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# Tree Risk Management Appraisal

at

## Land off Accrington Road, Whalley, Lancashire BB7

Prepared by:

Bowland Tree Consultancy Ltd

January 2024

**TREE RISK MANAGEMENT APPRAISAL**
**LAND OFF ACCRINGTON ROAD, WHALLEY**

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# TREE RISK MANAGEMENT APPRAISAL
# LAND OFF ACCRINGTON ROAD, WHALLEY

## PROJECT DETAILS

| | |
|---|---|
| **Project No.:** | BTC2870 |
| **Site:** | Land off Accrington Road, Whalley, Lancashire BB7 |
| **Survey Type:** | Individual Tree Survey |
| **Tree(s) Considered:** | Those within ownership boundaries as identified by client |
| **Report Time Frame:** | 12 months from date of issue |
| **Next Inspection Date:** | ≈18 months from date of issue |
| **Client:** | CCB Land Management |
| **Survey Date:** | 12 December 2023 |
| **Surveyor:** | [redacted] BSc(Hons) FdSc MArborA MICFor |
| **Report Prepared by:** | [redacted] BSc(Hons) FdSc MArborA MICFor |
| **Report Checked by:** | [redacted] MSc BSc(Hons) HND MArborA CEnv MICFor |
| **Date of Issue:** | 17 January 2024 |
| **Version No:** | 1 |

## 1. CIVIL LAW REGARDING TREE OWNERSHIP AND DUTY OF CARE

1.1 Under civil law the owner of the land on which a tree stands, together with any party who has control over the tree's management, has a duty of care to take reasonable steps to prevent or minimise the risk of personal injury and/or damage to property from any tree located within the curtilage of the land in question.

1.2 In turn, it is accepted that these steps should normally include commissioning a qualified and experienced arboriculturist to survey the tree in order to identify and appraise any risk of harm to persons or damage to property that it may present and, where unacceptable risks are identified, taking suitable remedial action to negate or reduce those risks accordingly.

## 2. QTRA METHODOLOGY OVERVIEW AND APPLICATION IN MANAGEMENT DECISIONS

2.1 A survey was carried out in order to consider the general structural stability of the identified trees at the site and the associated risk of harm posed to persons and/or property and, from this information, to make management recommendations to reduce any risks identified to be unacceptable to a level that is considered to be either tolerable or broadly acceptable (see Table 1, below).

2.2 The Quantified Tree Risk Assessment (QTRA) methodology utilised for the tree survey (see appended QTRA Practice Note for more details) quantifies the three components of tree failure risk, which are:
i. *Target* (something with potential to be harmed and/or damaged by the mechanical failure of tree parts);
ii. *Impact Potential*; and
iii. *Probability of Failure* (within the coming year).

2.3 The product of the three component values is the annualised 'Risk of Harm', which is a combined measure of the likelihood and the consequence of tree failure considered in terms of the loss within the coming year, and is expressed as a probability. In applying the 'Tolerability of Risk Framework' (ToR) the QTRA methodology divides the 'Risk of Harm' into three threshold values, being;
1. *Unacceptable* (i.e. >1/1,000), which is unacceptable and will not ordinarily be tolerated;
2. *Tolerable* (i.e. between 1/1,000,000 and 1/1,000, where the Risk of Harm will be tolerable if it is As Low As Reasonably Practicable (ALARP); but a Risk of Harm 1/10,000 or greater will not ordinarily be Tolerable where it is imposed on others, such as the public. In the Tolerable range management decisions are informed by consideration of the benefits and costs of risk control, including benefits provided by trees that would be lost to risk control measures; and
3. *Broadly Acceptable* (<1/1,000,000), which is already ALARP.

2.4 The QTRA advisory thresholds, (see Table 1, below) are proposed as a reasonable approach to balancing safety from falling trees with the costs of risk reduction. This approach takes account of the 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.

**Table 1: QTRA Advisory Risk Thresholds:**

| Threshold | Description | Action |
|---|---|---|
| Risk of harm of 1/1,000 or greater | **Unacceptable** - Risks will not ordinarily be tolerated | ▪ Control the risk |
| Risk of harm between 1/1,000 and 1/10,000 | **Unacceptable** (where imposed on others) - Risks will not ordinarily be tolerated | ▪ Control the risk<br>▪ 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<br>▪ Review the risk |
| Risk of harm between 1/10,000 and 1/1,000,000 | **Tolerable** (where imposed on others) - Risks are tolerable if ALARP | ▪ Assess costs and benefits of risk control<br>▪ Control the risk only where a significant benefit might be achieved at reasonable cost<br>▪ Review the risk |
| Risk of harm less than 1/1,000,000 | **Broadly Acceptable** - Risk is already ALARP | ▪ No action currently required<br>▪ Review the risk |

2.5 As detailed in Table 1, a Risk of Harm less than 1/1,000,000 is Broadly Acceptable and already ALARP (i.e. 'as low as reasonably practicable'). A Risk of Harm 1/1,000 or greater is unacceptable and will not

ordinarily be tolerated. Between these two thresholds, the Risk of Harm is in the Tolerable region of the ToR Framework and will be tolerable if it is ALARP, but a Risk of Harm 1/10,000 or greater will not ordinarily be Tolerable where it is imposed on others, such as the public. Here, management decisions are informed by consideration of the benefits and costs of risk control, including benefits provided by trees that would be lost to risk control measures.

2.6 In respect of the above the assessor (i.e. Bowland Tree Consultancy Ltd) may consider the costs of risk control when providing options for management if specifically asked to do so, but the tree owner/manager, who owns the risk and therefore exercises control over the costs, must consider the balance and make the final management decision(s).

## 3. SUMMARY OF SURVEY FINDINGS AND RECOMMENDATIONS

3.1 An 'Individual Tree Survey' (see 'Schedule of Operations' appended to agreed project quote) was undertaken at the site under consideration on 12 December 2023. The trees to be considered for the survey were identified by the instructing client's representative Christopher Bolton, in the form of a boundary plan supplied via e-mail.

3.2 The survey identified ten individual trees and 13 groups of trees as detailed on the appended Tree Survey Plan and Tree Survey Schedule.

3.3 The site under consideration forms an area of unmanaged vegetation, with various trees standings as closely spaced groups and individuals throughout the site, predominantly to its boundaries. A mountain bike track, which is understood to currently be closed, is located to the site's centre. Two public footpaths cross the site roughly from east to south-west and east to north-west.

3.4 As a component of this appraisal various targets were identified to be within falling distances of the surveyed trees, including, but not restricted to vehicles and occupants and pedestrians using the adjacent Accrington Road, persons accessing the site and using the public footpaths, persons using neighbouring residential properties and gardens and various items of property including parked cars, neighbouring property and boundary features such as fences and walls.

3.5 Furthermore, it is noted that a widespread presence of Ash Dieback Disease *(Hymenoscyphus fraxineus)* was identified throughout the Ash tree population, both within the site under consideration and the wider local landscape. Consequently, all Ash trees exhibiting a late stage of decline as a result of the disease have been recommended for removal in accordance with prudent arboricultural practice.

3.6 In turn, as a guide, the surveyed Ash trees have been assessed in accordance with the following scales of approximate percentages of remaining canopy at the time of viewing:
- Class 1 – 100% canopy - Healthy trees displaying good vitality;
- Class 2 – 75% canopy - Weakened trees show treetop shoots in the degeneration phase;
- Class 3 – 50% canopy – Severely weakened trees exhibiting a significant reduction in vitality, e.g. with bushy and lumpy accumulation of growth; and
- Class 4 – 25% canopy – Trees in a state of severe decline, e.g. with large dead canopy areas and twigs and branches starting to break off.

3.7 With regard to these classifications, it is emphasised that trees falling within classes 3 and 4 are normally recommended for risk management remedial works where targets exist within falling distance of said trees.

