

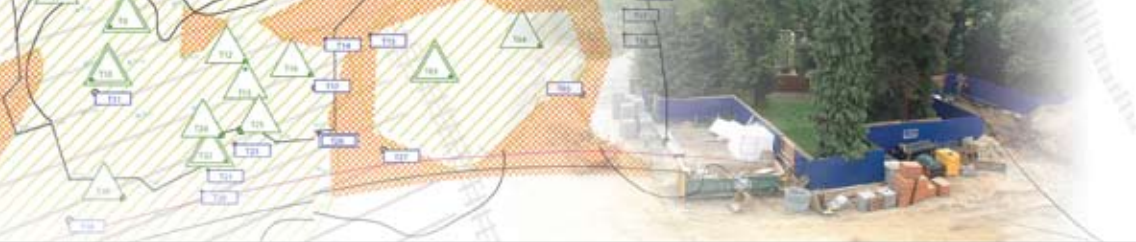


TreeAZ: An international framework for tree assessment

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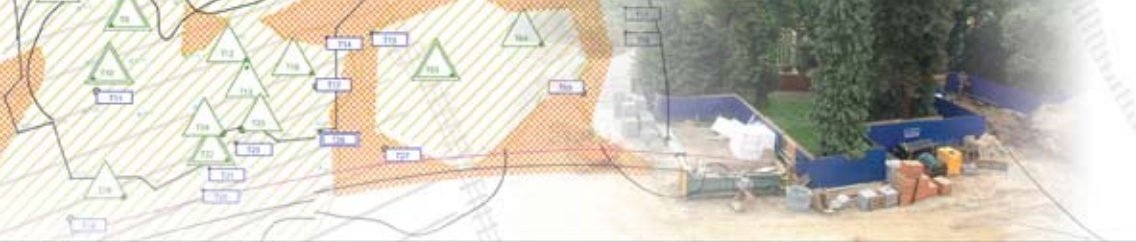
Wouldn't it be good if there was a standard approach to tree assessment throughout the world? Wouldn't it be better if it was a British innovation and we were the lead nation in its development? Jeremy Barrell has designed tree assessment systems in the USA, Australia, France and the UK, with a reputation for innovation and success. In the context of this international experience, he believes he has found Arboriculture's Holy Grail and has embarked on a world tour of enlightenment. He takes time out from preparing for his next presentation in New Zealand to explain his vision and why he thinks it will be an international winner.



No matter where you are in the world, there are obvious common threads running through urban tree management. It is always a priority to manage risk and reduce adverse impact on people and property, it is always important to maximise the benefit or amenity that arises from them and it is always desirable to sustain the resource. These similarities lend themselves to a systematic approach to tree management decision making that can be applied across national boundaries with the real potential to be adopted as an international standard. Of course, the detail will vary on a local level but the general principles will be the same in suburbia throughout the world.

One of the commonest and often the most difficult management decision that arboriculturists have to make relates to tree removal. What are valid reasons for removal and when is the right time to do it? Fundamental dilemmas that arboriculturists have to deal with on a daily basis, often relying on intuition rather than any analytical process to find a solution. Why is this such a difficult issue and is there a more reliable way to make the decision?

Historically, arboricultural practice has developed in a piecemeal fashion with methods for assessing trees evolving to meet a specific need; development sites had BS 5837 and then SULE, TPOs have the typical government 'suck it and see' amenity bodge and general tree management decisions are more about guesswork than any systematic approach. Despite the common underlying principles, there has never been any attempt to pull all the methods together to create a universal tree assessment methodology. Because these principles are a common feature of all tree management, I believe a better way would be to set out these fundamental elements as a starting point for all tree assessment and modify that to provide the detail for each different application. Even for the most experienced arboriculturist, there is no denying that these are difficult issues and there would be significant benefits to a standardised decision making process.



