QUANTIFIED TREE RISK ASSESSMENT SYSTEM

Most tree defects can be identified and assessed by a skilled inspector, but there is no evaluation methodology currently in general use that enables the inspector to quantify risk in a way that the risks associated with the retention of trees can be compared with a broadly acceptable level of risk. The Quantified Tree Risk Assessment system expands concepts developed by others and enables a probability of significant harm to be applied to tree-failure risk. By evaluating the components of a tree-failure hazard and assigning to them estimates of probability, the proposed system enables the skilled tree inspector to calculate the product of the probabilities to produce a numerical estimate of risk. The use of quantification in the assessment of tree hazards enables property owners and managers to operate, in as far as is reasonably practicable, to a predetermined limit of reasonable or acceptable risk.

If absolute safety from tree failure were achievable, society would almost certainly find the cost in terms of tree losses unacceptable. The concept of 'reasonable practicability' is a central tenet of English law, which is evident throughout the English Health and Safety legislation and guidance (e.g. Health and Safety at Work Act 1974), and in judgements of the higher courts in relation to tree failure. This concept is embraced in the Quantified Tree Risk Assessment system.

Quantified Tree Risk Assessment provides a framework for the assessment of the three components of tree-failure risk – Probability of Failure, Impact Potential and Target Value. Having assessed the value or usage of targets upon which trees might fail, tree owners and site managers can establish whether or not and at what degree of rigour tree inspections are required.

By allocating quantifiable values to the probability of failure and impact potential of trees, and to the targets upon which trees might fail, the arborist can, with training, assess tree-failure hazards with sufficient accuracy that property owners and managers are able to balance the risk of significant harm from tree failure against a level of reasonable or acceptable risk. Using the Quantified Tree Risk Assessment system, it is possible, not only to identify unacceptable risks, but also to identify the elements of the risk, which when modified will effectively reduce the overall risk of harm in the most cost efficient or appropriate manner.

Target Evaluation. A target is anything of value, which could be harmed in the event of tree failure. Frequent inspection of trees and assessment of associated risks may be essential in areas of high public access or where trees are within striking range of valuable or fragile structures. Conversely, in a location without structures and having very low public access, assessment of tree hazards may be unnecessary. The target value is the most significant and most easily quantified element of the assessment. In Quantified Tree Risk Assessment, evaluating the nature of the targets within a survey area before the assessment of trees enables the tree manager to prioritise inspections and establish the degree of rigour required of the risk assessment.

Weather conditions greatly influence tree failure. A walk through woodland and other recreational areas after a moderate storm will often reveal paths and tracks littered with dead and recently living branches. The same weather conditions might at the same time result in reduced pedestrian access to recreational areas, substantially reducing the risk of harm from tree-failure. People may venture beneath trees during high winds either in the pursuit of recreation, thus voluntarily contributing to their increased exposure harm from tree failure, or out of necessity such as en route from home to a workplace. Even in the latter example, weather conditions may be so extreme that the risk of harm from the failure of not only trees but the collapse of buildings and other storm related hazards is such that to venture out at all would be foolhardy. Conversely, the risk of branch failure in tree species susceptible to summer branch drop increases during periods of hot dry weather when pedestrians might seek shade beneath trees. Quantified Tree Risk Assessment includes a facility for considering these scenarios.

Impact Potential. The system categorises impact potential by the diameter of tree stems and branches. A biomass equation derived from weight measurements of trees is used to produce a

data set of comparative weight estimates of trees and branches ranging from 10 to 600 mm diameter.

Probability of Failure. Accurately assessing the probability that a tree or branch will fail is highly dependant upon the skill and experience of the assessor. Having assessed the tree, the assessor visualises 1,000, 100, or 10 similar trees in a similar state in the same environment and estimates how many would be likely to fail during the coming year.

The Quantified Tree Risk Assessment system not only significantly reduces the influence of assessor subjectivity upon the outcome of the risk assessment, but also applies a robust structure to the assessment procedure, requiring detailed assessment of the tree only where there is a significant likelihood of unacceptable risk. By first evaluating and mapping both the general nature of the tree population within an administrative area and the range of targets upon which they could fail, the manager of a large tree population can identify the interface between trees and targets, thus enabling prioritisation of risk assessments. A post-mature tree population adjacent to a busy urban thoroughfare might require biannual assessment, whereas the same tree population in a remote wilderness might never be assessed in detail. Between these extremes is a range of inspection frequency, which can be applied as appropriate to the situation.

Use of the system without training leads to misapplication of the data. To ensure, insofar as practicable, that the value of the system is maintained through consistent application, training and ongoing development through a licensing programme has been developed.