3.8 According to information available on Ribble Valley Borough Council's website; https://www.ribblevalley.gov.uk/downloads/download/263/list-of-tree-preservation-orders-tpo, parts of the surveyed site, and trees adjacent to the site, are subject to statutory protection under Tree Preservation Orders (TPOs), refenced as Whalley Order 1957, Spring Wood 1962 and Archbishop's Wood 1989, the latter possibly superseding parts of Whalley Order 1957. As such, other than for limited exceptions, an application must be made to the applicable Council's planning department for permission to undertake any necessary tree works to such trees, groups and woodlands.

3.9 Table 2, overleaf, cross references the surveyed tree and group numbers of the survey with listed tree, group and woodland numbers of respective TPOs, available on the council's website. It should, however, be noted that Table 2 is given as a guide only based on online information (which may not always be entirely up to date) to assist the client in making management decisions, and should not be considered a

definitive list. Additionally, the youngest TPO is now approaching 35 years old and subsequently, due to changes in the site usage, surrounding landscape, onset of disease and tree management/loss within this period, it is strongly recommended that the relevance and accuracy of such TPOs on site be checked and discussed directly with Ribble Valley Borough Council prior to scheduling or undertaking tree works on site, or making an application for tree management works.

**Table 2: Cross Reference Guide of TPOs and Surveyed Tree, Group and Wood Numbers:**

| TPO Ref | Number on TPO and Species | Observed on site during Survey? | Survey Tree/ Group/Wood No. |
|---|---|---|---|
| Whalley Order 1957 | T127 – Elm | Not observed | N/A |
| Whalley Order 1957 | T128 - Ash | Ash Observed, but deemed not present ≈1957 | N/A |
| Whalley Order 1957 | T129 - Sycamore | Observed | G7 |
| Whalley Order 1957 | T130 – Elm | Not Observed | N/A |
| Whalley Order 1957 | T131 - Beech | Not Observed | N/A |
| Whalley Order 1957 | T132 - Lime | Observed | G2 |
| Whalley Order 1957 | T133 - Lime | Observed | G2 |
| Whalley Order 1957 | T155 - Beech | Observed | G3 (marked G3a) |
| Whalley Order 1957 | G49 | Not confirmed on Order | N/A |
| Whalley Order 1957 | G50 – 4no. Lime | Not observed, possibly lost to past highway alteration works | N/A |
| Whalley Order 1957 | G42 – 1no. Elm, 1no. Sycamore | Sycamore potentially present offsite to west | N/A |
| Whalley Order 1957 | G43 – 7no. Elm, 2no. Alder, 1no. Sycamore, 1no. Ash | Alder and Ash observed | T6 – Ash<br>G10 - Alder |
| Whalley Order 1957 (possibly superseded by Archbishop's Wood 1989) | W15 - Birch | Observed | G6 and W1 |
| Spring Wood 1962 | W1 – Mixed Hardwood | Observed | T9, T10, G11 and W2 (off site) |
| Archbishop's Wood 1989 | G1 - Mixed | Observed | G7, G8 |
| Archbishop's Wood 1989 | G2 - Mixed | Observed | T5, G7 |
| Archbishop's Wood 1989 | G3 - Mixed | Observed | G7, W1 |
| Archbishop's Wood 1989 | W1 - Mixed | Observed | W1, G4 (part) |

*Note: Table 2, above, is intended as a guide only and the presence/absence of TPO protection for surveyed trees, groups and woodlands should be confirmed by the client with Ribble Valley Borough Council

3.10 Additionally, subject to certain exemptions, the Forestry Act (1967) requires that a 'Felling Licence' be obtained to remove growing trees amounting to more than five cubic metres of timber in a calendar quarter. Felling Licences are administered by the Forestry Commission and contravention of the associated controls can incur substantial penalties.

3.11 In turn, as highlighted with the colours red and orange in the appended Tree Survey Schedule and in Table 3, over page the risk assessment established that trees T1, T2, T6 and groups G1, G2 and G12 have calculated QTRA risk indices that fall within the unacceptable risk threshold range of 1/10,000 or over (please refer to Table 1, on the previous page, with regard to advisory tree risk thresholds). Consequently, as also detailed in the TSS, works are recommended to mitigate the risk that these trees present.

3.12 As also detailed in Table 3, works have been recommended to various trees with calculated QTRA risk indices that fall within the tolerable risk threshold range (as highlighted with the colour yellow) either in order to negate the risk that these trees present, for general non-risk management related reasons (as denoted with the suffix (M)), to mitigate risk to a fixed structure (as denoted with the suffix (S)) or, where applicable, to enable applicable trees to be inspected in further detail for risk assessment purposes (as denoted with the suffix (I)).

**Table 3: Tree Work Recommendations:**

| No. | Species | Management Works Recommended* | Responsible Professional | Work Priority |
|---|---|---|---|---|
| T1 | Downy Birch | 1. Prune tree down to 4m high habitat poles due to identified increased risk of failure and unacceptable risk of harm to persons. | 1. Tree contractor | 1. High |
| T2 | Downy Birch | 1. Remove tree due to identified increased risk of failure and unacceptable risk of harm to persons. | 1. Tree contractor | 1. High |
| T3 | Goat Willow | 1. Coppice tree at ground level due to projected continued progression of lean towards public footpath. | 1. Tree contractor | 1. Moderate |
| T4 | Downy Birch | 1. Remove fallen section of tree from field. | 1. Tree contractor | 1. Low |
| T5 | Goat Willow | 1. Coppice tree at ground level due to evident poor condition and limited future potential. | 1. Tree contractor | 1. Low |
| T6 | Common Ash | 1. Remove tree due to identified increased risk of failure and subsequent unacceptable risk of harm to persons. | 1. Tree contractor | 1. High |
| T7 | Common Oak | 1. Prune tree to shorten deadwood over desire line footpaths to approximately 2m long stubs and retain as habitat value. | 1. Tree contractor | 1. Low |
| T9 | Common Oak | 1. Establish ownership of tree.<br>2. If within boundaries: Remove tree to 6m high standing dead stem due to evident poor condition and identified increased risk of failure.<br>3. If outside ownership boundaries: Inform tree owner of report findings. | 1. Client<br>2. Tree contractor<br>3. Client | 1. High<br>2. Moderate<br>3. Moderate |
| T10 | Downy Birch | 1. Establish ownership of tree. | 1. Client | 1. High |
| G1 | 7no. Common Ash | 1. Remove group due to identified increased risk of failure and subsequent unacceptable risk of harm to persons. | 1. Tree contractor | 1. High |
| G2 | 2no. Common Lime | 1. Prune group to:<br>a. Clear basal growth from both trees from ground level to approximately 3m height to facilitate clear detailed inspection (I).<br>b. Lift canopies to attain 5.2m clearance over road and clearance from footway (M). | 1. Tree contractor | 1. High |
| G3 | Downy Birch, Norway Maple, Sycamore, Oak, Horse Chestnut | 1. Remove all self set, young, multi- stemmed Sycamore and Hawthorn growing immediately adjacent to footway edge, and to prune all vegetation to clear footway.<br>2. Prune group to attain minimum 2.5m canopy clearance over footway, 5.2m canopy clearance over road, and 1.5m clearance around each street light (M).<br>3. Initiate programme of eradication of Himalayan Balsam. | 1. Tree contractor<br>2. Tree contractor<br>3. Client | 1. High<br>2. High<br>3. Moderate |
| G4 | 6no. Common Hawthorn, Goat Willow | 1. Prune group to clear overhangs from footway and road back to boundary.<br>2. Initiate programme of eradication of Himalayan Balsam. | 1. Tree Contractor<br>2. Client | 1. High<br>2. Moderate |

