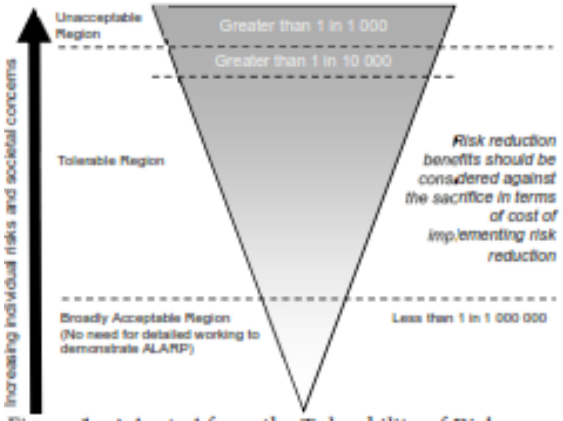


Figure 1. Adapted from the Tolerability of Risk framework (HSE 2001).

Value of Statistical Life

The Value of Statistical Life (VOSL), is a widely applied risk management device, which uses the value of a hypothetical life to guide the proportionate allocation of resources to risk reduction. In the UK, this value is currently in the region of £2 000 000, and this is the value adopted in the QTRA method.

In QTRA, placing a statistical value on a human life has two particular uses. Firstly, QTRA uses VOSL to enable damage to property to be compared with the loss of life, allowing the comparison of risks to people and property. Secondly, the proportionate allocation of financial resources to risk reduction can be informed by VOSL. *"A value of statistical life of £1 000 000 is just another way of saying that a reduction in risk of death of 1/100 000 per year has a value of £10 per year"* (HSE 1996).

Internationally, there is variation in VOSL, but to provide consistency in QTRA outputs, it is suggested that VOSL of £2 000 000 should be applied internationally. This is ultimately a decision for the tree manager.

2. OWNERSHIP OF RISK

Where many people are exposed to a risk, it is shared between them. Where only one person is exposed, that individual is the recipient of all of the risk and if they have control over it, they are also the owner of the risk. An individual may choose to accept or reject any particular risk to themselves, when that risk is under their control. When risks that are imposed upon others become elevated, societal concern will usually require risk controls, which ultimately are imposed by the courts or government regulators.

Although QTRA outputs might occasionally relate to an individual recipient, this is seldom the case. More often, calculation of the Risk of Harm is based on a cumulative occupation – i.e. the number of people per hour or vehicles per day, without attempting to identify the individuals who share the risk.

Where the risk of harm relates to a specific individual or a known group of people, the risk manager might consider the views of those who are exposed to the risk when making management decisions. Where a risk is imposed on the wider community, the principles set out in the ToR framework can be used as a reasonable approach to determine whether the risk is ALARP.

3. THE QTRA METHOD - VERSION 5

The input values for the three components of the QTRA calculation are set out in broad ranges[3] of Target, Size, and Probability of Failure. The assessor

[2] Discussed further on page 5.

[3] See Tables 1, 2 & 3.

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estimates values for these three components and inputs them on either the manual calculator or software application to calculate the Risk of Harm.

Assessing Land-use (Targets)

The nature of the land-use beneath or adjacent to a tree will usually inform the level and extent of risk assessment to be carried out. In the assessment of Targets, six ranges of value are available. Table 2 sets out these ranges for vehicular frequency, human occupation and the monetary value of damage to property.

Human Occupation

The probability of pedestrian occupation at a particular location is calculated on the basis that an average pedestrian will spend five seconds walking beneath an average tree. For example, an average occupation of ten pedestrians per day, each occupying the Target for five seconds is a daily occupation of fifty seconds, giving a likelihood of occupation 1/1,728. Where a longer occupation is likely, as with a habitable building, outdoor café, or park bench, the period of occupation can be measured, or estimated as a proportion of a given unit of time, e.g. six hours per day (1/4). The Target is recorded as a range (Table 2).

Weather Affected Targets

Often the nature of a structural weakness in a tree is such that the probability of failure is greatest during windy weather, while the probability of the site being occupied by people during such weather is often low. This applies particularly to outdoor recreational areas. When estimating human Targets, the risk assessor must answer the question 'in the weather conditions that I expect the likelihood of failure of the tree to be initiated, what is my estimate of human occupation?' Taking this approach, rather than using the average occupation, ensures that the assessor considers the relationship between weather, people, and trees, along with the nature of the average person with their ability to recognise and avoid unnecessary risks.