Table continued overleaf

**Table 3: Tree Work Recommendations (continued):**

| No. | Species | Management Works Recommended* | Responsible Professional | Work Priority |
|---|---|---|---|---|
| G5 | Downy Birch, Goat Willow, Hawthorn | 1. Remove all Ash trees from group in accordance with prudent arboricultural management practices. NB: Stems may be retained as standing and fallen deadwood where appropriate of habitat value.<br>2. Initiate programme of eradication of Himalayan Balsam. | 1. Tree contractor<br>2. Client | 1. Low<br>2. Moderate |
| G6 | 3no. Sycamore, 1no. Elm | 1. Remove group due to unsuitability for long term retention in relation to location. | 1. Tree contractor | 1. Low |
| G8 | Goat Willow | 1. Coppice group at ground level due to partial failures and continued progression of stem leans over public footpath, with projected increase in failure risk over long term. | 1. Tree contractor | 1. Low |
| G 10 | Common Oak, Common Ash | 1. Remove all Ash trees from group due to identified increased risk of failure. NB: Stems may be retained as standing and fallen deadwood for habitat value where appropriate | 1. Tree contractor | 1. Moderate |
| G 12 | Common Ash, Goat Willow, Hawthorn | 1. Contact applicable land owner (likely highways authority) to notify them of survey findings and associated recommendations.<br>2. Remove and clear back fallen stems to site boundary to facilitate any stock fence repairs | 1. Client<br>2. Land owner's tree contractor | 1. High<br>2. Moderate |
| W1 | Downy Birch, Oak, Goat Willow, Sycamore, Holly, Hawthorn | 1. Remove all hung up and partially failed stems and branches throughout group, leaving as fallen deadwood on ground for habitat value where appropriate.<br>2. Consider preparation of long term woodland management plan, in conjunction with tree consultant and an ecologist, to maintain and improve long term tree cover. | 1. Tree contractor<br>2. Client | 1. Moderate<br>2. Low |

*Note: it shall be the client's responsibility to arrange contact with the applicable council's planning department to check the accuracy of any statutory tree protection measures in the form of Tree Preservation Orders, and gain any subsequently necessary permissions, prior to scheduling or carrying out any tree works

3.13 In addition to the above, Table 4, below, details the trees that are recommended for more detailed inspections for risk management related reasons following any works recommended in Table 3, along with their accompanying re-inspection schedule.

**Table 4: Tree Re-Inspection Recommendations:**

| No. | Species | Re-Inspection Recommendations* | When? |
|---|---|---|---|
| T7 | Common Oak | 1. Reinspect tree when next in full leaf to re-appraise vitality. | 1. Summer 2024 |
| G2 | 2no. Common Lime | 1. Reinspect group immediately following removal of basal growth to appraise structural condition. | 1. Within 6 months of report date |

*Note: Unless otherwise specified, all inspections detailed in Table 3 are to be carried out by the project tree consultant upon instruction by the client

3.14 With regard to the above it is noted that, where trees are recommended for removal, whether for risk management purposes or for other arboricultural management reasons, then it is strongly recommended that replacement trees of suitable sizes and species be planted in appropriate locations of the site, both in order to compensate for the loss of the multiple benefits the trees provided to the environment, and to help ensure continuity of canopy cover in the local area. Accordingly, new tree planting advice should be sought from the project tree consultant.

3.15 Subsequently, any new tree planting should be carried out in strict accordance with BS8545:2014 that they are of a suitable quality for usage, and that they are provided with adequate care and maintenance following planting for them to successfully establish and, over the long term, grow to maturity.

3.16 It is understood, from information provided by the client, that the open ground within the site is to be returned to grazing land for livestock. As a component of this, it is envisaged that repairs and replacement of boundary fencing will be required to contain said livestock. As such, pruning works may be required to trees/groups of trees that border such areas to raise canopies and allow the installation and positioning of such fencing, and attention for such works is drawn back to paragraphs 3.8 and 3.9 and Table 2. It is recommended that any stock fence posts to be knocked in are positioned to avoid the locations of primary roots of mature trees, and no pruning of buttress roots should take place to allow passage of stock net or similar.

3.17 Additionally, it is recommended that areas of trees and woodland are suitably fenced to exclude livestock to prevent browsing by livestock and subsequent damage to succession trees/shrubs within wooded groups, abrasion and damage to bark and compaction and waterlogging of ground.

3.18 In consideration of the proximity of the adjacent public road (i.e. Accrington Road), within falling distance of the surveyed trees, it is subsequently recommended that they be initially re-inspected on a cyclical programme of roughly every 18 months, so that they can be alternately viewed whilst in and out of leaf in order to monitor both their structural and physiological condition and, consequently, for the owner to meet their duty of care. In this respect it is therefore recommended that the trees next be inspected during August/September (i.e. late Summer) of 2025 when in leaf.

3.19 Additionally, it is strongly recommended that the client, or persons subsequently using the land for grazing, undertake a walkover check of trees around the site following any inclement weather events in order to identify any obvious risk features, such as broken, split or hanging branches, rootplate heave, etc., and, if identified as necessary, to then seek appropriate professional advice from a tree consultant or a tree contractor.

## 4. GENERAL OBSERVATIONS, AIMS AND RECOMMENDATIONS FOR WOODLAND AREA

### Observations

4.1 The client representative requested that, where applicable, general management observations and high level recommendations be made to advise on managing the trees on site over the long term.

4.2 It was observed that, trees are predominantly situated as closely spaced groups broadly to the perimeters of the site, with some young and semi-mature, self set trees throughout the site, with the exception of mature and early-mature trees T7 and T8.

4.3 It was also observed that the site has evidently had very little tree management undertaken over recent years, with various risk management issues subsequently identified and general management works recommended. Additionally, public access throughout the site has led to vandalism of several trees and the depositing and accumulation of debris and rubbish in some areas of the site. Various boundary features, such as fencing and hedges, are in a poor state of repair, and invasive Himalayan Balsam is prevalent, predominantly to the site's south-west.

4.4 It was also established that the trees are visually prominent within the immediate local landscape, and that adjacent footpaths, both on and adjacent to the site, are well used by members of the public. A mountain bike track area has evidently previously been established to the site's centre south, although this was closed at the time of the site visit for insurance reasons. In turn, it is evident that earth moving activities, and hand tools/debris within this area have partly spilled down the steep bank and into tree group G3.

4.5 Areas of the site's south-west and west were noted to be very waterlogged during the site visit. There is some evidence of previous attempts to establish new trees and hedges, with varying levels of successful establishment and large accumulations of redundant, failed trees stakes and guards throughout the site.

### General Recommendations

4.6 In consideration of the observations above, and based on the professional opinion of the consultant, the following general recommendations are suggested for consideration:

4.6.1 Schedule periodic tree risk management appraisals, in line with paragraph 3.18 in light of targets including Accrington Road, adjacent residential properties and public footpaths;

4.6.2 Undertake regular periodic pruning of trees and vegetation bordering the road, footway and neighbouring residential properties, in order to maintain clearances to both properties and statutory clearances to footways and highways;

4.6.3 Initiate programme of eradication of invasive vegetation, in particular Himalayan Balsam, but also Horses Tail, on the site;

4.6.4 Re-establish boundary along residential properties to west and boundaries between woodland and mountain bike park to prevent public encroachment into the site from desire line and public footpaths, and consequent tree damage;

4.6.5 Establish a boundary fence between areas used for livestock grazing and wooded groups (see paragraphs 3.16 and 3.17); and

4.6.6 Establish woodland management plans for areas of retained woodland in order to help ensure long-term woodland cover and improve habitat and biodiversity potential.

| | |
|---|---|
| **Site:** | Land off Accrington Road, Whalley, Lancashire BB7 |
| **Client:** | CCB Land Management |
| **Brief:** | Carry out an individual tree survey within area specified by client, report on projected risk posed to persons and property, and make management recommendations where appropriate |

| | |
|---|---|
| **Surveyor:** | [redacted] Charted Arboriculturist |
| **Survey Date:** | 12 December 2023 |
| **Viewing Conditions:** | Overcast but bright, with overnight rain |
| **Job Reference:** | BTC2870 |



| No. | Species | Age | Height (m) | Stem Diam. (mm) | Crown Spread (m) | Vitality | Comments | Management Recommendations | Risk Assessment Description (Part/Target) | Target | Size | P.O.F | Reduced Mass % | Risk Index | Work Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | Downy Birch | EM | 14 | 1x260 1x210 1x180 (ms) | 12 | M | ▪ Three stems arising from base of a previously failed and significantly decayed tree.<br>▪ Fungal fruiting bodies of brown rot decay causing *Fomitopsis betulina* in stem arising to north.<br>▪ Stems theoretically within falling distance of road. | ▪ Tree contractor to prune tree down to 4m high habitat poles due to identified increased risk of failure and unacceptable risk of harm to persons. | P = Stem of approximately 210mm diameter. T = Vehicles and occupant using adjacent road. | 1 | 3 | 3 | N/A | 5K | H |
| T2 | Downy Birch | SM | 12 | 220 | 4 | MD | ▪ Partially failed at rootplate to north up bank.<br>▪ Immediately adjacent to semi-mature Oak.<br>▪ Failure may result in stem sliding down steep bank onto footway below. | ▪ Tree contractor to remove tree due to identified increased risk of failure and unacceptable risk of harm to persons. | P = Stem of approximately 210mm diameter. T = Persons using footway. | 3 | 3 | 1 | N/A | 5K | H |
| T3 | Goat Willow | EM | 12 | 2x310 (ts) | 11 | G | ▪ Has evidently sustained previous rootplate failure to west, with subsequent severe stem leans and highly biased canopy to west.<br>▪ Twin stemmed from ground level, with severe bark inclusion to approximately 1m height.<br>▪ Several primary branches removed to approximately 200mm diameter to clear public footpath below. | ▪ Tree contractor to coppice tree at ground level due to projected continued progression of lean towards public footpath. | P = Stems up to approximately 310mm diameter. T = Persons using public footpath. | 3 | 2 | 3 | N/A | 100 K | M |
| T4 | Downy Birch | EM | 3 | 250 | N/A | D | ▪ Failed stem into field with dead standing stem 3m high in fence line. | ▪ Tree contractor to remove fallen section of tree from field. | P = Stem at ground level. T = Persons using adjacent field. | 4 | 3 | 3 | N/A | <1M | L |
| T5 | Goat Willow | M | 10 | 370# | 15 | G | ▪ Tree indicated as subject to Tree Preservation Order (TPO) Archbishop's Wood (1989).<br>▪ Not fully accessed due to debris within group. Has evidently sustained significant vandalism with resulting stem tear outs.<br>▪ Semi-mature shoots arising from fallen branches and ground surrounding tree.<br>▪ Dead Hawthorn immediately north. | ▪ Tree contractor to coppice tree at ground level due to evident poor condition and limited future potential. | P = Stems up to 100mm. T = persons accessing field. | 4 | 4 | 3 | N/A | <1M | L |

**HEADINGS & ABBREVIATIONS**

**NO.:** TREE/GROUP REFERENCE NUMBER. REFER TO PLAN OR NUMBERED TAGS WHERE APPLICABLE
**SPECIES:** COMMON NAME
**AGE:** Y = YOUNG, SM = SEMI MATURE, EM = EARLY MATURE, M = MATURE, PM = POST MATURE
**HEIGHT:** APPROXIMATELY 80% OF TREES ARE MEASURED USING AN ELECTRONIC CLINOMETER AND THE REMAINDER ESTIMATED AGAINST THE MEASURED TREES
**DIAMETER:** STEM DIAMETER MEASURED OR ESTIMATED AT A HEIGHT OF APPROXIMATELY 1.3 METRES
**CROWN SPREAD:** MEASURED OR ESTIMATED DIAMETER OF CROWN(S) AT THE WIDEST POINT
**VITALITY:** A MEASURE OF PHYSIOLOGICAL CONDITION WHEREBY D = DEAD, MD = MORIBUND, P = POOR, M = MODERATE, G = GOOD
**MANAGEMENT:** SUFFIXES (M) = FOR GENERAL ARBORICULTURAL OR SILVICULTURAL MANAGEMENT, (S) = TO REMOVE OR REDUCE THE RISK OF DIRECT DAMAGE TO A FIXED STRUCTURE BY MEANS OF CIRCUMFERENTIAL ROOT, STEM OR BRANCH GROWTH, (I) = TO ENABLE THE TREE(S) TO BE INSPECTED FURTHER FOR RISK ASSESSMENT PURPOSES
**TARGET RANGE:** HIGHEST VALUE TARGET THAT THE MOST SIGNIFICANT PART LIKELY TO FAIL COULD STRIKE. RANGES 1-5: 1 = HIGH, 5 = LOW VALUE/OCCUPANCY
**RISK ASSESSMENT DESCRIPTION:** DESCRIPTION OF PART IDENTIFIED AS MOST LIKELY TO FAIL AND ASSOCIATED TARGET, ASSESSED IN ACCORDANCE WITH QTRA SYSTEM
**SIZE RANGE:** SIZE CATEGORY OF MOST SIGNIFICANT PART CONSIDERED LIKELY TO FAIL - RANGES 1-4 WHEREBY 1 = LARGE, 4 = SMALL. P = PROPERTY
**P.O.F.:** PROBABILITY OF FAILURE WITHIN 12 MONTHS. RANGES 1-7: 1 = HIGH, 7 = LOW
**REDUCED MASS %:** WHERE THE MASS OF A TREE OR BRANCH IS REDUCED BY DEGRADATION THE RISK INDEX IS MULTIPLIED TO REFLECT THE PERCENTAGE OF MASS REDUCTION
**RISK INDEX:** E.G. RISK INDEX 20 = RISK OF SIGNIFICANT HARM 1 IN 20,000. AN ADDITIONAL FIGURE, IN BRACKETS, MAY BE SUFFIXED 'I' REPRESENTING THE RATE OF MULTIPLE OCCUPATION OVER THE YEAR. E.G. 10(100) REPRESENTS A RISK OF HARM 1/10,000 TO 10 OCCUPANTS OR AN EQUIVALENT MONETARY VALUE. SEE QTRA PRACTICE NOTE FOR MORE INFORMATION REGARDING COLOURS USED TO SIGNIFY RISK INDEX
**WORK PRIORITY:** H (HIGH) = TREE WORKS TO BE GIVEN IMMEDIATE CONSIDERATION. M (MODERATE) = TREE WORKS TO BE CARRIED OUT WITHIN 12 MONTHS OF SURVEY (TIMING MAY BE SPECIFIED IN MANAGEMENT RECOMMENDATIONS). L (LOW) = TREE WORKS THAT ARE NOT CONSIDERED ESSENTIAL FOR RISK MANAGEMENT PURPOSES, BUT ARE RECOMMENDED IN ACCORDANCE WITH PRUDENT ARBORICULTURAL MANAGEMENT (TO BE REVIEWED IN 12 MONTHS, OR SPECIFIED TIME, IF APPLICABLE). N/A = NOT APPLICABLE