Vehicles on the Highway

In the case of vehicles, likelihood of occupation may relate to either the falling tree or branch striking the vehicle or the vehicle striking the fallen tree. Both types of impact are influenced by vehicle speed; the faster the vehicle travels the less likely it is to be struck by the falling tree, but the more likely it is to strike a fallen tree. The probability of a vehicle occupying any particular point in the road is the ratio of the time it is occupied - including a safe stopping distance - to the total time. The average vehicle on a UK road is occupied by 1.6 people (DfT 2010). To account for the substantial protection that the average vehicle provides against most tree impacts and in particular, frontal collisions, QTRA values the substantially protected 1.6 occupants in addition to the value of the vehicle as equivalent to one exposed human life.

Property

Property can be anything that could be damaged by a falling tree, from a dwelling, to livestock, parked car, or fence. When evaluating the exposure of property to tree failure, the QTRA assessment considers the cost of repair or replacement that might result from failure of the tree. Ranges of value are presented in Table 2 and the assessor's estimate need only be sufficient to determine which of the six ranges the cost to select.

In Table 2, the ranges of property value are based on a VOSL of £2 000 000, e.g. where a building with a replacement cost of £20 000 would be valued at 0.01 (1/100) of a life (Target Range 2).

When assessing risks in relation to buildings, the Target to be considered might be the building, the occupants, or both. Occupants of a building could be protected from harm by the structure or substantially exposed to the impact from a falling tree if the structure is not sufficiently robust, and this will determine how the assessor categorises the Target.

Multiple Targets

A Target might be constantly occupied by more than one person and QTRA can account for this. For example, if it is projected that the average occupation will be constant by 10 people, the Risk of Harm is calculated in relation to one person constantly occupying the Target before going on to identify that the average occupation is 10 people. This is expressed as Target 1(10T)/1, where 10T represents the Multiple Targets. In respect of property, a Risk of Harm 1(10T)/1 would be equivalent to a risk of losing £20 000 000 as opposed to £2 000 000.

Tree or Branch Size

A small dead branch of less than 25mm diameter is not likely to cause significant harm even in the case of direct contact with a Target, while a falling branch with a diameter greater than 450mm is likely to cause some harm in the event of contact with all but the most robust Target. The QTRA method categorises

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Size by the diameter of tree stems and branches (measured beyond any basal taper). An equation derived from weight measurements of trees of different stem diameters is used to produce a data set of comparative weights of trees and branches ranging from 25mm to 600mm diameter, from which Table 1 is compiled. The size of dead branches might be discounted where they have undergone a significant reduction in weight because of degradation and shedding of subordinate branches. This discounting, referred to as 'Reduced Mass', reflects an estimated reduction in the mass of a dead branch.

Table 1. Size

Size Range	Size of tree or branch	Range of Probability
1	> 450mm (>18") dia.	1/1 - >1/2
2	260mm (10½") dia. - 450mm (18") dia.	1/2 - >1/8.6
3	110mm (4½") dia. - 250mm (10") dia.	1/8.6 - >1/62
4	25mm (1") dia. - 100mm (4") dia.	1/62 - 1/2 500

* Range 1 is based on a diameter of 600mm.

Table 2. Targets

Target Range	Property (repair or replacement cost)	Human (not in vehicles)		Vehicle Traffic (number per day)	Ranges of Value (probability of occupation or fraction of £2 000 000)
1	£2 000 000 – >£200 000	**Occupation:**	Constant – 2.5 hours/day	26 000 – 2 700 @ 110kph (68mph)	1/1 – >1/10
		Pedestrians & cyclists:	720/hour – 73/hour	32 000 – 3 300 @ 80kph (50mph)	
				47 000 – 4 800 @ 50kph (32mph)	
2	£200 000 – >£20 000	**Occupation:**	2.4 hours/day – 15 min/day	2 600 – 270 @ 110kph (68mph)	1/10 – >1/100
		Pedestrians & cyclists:	72/hour – 8/hour	3 200 – 330 @ 80kph (50mph)	
				4 700 – 480 @ 50kph (32mph)	
3	£20 000 – >£2 000	**Occupation:**	14 min/day – 2 min/day	260 – 27 @ 110kph (68mph)	1/100 – >1/1 000
		Pedestrians & cyclists:	7/hour – 2/hour	320 – 33 @ 80kph (50mph)	
				470 – 48 @ 50kph (32mph)	
4	£2 000 – >£200	**Occupation:**	1 min/day – 2 min/week	26 – 4 @ 110kph (68mph)	1/1 000 – >1/10 000
		Pedestrians & cyclists:	1/hour – 3/day	32 – 4 @ 80kph (50mph)	
				47 – 6 @ 50kph (32mph)	
5	£200 – >£20	**Occupation:**	1 min/week – 1 min/month	3 – 1 @ 110kph (68mph)	1/10 000 – >1/100 000
		Pedestrians & cyclists:	2/day – 2/week	3 – 1 @ 80kph (50mph)	
				5 – 1 @ 50kph (32mph)	
6	£20 – £2	**Occupation:**	<1 min/month – 0.5 min/year	None	1/100 000 – 1/1 000 000
		Pedestrians & cyclists:	1/week – 6/year		