Bowland Tree Consultancy Ltd

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|---|---|
| **Site:** | Land off Accrington Road, Whalley, Lancashire BB7 |
| **Client:** | CCB Land Management |
| **Brief:** | Carry out an individual tree survey within area specified by client, report on projected risk posed to persons and property, and make management recommendations where appropriate |

| | |
|---|---|
| **Surveyor:** | [redacted] Chartered Arboriculturist |
| **Survey Date:** | 12 December 2023 |
| **Viewing Conditions:** | Overcast but bright, with overnight rain |
| **Job Reference:** | BTC2870 |



| No. | Species | Age | Height (m) | Stem Diam. (mm) | Crown Spread (m) | Vitality | Comments | Management Recommendations | Risk Assessment Description (Part/Target) | Target | Size | P.O.F | Reduced Mass % | Risk Index | Work Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T6 | Common Ash | M | 16 | 600# | 17 | D | ▪ Tree indicated as subject to TPO Whalley Order (1957).<br>▪ Dead, evidently resultant of effects of Ash Dieback Disease (ADD - see paragraph 3.6).<br>▪ Immediately adjacent to and overhanging footpath.<br>▪ Dense Ivy impeded inspection. | ▪ Tree contractor to remove tree due to identified increased risk of failure and subsequent unacceptable risk of harm to persons. | P = Dead and moribund branches up to approximately 300mm diameter.<br>T = Persons using public footpath. | 3 | 2 | 1 | N/A | 1K | H |
| T7 | Common Oak | M | 20 | 1010 | 20 | M-G | ▪ Evident partially occluded historic damage at base on north side.<br>▪ Moderately large amount of deadwood up to approximately 200mm diameter and up to 8m long over evident desire line footpaths to east.<br>▪ Dense Hawthorn scrub impeded access below south west side of stem. | ▪ Tree contractor prune tree to shorten deadwood over desire line footpaths to approximately 2m long stubs and retain as habitat value.<br>▪ Tree consultant to reinspect tree when next in full leaf (i.e. during summer 2024) to re-appraise vitality. | P = Deadwood up to approximately 200mm diameter.<br>T = Persons using desire lines. | 4 | 3 | 2 | N/A | 500 K | L |
| T8 | Goat Willow | EM | 14 | 180 | 9 | G | ▪ Outlying tree to wider group.<br>▪ Multi-stemmed from ground level with included bark unions. | ▪ | P = Stems up to approximately 200mm diameter.<br>T = Persons using desire lines. | 4 | 3 | 5 | N/A | <1M | N/A |
| T9 | Common Oak | M | 19 | 600 | 14 | MD | ▪ Tree indicated as subject to TPO Spring Wood (1962).<br>▪ Evidently in late stages of terminal decline and largely dead at time of survey.<br>▪ Located atop banking, but to south of stock fencing, with ownership subsequently unclear. | ▪ Establish tree's ownership.<br>▪ If within boundaries: Tree contractor to remove tree to 6m high standing dead stem due to evident poor condition and identified increased risk of failure.<br>▪ If outside ownership boundaries: Inform tree owner of report findings. | P = Stem at ground level.<br>T = Persons accessing field. | 4 | 1 | 3 | N/A | 400 K | H |
| T10 | Downy Birch | EM | 17 | 440 | 12 | G | ▪ Tree indicated as subject to TPO Spring Wood (1962).<br>▪ Located in southern edge of banking along boundary but north of stock fence, with ownership subsequently unclear.<br>▪ Moderate stem lean south. | ▪ Establish tree's ownership. | P = Deadwood up to approximately 25mm diameter.<br>T = Persons accessing field. | 4 | 4 | 5 | N/A | <1M | H |

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|---|---|
| **Site:** | Land off Accrington Road, Whalley, Lancashire BB7 |
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|---|---|
| **Surveyor:** | [redacted] ried Arboriculturist |
| **Survey Date:** | 12 December 2023 |
| **Viewing Conditions:** | Overcast but bright, with overnight rain |
| **Job Reference:** | BTC2870 |



| No. | Species | Age | Height (m) | Stem Diam. (mm) | Crown Spread (m) | Vitality | Comments | Management Recommendations | Risk Assessment Description (Part/Target) | Target | Size | P.O.F | Reduced Mass % | Risk Index | Work Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G1 | 6no. Common Ash | EM-SM | ≤ 7 | ≤ 450 | ≤ 14 | MD | ▪ Located along roadside edge of wider wooded group.<br>▪ Trees out of leaf but evidently all in late stages of decline resultant of colonisation by ADD, with remaining canopy cover falling into Classes 3-4 (See paragraph 3.6).<br>▪ Overhanging and adjacent to moderately high usage road. | ▪ Tree contractor to remove group due to identified increased risk of failure and subsequent unacceptable risk of harm to persons. | P = Dead and moribund stems and branches up to approximately 200mm diameter.<br>T = Vehicles and occupants using adjacent road. | 1 | 3 | 2 | N/A | 500 | H |
| G2 | 2no. Common Lime | M | ≤ 21 | ≤ 850# | ≤ 14 | M-G | ▪ Group indicated as subject to TPO Whalley Order (1957).<br>▪ Two mature trees standing in wider semi and early-mature group.<br>▪ Not accessed due to topography and dense basal growth.<br>▪ Tree to east has moderate basal growth and tree to west has very dense basal growth.<br>▪ Both canopies show signs of previous retrenchment.<br>▪ Passing vehicles evidently contacting canopy of tree to west contacting. | ▪ Tree contractor to prune group to:<br>a. Clear basal growth from both trees from ground level to approximately 3m height to facilitate clear detailed inspection (I).<br>b. Lift canopies to attain 5.2m clearance over road and clearance from footway (M).<br>▪ Tree consultant to reinspect group during summer 2024, immediately following removal of basal growth, to appraise structural condition. | P = Stems at ground level.<br>T = Vehicles and occupants using road. | 1 | 1 | 4 | N/A | 4K | H |

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|---|---|---|---|---|---|
| **Site:** | Land off Accrington Road, Whalley, Lancashire BB7 | **Surveyor:** | [redacted] Charted Arboriculturist | Page: 4 of 8 | |
| **Client:** | CCB Land Management | **Survey Date:** | 12 December 2023 | | |
| **Brief:** | Carry out an individual tree survey within area specified by client, report on projected risk posed to persons and property, and make management recommendations where appropriate | **Viewing Conditions:** | Overcast but bright, with overnight rain | | |
| | | **Job Reference:** | BTC2870 | | |

| No. | Species | Age | Height (m) | Stem Diam. (mm) | Crown Spread (m) | Vitality | Comments | Management Recommendations | Risk Assessment Description Part/Target) | Target | Size | P.O.F | Reduced Mass % | Risk Index | Work Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G3 | Downy Birch, Norway Maple, Sycamore, Oak, Horse Chestnut | SM-M | ≤ 17 | ≤ 500 | ≤ 14 | M-G | ▪ Wooded group in very steep soil banking sloping to south to footway and road.<br>▪ Access within group severely limited due to steep terrain and slippery conditions, and subsequently viewed largely from road and bank top.<br>▪ Several trees have moderate stem leans.<br>▪ Limited understorey growth.<br>▪ Evidence of highly invasive Himalayan Balsam in parts.<br>▪ Dense Bramble and scrub along roadside impinging on footway.<br>▪ growing from kerb edge to footway and impinging on footway and likely to displace kerb edges on future incremental growth.<br>▪ Several self set multi-stemmed Sycamore and Hawthorn<br>▪ Several canopies impinging on street lighting and minor encroachments over road.<br>▪ Ivy to several stems within group.<br>▪ Low canopies within site itself over fencing.<br>▪ Tight unions to several Maple and Beech within group.<br>▪ One early-mature to mature Beech in group (marked G3a) indicated as subject to TPO Whalley Order (1957). | ▪ Tree contractor to remove all self set, young, multi-stemmed Sycamore and Hawthorn growing immediately adjacent to footway edge, and to prune all vegetation to clear footway.<br>▪ Tree contractor to prune group to attain minimum 2.5m canopy clearance over footway, 5.2m canopy clearance over road, and 1.5m clearance around each street light (M).<br>▪ Client to initiate programme of eradication of Himalayan Balsam. | P = Stems up to approximately 180mm diameter. T = Vehicles and occupants using road. | 1 | 3 | 6 | N/A | <1M | H |
| G4 | 6no. Common Hawthorn, Goat Willow | M | ≤ 7.5 | ≤ 150 | ≤ 4 | M | ▪ Group indicated as subject to TPO Archbishop's Wood (1989).<br>▪ Scrub group along road frontage.<br>▪ Dense Ivy in parts.<br>▪ Canopies partially encroaching over footway and highway.<br>▪ Evidently growing around some old structures.<br>▪ Dead Elder within group.<br>▪ Highly invasive Himalayan Balsam throughout group. | ▪ Tree contractor to prune group to clear overhangs from footway and road back to boundary.<br>▪ Client to initiate programme of eradication of Himalayan Balsam. | P = Stems at ground level up to approximately 150mm diameter. T = Vehicles and occupants using road. | 1 | 3 | 5 | N/A | 500 K | H |

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|---|---|
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| **Surveyor:** | [redacted] t Charted Arboriculturist |
| **Survey Date:** | 12 December 2023 |
| **Viewing Conditions:** | Overcast but bright, with overnight rain |
| **Job Reference:** | BTC2870 |



| No. | Species | Age | Height (m) | Stem Diam. (mm) | Crown Spread (m) | Vitality | Comments | Management Recommendations | Risk Assessment Description (Part/Target) | Target | Size | P.O.F | Reduced Mass % | Risk Index | Work Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G5 | Downy Birch, Goat Willow, Hawthorn | M | ≤ 15 | ≤ 540 | ≤ 14 | G-P | ▪ Moderately to closely spaced stand of mainly Goat Willow and Ash.<br>▪ In boggy ground to west, with better quality semi-mature to mature Birch to east.<br>▪ Outlying Goat Willow and early mature Hawthorn between bulk of group and edge of mountain biking area to east.<br>▪ Two Ash within group colonised by ADD, with remaining canopy falling into Class 4, but not within falling distances of public rights of way.<br>▪ Dense invasive Himalayan Balsam throughout. | ▪ Tree contractor to remove all Ash trees from group in accordance with prudent arboricultural management practices. NB: Stems may be retained as standing and fallen deadwood where appropriate of habitat value.<br>▪ Client to initiate programme of eradication of Himalayan Balsam. | P = Stems up to 100mm diameter. T = Persons using footpath. | 3 | 4 | 5 | N/A | <1M | L |
| G6 | 3no. Sycamore, 1no. Elm | SM | ≤ 13 | ≤ 160 | ≤ 4 | G | ▪ Group indicated as subject to TPO Archbishop's Wood (1989).<br>▪ Closely spaced group located immediately adjacent to residential garden with several stems having previously been removed.<br>▪ Currently semi-mature, with significant potential for future growth, and subsequently considered unsuitable for location over long term. | ▪ Tree contractor to remove group due to unsuitability for long term retention in relation to location. | P = Deadwood up to approximately 25mm diameter. T = Persons using residential garden. | 3 | 4 | 5 | 25% | <1M | L |
| G7 | Common Oak, Sycamore, Holly, Hawthorn | M | ≤ 18.5 | ≤ 700 | ≤ 14 | M-G | ▪ Group indicated as subject to TPO Archbishop's Wood (1989).<br>▪ Linear group of mature Oak and Sycamore to south, in dense and closely spaced Holly and Hawthorn evidently outgrown hedge.<br>▪ Group straddles ditch in parts, and possibly ownership boundary.<br>▪ Canopies of Oaks low over site to east.<br>▪ Sycamore has significant retrenchment and upper canopy dieback with deadwood up to approximately 150mm diameter, but evidently low usage below and adjacent to canopy. | ▪ | P = Deadwood up to approximately 150mm diameter. T = Persons accessing field. | 4 | 3 | 2 | N/A | 500 K | N/A |

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| **Surveyor:** | [redacted] Charted Arboriculturist |
| **Survey Date:** | 12 December 2023 |
| **Viewing Conditions:** | Overcast but bright, with overnight rain |
| **Job Reference:** | BTC2870 |



| No. | Species | Age | Height (m) | Stem Diam. (mm) | Crown Spread (m) | Vitality | Comments | Management Recommendations | Risk Assessment Description (Part/Target) | Target | Size | P.O.F | Reduced Mass % | Risk Index | Work Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G8 | Goat Willow | SM | ≤ 12 | ≤ 240 | ≤ 10 | G-D | ▪ Group indicated as subject to TPO Archbishop's Wood (1989).<br>▪ Closely spaced group in far north-west corner of site, emanating from south-west of footpath and south of watercourse.<br>▪ Dense Ivy and failed stems throughout, which impeded inspection.<br>▪ Stems that have not failed have severe leans over footpath to north-east. | ▪ Tree contractor to coppice group at ground level due to partial failures and continued progression of stem leans over public footpath, with projected increase in failure risk over long term. | P = Stems up to 240mm diameter at ground level.<br>T = Persons using public footpath. | 3 | 3 | 4 | N/A | <1M | L |
| G9 | Wych Elm, Hawthorn | SM | ≤ 12 | ≤ 160# | ≤ 6 | G | ▪ Group potentially indicated as subject to TPO Whalley Order (1957).<br>▪ Closely spaced stand of Elm and Hawthorn in dense Ivy to north of watercourse, but within indicated ownership boundary.<br>▪ Dense Ivy impeded inspection. | ▪ Client to monitor Elm for signs of colonisation by Dutch Elm Disease and associated dieback. | P = Stems up to 160mm diameter at ground level.<br>T = Persons using public footpath. | 3 | 3 | 6 | N/A | <1M | L |
| G10 | Common Oak, Common Ash, Alder | SM-EM | ≤ 17 | ≤ 370 | ≤ 14 | G-D | ▪ Group potentially indicated as subject to TPO Whalley Order (1957).<br>▪ Mixed tree belt along watercourse, with more established semi and early-mature trees along watercourse itself and younger trees extending out to south.<br>▪ Approximately four Ash evidently colonised by ADD, with remaining canopy falling into Classes 3-4 (see paragraph 3.6).<br>▪ Ash are theoretically within falling distance of footpath to south and one tree within falling distance of utility compound to north. | ▪ Tree contractor to remove all Ash trees from group due to identified increased risk of failure. NB: Stems may be retained as standing and fallen deadwood for habitat value where appropriate. | P = Dead and moribund stems up to 200mm diameter.<br>T = Persons using footpath. | 3 | 3 | 2 | N/A | 50K | M |
| G11 | 2no. Common Alder | EM | ≤ 16 | ≤ 350 | ≤ 10 | G | ▪ Group potentially indicated as subject to TPO Spring Wood (1962).<br>▪ Two Alder stems located outlying from main woodland to north-east, and stems evidently located within site boundaries. | ▪ N/A | P = Deadwood up to approximately 25mm diameter.<br>T = Persons accessing field. | 4 | 4 | 5 | 25% | <1M | N/A |

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|---|---|
| **Site:** | Land off Accrington Road, Whalley, Lancashire BB7 |
| **Client:** | CCB Land Management |
| **Brief:** | Carry out an individual tree survey within area specified by client, report on projected risk posed to persons and property, and make management recommendations where appropriate |

| | |
|---|---|
| **Surveyor:** | [redacted] Chartered Arboriculturist |
| **Survey Date:** | 12 December 2023 |
| **Viewing Conditions:** | Overcast but bright, with overnight rain |
| **Job Reference:** | BTC2870 |



| No. | Species | Age | Height (m) | Stem Diam. (mm) | Crown Spread (m) | Vitality | Comments | Management Recommendations | Risk Assessment Description (Part/Target) | Target | Size | P.O.F | Reduced Mass % | Risk Index | Work Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G12 | Common Ash, Goat Willow, Hawthorn | EM | ≤ 17 | ≤ 450# | ≤ 10 | M-D | ▪ Group of Predominantly Ash and Goat Willow.<br>▪ Evidently, under adjacent highways ownership, and planted as part of past highways alteration scheme.<br>▪ Not accessed to inspect.<br>▪ Ash all heavily colonised by ADD, with remaining canopy cover falling into Classes 3-4 (see paragraph 3.6) and stems evidently within falling distance of site and highway.<br>▪ Several partially failed Goat Willows to south-western extents.<br>▪ Group is evidently a wider continuation of group G3, which is within client's ownership, with steep banking down to road.<br>▪ Hawthorn hedge located along dilapidated highway boundary fence on western and northern group edge that borders client's site.<br>▪ Several failed stems within group have fallen into site. | ▪ Client to contact applicable land owner (likely highways authority) to notify them of survey findings and associated recommendations.<br>▪ Land owner's tree contractor to remove and clear back fallen stems to site boundary to facilitate any stock fence repairs. | P = Dead and Moribund stems up to 350mm diameter.<br>T = Vehicles and occupants using road. | 1 | 2 | 2 | N/A | 100 | H |
| G13 | Common Oak, Alder, Goat Willow, Hawthorn, Spruce | Y-SM | ≤ 8 | ≤ 150 | ≤ 4 | G | ▪ Various self set young and semi-mature trees and some evidently planted Spruce in loosely spaced group throughout site, largely to open areas to centre.<br>▪ Group largely evidently self set following site becoming out of use for any other purpose.<br>▪ Not shown on Tree Survey Plan (TSP). | ▪ | N/A | - | - | - | N/A | <1M | N/A |