Vehicle, pedestrian and property Targets are categorised by their frequency of use or their monetary value. The probability of a vehicle or pedestrian occupying a Target area in Target Range 4 is between the upper and lower limits of 1/1 000 and >1/10 000 (column 5). Using the VOSL £2 000 000, the property repair or replacement value for Target Range 4 is £2 000 - >200.

Probability of Failure

In the QTRA assessment, the probability of tree or branch failure within the coming year is estimated and recorded as a range of value (Ranges 1 – 7, Table 3).

Selecting a Probability of Failure (PoF) Range requires the assessor to compare their assessment of the tree or branch against a benchmark of either a non-compromised tree at Probability of Failure Range 7, or a tree or branch that we expect to fail within the year, which can be described as having a 1/1 probability of failure.

During QTRA training, Registered Users go through a number of field exercises in order to calibrate their estimates of Probability of Failure.

Table 3. Probability of Failure

Probability of Failure Range	Probability
1	1/1 - >1/10
2	1/10 - >1/100
3	1/100 - >1/1 000
4	1/1 000 - >1/10 000
5	1/10 000 – >1/100 000
6	1/100 000 – >1/1 000 000
7	1/1 000 000 – 1/10 000 000

The probability that the tree or branch will fail within the coming year.

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The QTRA Calculation

The assessor selects a Range of values for each of the three input components of Target, Size and Probability of Failure. The Ranges are entered on either the manual calculator or software application to calculate a Risk of Harm.

The Risk of Harm is expressed as a probability and is rounded, to one significant figure. Any Risk of Harm that is lower than 1/1 000 000 is represented as <1/1 000 000. As a visual aid, the Risk of Harm is colour coded using the traffic light system illustrated in Table 4 (page 7).

Risk of Harm - Monte Carlo Simulations

The Risk of Harm for all combinations of Target, Size and Probability of Failure Ranges has been calculated using Monte Carlo simulations[4]. The QTRA Risk of Harm is the mean value from each set of Monte Carlo results.

In QTRA Version 5, the Risk of Harm should not be calculated without the manual calculator or software application.

Assessing Groups and Populations of Trees

When assessing populations or groups of trees, the highest risk in the group is quantified and if that risk is tolerable, it follows that risks from the remaining trees will also be tolerable, and further calculations are unnecessary. Where the risk is intolerable, the next highest risk will be quantified, and so on until a tolerable risk is established. This process requires prior knowledge of the tree manager's risk tolerance.

Accuracy of Outputs

The purpose of QTRA is not necessarily to provide high degrees of accuracy, but to provide for the quantification of risks from falling trees in a way that risks are categorised within broad ranges (Table 4).

4. INFORMING MANAGEMENT DECISIONS

Balancing Costs and Benefits of Risk Control

When controlling risks from falling trees, the benefit of reduced risk is obvious, but the costs of risk control are all too often neglected. For every risk reduced there will be costs, and the most obvious of these is the financial cost of implementing the control measure. Frequently overlooked is the transfer of risks to workers and the public who might be directly affected by the removal or pruning of trees. Perhaps more importantly, most trees confer benefits, the loss of which should be considered as a cost when balancing the costs and benefits of risk control.

When balancing risk management decisions using QTRA, consideration of the benefits from trees will usually be of a very general nature and not require detailed consideration. The tree manager can consider, in simple terms, whether the overall cost of risk control is a proportionate one. Where risks are approaching 1/10 000, this may be a straightforward balancing of cost and benefits. Where risks are 1/10 000 or greater, it will usually be appropriate to implement risk controls unless the costs are grossly disproportionate to the benefits rather than simply disproportionate. In other words, the balance being weighted more on the side of risk control with higher associated costs.

Considering the Value of Trees

It is necessary to consider the benefits provided by trees, but they cannot easily be monetised and it is often difficult to place a value on those attributes such as habitat, shading and visual amenity that might be lost to risk control.

A simple approach to considering the value of a tree asset is suggested here, using the concept of 'average benefits'. When considered against other similar trees, a tree providing 'average benefits' will usually present a range of benefits that are typical for the species, age and situation. Viewed in this way, a tree providing 'average benefits' might appear to be low when compared with particularly important trees – such as in Figure 2, but should nonetheless be sufficient to offset a Risk of Harm of less than 1/10 000. Without having to consider the benefits of risk controls, we might reasonably assume that below 1/10 000, the risk from a tree that provides 'average benefits' is ALARP.