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|---|---|---|---|
| **Site:** | Land off Accrington Road, Whalley, Lancashire BB7 | **Surveyor:** | [redacted] Chartered Arboriculturist |
| **Client:** | CCB Land Management | **Survey Date:** | 12 December 2023 |
| **Brief:** | Carry out an individual tree survey within area specified by client, report on projected risk posed to persons and property, and make management recommendations where appropriate | **Viewing Conditions:** | Overcast but bright, with overnight rain |
| | | **Job Reference:** | BTC2870 |



| No. | Species | Age | Height (m) | Stem Diam. (mm) | Crown Spread (m) | Vitality | Comments | Management Recommendations | Risk Assessment Description (Part/Target) | Target | Size | P.O.F | Reduced Mass % | Risk Index | Work Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W1 | Downy Birch, Oak, Goat Willow, Sycamore, Holly, Hawthorn | EM | ≤ 17 | ≤ 500 | ≤ 14 | G-D | ▪ Areas of severe waterlogging throughout.<br>▪ Several instances of hung up and partially failed trees with hanging stems and branches throughout.<br>▪ Woodland evidently accessed by persons, with desire line footpaths and gaps in boundary fencing to adjacent residential properties.<br>▪ Waterlogging topography and abandoned shelter with litter and debris etc., which impeded inspection in parts.<br>▪ Evident gap between main group to west and part of group to east, but tree age and form consistent across wider group.<br>▪ Little to no management evident throughout.<br>▪ Debris and rubbish dumped within, with indications that some of this may be from adjacent residential properties.<br>▪ Invasive Himalayan Balsam in parts, as well as dense areas of invasive Horses Tail.<br>▪ Two Birch stems to south west corner marked W1a have severe leans although failure would occur into evidently low use woodland.<br>▪ Area of scrubby Hawthorn and Ivy to south west corner adjacent to footway edge. | ▪ Tree contractor to remove all hung up and partially failed stems and branches throughout group, leaving as fallen deadwood on ground for habitat value where appropriate.<br>▪ Client to consider preparation of long term woodland management plan, in conjunction with tree consultant and an ecologist, to maintain and improve long term tree cover. | P = Dead and hung up stems up to approximately 250mm diameter.<br>T = Persons accessing woodland. | 4 | 3 | 2 | N/A | 500 K | M |
| W2 | Common Oak, Beech | M | ≤ 21 | ≤ 1000# | ≤ 20 | M-G | ▪ Mature area of woodland.<br>▪ Located on neighbouring land and not accessed to inspect in detail.<br>▪ One Beech to south-west has evidently failed into site.<br>▪ Low canopies to ground on most parts over fence, which would require pruning to renew fence along boundary. | ▪ | P = Deadwood up to approximately 100mm diameter.<br>T = Persons accessing field. | 4 | 4 | 2 | 50% | <1M | N/A |


T = Individual Tree, G = Group of Trees, W = Woodland

(Red) = Tree/Group/Woodland with Risk of Harm of 1/1,000 or greater

(Orange) = Tree/Group/Woodland with Risk of Harm between 1/1,000 and 1/10,000

(Yellow) = Tree/Group/Woodland with Risk of Harm between 1/10,000 and 1/1,000,000

(Green) = Tree/Group/Woodland with Risk of Harm less than 1/1,000,000

* See QTRA Methodology Overview and Application in Management Decisions Section of Report for details regarding Risk of Harm

Site: Land off Accrington Road, Whalley, Lancashire, BB7

Job No.: BTC2870

Scale: Not to Scale

Paper Size (for printing): A3

Date: January 2024

# TREE SURVEY PLAN

(Overview)

Bowland Tree Consultancy Ltd

e: info@bowlandtreeconsultancy.co.uk
t: 01772 457180


T = Individual Tree, G = Group of Trees, W = Woodland

- (Red) = Tree/Group/Woodland with Risk of Harm of 1/1,000 or greater
- (Orange) = Tree/Group/Woodland with Risk of Harm between 1/1,000 and 1/10,000
- (Yellow) = Tree/Group/Woodland with Risk of Harm between 1/10,000 and 1/1,000,000
- (Green) = Tree/Group/Woodland with Risk of Harm less than 1/1,000,000

* See QTRA Methodology Overview and Application in Management Conclusions Section of Report for details regarding Risk of Harm

Site: Land off Accrington Road, Whalley, Lancashire, BB7

Job No.: BTC2870

Scale: Not to Scale

Paper Size (for printing): A3

Date: January 2024

# TREE SURVEY PLAN

(Plan 1 of 4)

Bowland Tree Consultancy Ltd

e: info@bowlandtreeconsultancy.co.uk

t: 01772 437150


T = Individual Tree, G = Group of Trees, W = Woodland

(Red) = Tree/Group/Woodland with Risk of Harm of 1/1,000 or greater

(Orange) = Tree/Group/Woodland with Risk of Harm between 1/1,000 and 1/10,000

(Yellow) = Tree/Group/Woodland with Risk of Harm between 1/10,000 and 1/1,000,000

(Green) = Tree/Group/Woodland with Risk of Harm less than 1/1,000,000

* See RTRA Methodology Overview and Application in Management Guidance Section of Report for details regarding Risk of Harm

Site: Land off Accrington Road, Whalley, Lancashire, BB7

Job No.: BTC2870

Scale: Not to Scale

Paper Size (for printing): A3

Date: January 2024

# TREE SURVEY PLAN

(Plan 2 of 4)

Bowland Tree Consultancy Ltd

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T = Individual Tree, G = Group of Trees, W = Woodland

- (Red) = Tree/Group/Woodland with Risk of Harm of 1/1,000 or greater
- (Orange) = Tree/Group/Woodland with Risk of Harm between 1/1,000 and 1/10,000
- (Yellow) = Tree/Group/Woodland with Risk of Harm between 1/10,000 and 1/1,000,000
- (Green) = Tree/Group/Woodland with Risk of Harm less than 1/1,000,000

* See STRA Methodology Overview and Application in Management Decisions Section of Report for details regarding Risk of Harm

Site: Land off Accrington Road, Whalley, Lancashire, BB7

Job No.: BTC2870

Scale: Not to Scale

Paper Size (for printing): A3

Date: January 2024

# TREE SURVEY PLAN

(Plan 3 of 4)

Bowland Tree Consultancy Ltd

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T = Individual Tree, G = Group of Trees, W = Woodland

- (Red) = Tree/Group/Woodland with Risk of Harm of 1/1,000 or greater
- (Orange) = Tree/Group/Woodland with Risk of Harm between 1/1,000 and 1/10,000
- (Yellow) = Tree/Group/Woodland with Risk of Harm between 1/10,000 and 1/1,000,000
- (Green) = Tree/Group/Woodland with Risk of Harm less than 1/1,000,000

* See OTRA Methodology Overview and Application in Management Decisions Section of Report for details regarding Risk of Harm

Site: Land off Accrington Road, Whalley, Lancashire, BB7

Job No.: BTC2870

Scale: Not to Scale

Paper Size (for printing): A3

Date: January 2024

# TREE SURVEY PLAN

(Plan 4 of 4)

Bowland Tree Consultancy Ltd

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Bowland
Tree Consultancy Ltd

**DISCLAIMER**

**Survey Limitations:** Unless otherwise stated all trees are viewed from ground level using non-invasive techniques. The disclosure of hidden crown and stem defects, in particular where they may be above a reachable height or where trees are ivy clad or in areas of ground vegetation, cannot therefore be expected. All obvious defects, however, are reported. Where the QTRA Risk Index is calculated as Tolerable or Broadly Acceptable, but the tree(s) have not been adequately inspected (e.g. due to the presence of ivy and/or ground vegetation which impeded the inspection), then it is essential to follow the recommendations made in the Management Recommendations column and to have the applicable tree(s) re-inspected as recommended.

Detailed tree safety appraisals are only carried out under specific written instructions. Comments upon evident tree safety relate to the condition of said tree at the time of the survey only. The level of detail of the survey is as per the brief detailed on the Tree Survey Schedule and as per the specifics set out in the associated fee estimate for the project.

Unless otherwise stated all trees should be re-inspected annually in order to appraise their on-going mechanical integrity and physiological condition. It should, however, be recognised that tree condition is subject to change, for example due to the effects of disease, decay, high winds, development works, etc. Changes in land use or site conditions (e.g. development that increases access frequency) and the occurrence of severe weather incidents are also significant considerations with regards tree structural integrity and trees should therefore be re-assessed in the context of such changes and/or incidents and inspected at intervals relative to identified and varying site conditions and associated risks.

Where trees are located wholly or partially on neighbouring private third-party land then said land is not accessed and our inspection is therefore restricted to what can reasonably be seen from within the site. Any subsequent comments and judgments made in respect of such trees are based on these restrictions and are our preliminary opinion only. Recommendations for works to neighbouring third-party trees are only made where a potentially unacceptable risk to persons and/or property has been identified during our survey. Where significant structural defects of third-party trees are identified and associated management works are considered essential to negate any risk of harm and/or damage then we will first attempt to inform the site occupier of the issues and, if not possible, then inform the relevant Council. Where a more detailed assessment is considered necessary then appropriate recommendations are set out in the Tree Survey Schedule.

The potential influence of trees upon existing or proposed buildings or other structures, resulting from the effects of their roots abstracting water from shrinkable load-bearing soils, is not considered herein.



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**Statutory Tree Protection:** It is the client's responsibility to check for the presence of any statutory tree protection measures, such as the site's location within a Conservation Area and/or the presence of any Tree Preservation Orders, directly with the applicable Council's planning department prior to scheduling or carrying out any tree works. In turn, it is also the client's responsibility to check for the need for a felling licence with the Forestry Commission prior to scheduling or carrying out any tree works. Bowland Tree Consultancy Ltd cannot be held responsible for any decisions made by the client to prune or remove trees where any such statutory protection exists.

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QTRA Quantified Tree Risk Assessment

***Simply Balancing Risks With Benefits***

# Quantified Tree Risk Assessment

# PRACTICE NOTE

VERSION 5

# 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.

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

[1] See Tables 1, 2 & 3.

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.

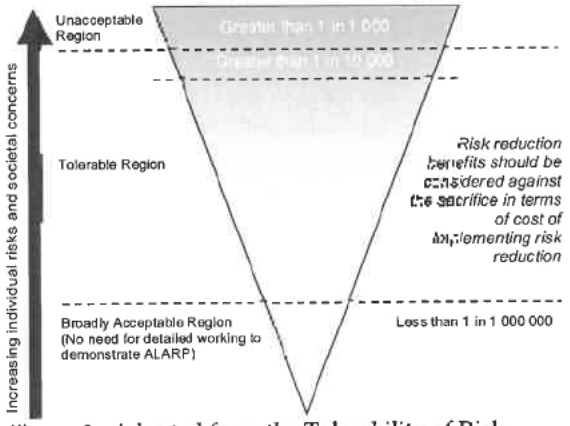


Figure 1. Adapted from the Tolerability of Risk framework (HSE 2001).

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

[2] Discussed further on page 5.

[3] See Tables 1, 2 & 3.

### 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

**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 - >1/82 |
| 4 | 25mm (1") dia. - 100mm (4") dia. | 1/82 - 1/2 500 |

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

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

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 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)<br>32 000 – 3 300 @ 80kph (50mph)<br>47 000 – 4 800 @ 50kph (32mph) | 1/1 – >1/10 |
| | | Pedestrians & cyclists: | 720/hour – 73/hour | | |
| 2 | £200 000 – >£20 000 | Occupation: | 2.4 hours/day – 15 min/day | 2 600 – 270 @ 110kph (68mph)<br>3 200 – 330 @ 80kph (50mph)<br>4 700 – 480 @ 50kph (32mph) | 1/10 – >1/100 |
| | | Pedestrians & cyclists: | 72/hour – 8/hour | | |
| 3 | £20 000 – >£2 000 | Occupation: | 14 min/day – 2 min/day | 260 – 27 @ 110kph (68mph)<br>320 – 33 @ 80kph (50mph)<br>470 – 48 @ 50kph (32mph) | 1/100 – >1/1 000 |
| | | Pedestrians & cyclists: | 7/hour – 2/hour | | |
| 4 | £2 000 – >£200 | Occupation: | 1 min/day – 2 min/week | 26 – 4 @ 110kph (68mph)<br>32 – 4 @ 80kph (50mph)<br>47 – 6 @ 50kph (32mph) | 1/1 000 – >1/10 000 |
| | | Pedestrians & cyclists: | 1/hour – 3/day | | |
| 5 | £200 – >£20 | Occupation: | 1 min/week – 1 min/month | 3 – 1 @ 110kph (68mph)<br>3 – 1 @ 80kph (50mph)<br>5 – 1 @ 50kph (32mph) | 1/10 000 – >1/100 000 |
| | | Pedestrians & cyclists: | 2/day – 2/week | | |
| 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.

### 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


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).

**Delegating Risk Management Decisions**

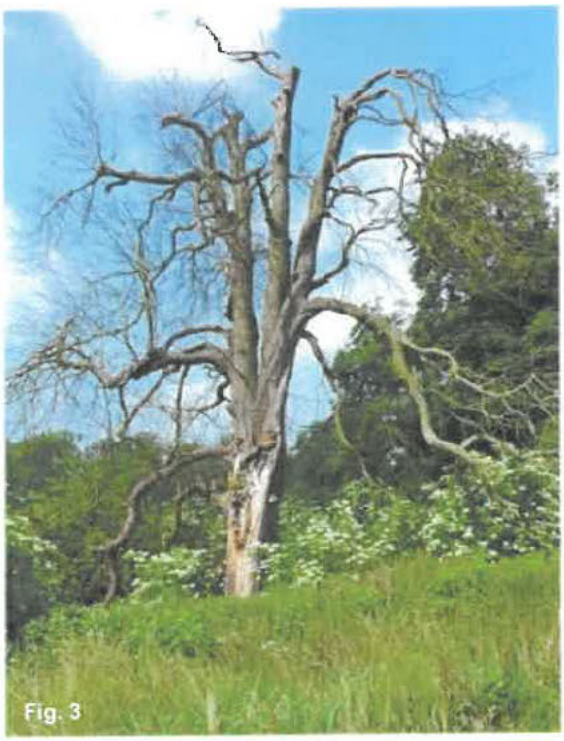
Fig. 3

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 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**<br>Risks will not ordinarily be tolerated | • Control the risk |
| 1/1,000 | | |
| | **Unacceptable**<br>(where imposed on others)<br>Risks will not ordinarily be tolerated | • Control the risk<br>• Review the risk |
| | **Tolerable**<br>(by agreement)<br>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<br>• Review the risk |
| 1/10 000 | | |
| | **Tolerable**<br>(where imposed on others)<br>Risks are tolerable if ALARP | • Assess costs and benefits of risk control<br>• Control the risk only where a significant benefit might be achieved at reasonable cost<br>• Review the risk |
| 1/1 000 000 | | |
| | **Broadly Acceptable**<br>Risk is already ALARP | • No action currently required<br>• 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.

**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 | 3 | = | 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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