In contrast, if it can be said that the tree provides lower than average benefits because, for example, it is declining and in poor physiological condition, it may be necessary to consider two further elements. Firstly, is the Risk of Harm in the upper part of the Tolerable Region, and secondly, is the Risk of Harm likely to increase before the next review because of an increased Probability of Failure. If both these conditions apply then it might be appropriate to consider the balance of costs and benefits of risk reduction in order to determine whether the risk is ALARP. This balance requires the tree manager to take a view of both the reduction in risk and the costs of that reduction.

[4] For further information on the Monte Carlo simulation method, refer to http://en.wikipedia.org/wiki/Monte_Carlo_method

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Fig. 2

Lower Than Average Benefits from Trees

Usually, the benefits provided by a tree will only be significantly reduced below the 'average benefits' that are typical for the species, age and situation, if the life of the benefits is likely to be shortened, perhaps because the tree is declining or dead. That is not to say that a disbenefit, such as undesirable shading, lifting of a footpath, or restricting the growth of other trees, should not also be considered in the balance of costs and benefits.

The horse chestnut tree in Figure 3 has recently died, and over the next few years, may provide valuable habitats. However, for this tree species and the relatively fast rate at which its wood decays, the lifetime of these benefits is likely to be limited to only a few years. This tree has an already reduced value that will continue to reduce rapidly over the coming five to ten years at the same time as the Risk of Harm is expected to increase. There will be changes in the benefits provided by the tree as it degrades. Visual qualities are likely to reduce while the decaying wood provides habitats for a range of species, for a short while at least. There are no hard and fast measures of these benefits and it is for the tree manager to decide what is locally important and how it might be balanced with the risks.

Where a risk is within the Tolerable Region and the tree confers lower than average benefits, it might be appropriate to consider implementing risk control while taking account of the financial cost. Here, VOSL can be used to inform a decision on whether the cost of risk control is proportionate. Example 3 below puts this evaluation into a tree management context.

There will be occasions when a tree is of such minimal value and the monetary cost of risk reduction so low that it might be reasonable to further reduce an already relatively low risk. Conversely, a tree might be of such considerable value that an annual risk of death greater than 1/10 000 would be deemed tolerable.

Occasionally, decisions will be made to retain elevated risks because the benefits from the tree are particularly high or important to stakeholders, and in these situations, it might be appropriate to assess and document the benefits in some detail. If detailed assessment of benefits is required, there are several methodologies and sources of information (Forest Research 2010).


Fig. 3

Delegating Risk Management Decisions

Understanding of the costs with which risk reduction is balanced can be informed by the risk assessor's knowledge, experience and on-site observations, but the risk management decisions should be made by the tree manager. That is not to say that the tree manager should review and agree every risk control measure, but when delegating decisions to surveyors and other staff or advisors, tree managers should set out in a policy, statement or contract, the principles and perhaps thresholds to which trees and their associated risks will ordinarily be managed.

Based on the tree manager accepting the principles set out in the QTRA Practice Note and or any other specific instructions, the risk assessor can take account of the cost/benefit balance and for most

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situations will be able to determine whether the risk is ALARP when providing management recommendations.

Table 4. QTRA Advisory Risk Thresholds

Thresholds	Description	Action
	Unacceptable Risks will not ordinarily be tolerated	• Control the risk
1/1,000		
	Unacceptable (where imposed on others) Risks will not ordinarily be tolerated	• Control the risk • Review the risk
	Tolerable (by agreement) Risks may be tolerated if those exposed to the risk accept it, or the tree has exceptional value	• Control the risk unless there is broad stakeholder agreement to tolerate it, or the tree has exceptional value • Review the risk
1/10 000		
	Tolerable (where imposed on others) Risks are tolerable if ALARP	• Assess costs and benefits of risk control • Control the risk only where a significant benefit might be achieved at reasonable cost • Review the risk
1/1 000 000		
	Broadly Acceptable Risk is already ALARP	• No action currently required • Review the risk

QTRA Informative Risk Thresholds

The QTRA advisory thresholds in Table 4 are proposed as a reasonable approach to balancing safety from falling trees with the costs of risk reduction. This approach takes account of the widely applied principles of ALARP and ToR, but does not dictate how these principles should be applied. While the thresholds can be the foundation of a robust policy for tree risk management, tree managers should make decisions based on their own situation, values and resources. Importantly, to enable tree assessors to provide appropriate management guidance, it is helpful for them to have some understanding of the tree owner's management preferences prior to assessing the trees.

A Risk of Harm that is less than 1/1 000 000 is Broadly Acceptable and is already ALARP. A Risk of Harm 1/1 000 or greater is unacceptable and will not ordinarily be tolerated. Between these two values, the Risk of Harm is in the Tolerable Region of ToR and will be tolerable if it is ALARP. In the Tolerable Region, management decisions are informed by consideration of the costs and benefits of risk control, including the nature and extent of those benefits provided by trees, which would be lost to risk control measures.

For the purpose of managing risks from falling trees, the Tolerable Region can be further broken down into two sections. From 1/1 000 000 to less than 1/10 000, the Risk of Harm will usually be tolerable providing that the tree confers 'average benefits' as discussed above. As the Risk of Harm approaches 1/10 000 it will be necessary for the tree manager to consider in more detail the benefits provided by the tree and the overall cost of mitigating the risk.

A Risk of Harm in the Tolerable Region but 1/10 000 or greater will not usually be tolerable where it is imposed on others, such as the public, and if retained, will require a more detailed consideration of ALARP. In exceptional circumstances a tree owner might choose to retain a Risk of Harm that is 1/10 000 or greater. Such a decision might be based on the agreement of those who are exposed to the risk, or perhaps that the tree is of great importance. In these circumstances, the prudent tree manager will consult with the appropriate stakeholders whenever possible.

5. EXAMPLE QTRA CALCULATIONS AND RISK MANAGEMENT DECISIONS

Below are three examples of QTRA calculations and application of the QTRA Advisory Thresholds.

Example 1.

	Target		Size		Probability of Failure		Risk of Harm
Range	6	x	1	x	3	=	<1/1 000 000

Example 1 is the assessment of a large (Size 1), unstable tree with a probability of failure of between 1/100 and >1/1 000 (PoF 3). The Target is a footpath with less than one pedestrian passing the tree each week (Target 6). The Risk of Harm is calculated as less than 1/1 000 000 (green). This is an example of where the Target is so low consideration of the structural condition of even a large tree would not usually be necessary.

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Example 2.

	Target		Size		Probability of Failure		Risk of Harm
Range	1	x	4	x	3	=	1(2T)/50 000

In Example 2, a recently dead branch (Size 4) overhangs a busy urban high street that is on average occupied constantly by two people, and here Multiple Target occupation is considered.

Having an average occupancy of two people, the Risk of Harm 1(2T)/50 000 (yellow) represents a twofold increase in the magnitude of the consequence and is therefore equivalent to a Risk of Harm 1/20 000 (yellow). This risk does not exceed 1/10 000, but being a dead branch at the upper end of the Tolerable Region it is appropriate to consider the balance of costs and benefits of risk control. Dead branches can be expected to degrade over time with the probability of failure increasing as a result. Because it is dead, some of the usual benefits from the branch have been lost and it will be appropriate to consider whether the financial cost of risk control would be proportionate.

Example 3.

	Target		Size		Probability of Failure		Risk of Harm
Range	3	x	3	x	5	=	1/500 000

In Example 3, a 200mm diameter defective branch overhangs a country road along which travel between 470 and 48 vehicles each day at an average speed of 50kph (32mph) (Target Range 3). The branch is split and is assessed as having a probability of failure for the coming year of between 1/100 and 1/1 000 (PoF Range 3). The Risk of Harm is calculated as 1/500 000 (yellow) and it needs to be considered whether the risk is ALARP. The cost of removing the branch and reducing the risk to Broadly Acceptable (1/1 000 000) is estimated at £350. To establish whether this is a proportionate cost of risk control, the following equation is applied. £2 000 000 (VOSL) x 1/500 000 = £4 indicating that the projected cost of £350 would be disproportionate to the benefit. Taking account of the financial cost, risk transfer to arborists and passers-by, the cost could be described as being grossly disproportionate, even if accrued benefits over say ten years were taken into account.

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Revision 5.2.4. Monetary values for non-uk versions updated at 1st January 2019.

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Appendix H: Tree Preservation Order No. 259



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- https://**www.gov.uk/guidance/tree-preservation-orders-and-trees-in-conservation-areas**
- http://**www.legislation.gov.uk/ukpga/1981/69/contents Wildlife & Countryside Act 1981**
- **https://www.hse.gov.uk**
- https://**www.forestresearch.gov.uk**
- http://**www.treeterms.co.uk**
- **QTRA (Quantified Tree Risk Assessment)**
- **Google Earth**
- **Google Maps**