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Arboriculturists manage trees close to people and property, with a number of fundamental requirements arising from this proximity. In this context, it is useful to understand the following basic principles before specific management options for individual trees can be properly considered:

- **Proximity - levels of risk:** Where there are people and property, establishing and maintaining acceptable levels of risk is an absolute priority. It is far more important than tree amenity or the cost of any work. The measure for action is hazard potential, which is related to tree size, tree structure and the number of targets that could be hit. As trees grow bigger, their potential to cause damage increases; as tree structure becomes more suspect, so the chance of failure increases; as the number and value of targets increases, so the potential for damage and injury increases. This absolute priority of reducing risk to an acceptable level can be achieved through tree removal, tree treatment or removing the targets. Nothing is more important than meeting this objective. Not surprisingly, the high profile of this management aspect has focused attention resulting in a number of sophisticated methodologies that comprehensively cover the issues (see hazard assessment).

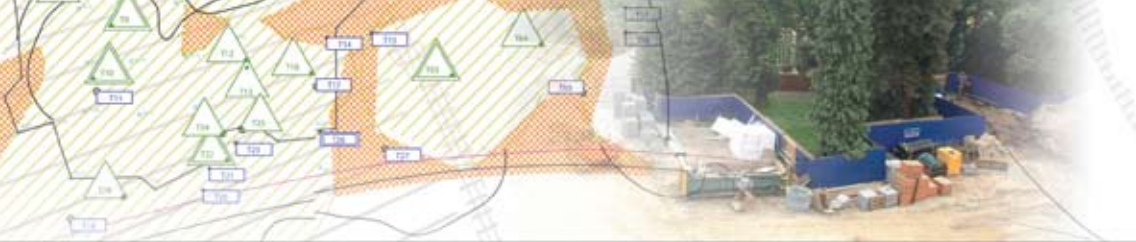
- **Proximity - nuisance and inconvenience:** In addition to risk management, issues related to people's tolerance of tree problems also arise because of proximity. If trees are too close, they can disrupt property owner's normal activities; mild disruption (inconvenience) is at one extreme and severe disruption (nuisance) is at the other. Inconvenience focuses around issues of excessive shading, encroachment by branches and clearance of fallen debris. Nuisance relates to the more serious impact of trees such as damage by roots and trespass across boundaries. As the disruption to normal property use increases, the property owner's tolerance of the tree problems decreases to a point when action becomes unavoidable. The thresholds for action are not as clear cut as with levels of risk but there are reference points and responsible decisions on these issues are made on a regular basis within the legal and planning systems (see establishing thresholds). Both inconvenience and nuisance are valid reasons for removing trees and they must be integrated into the decision making process.

Hazard assessment Trees can cause severe injury and damage so it is not surprising that the focus in the tree management debate has fallen on quantifying these risks. Various international texts are devoted to sophisticated methods and systems based on extensive research to help assess risk as a guide to management decision making. In the clamour to deal with the high profile issue of risk, the more mundane matters of sustaining amenity and dealing with inconvenience/nuisance have been virtually ignored. Whilst hazard assessment is undeniably an important element of any tree management system, it is not the whole system and lavishing attention on this one aspect does not constitute a sustainable approach. Arboriculture will not come of age until all these elements of tree management have been fully integrated into one overarching strategy setting each into context. Hazard is not the whole story, a point that arboricultural evolution to date seems to have missed! Establishing thresholds of acceptable levels of inconvenience/nuisance.

In its broadest sense, inconvenience/nuisance is the interference with the authorised use of land. Relating to trees, it can be in the form of roots disrupting landscaping and hard surfacing, parts of trees physically preventing land use, tree debris such as leaves and fruit falling and tree crowns causing excessive shade. The principles for establishing what are acceptable



USA: Keith Shriver, Plantation City Forester, is forced to remove healthy black olive trees because the staining caused by leachate from leaves and fruit is a nuisance not tolerated by the public.



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levels of inconvenience/nuisance are the same irrespective of the cause. In a community context, it is generally accepted that the benefits from trees are significant and it is reasonable for individuals to tolerate some level of inconvenience to secure those benefits for society. However, the precise location or value of these thresholds is not always obvious and is often a subjective interpretation rather than a definitive point. There will always have to be a balancing of the benefit to the community weighed against the inconvenience suffered by the individual. What is an acceptable, tolerable or reasonable level of inconvenience is often a matter of judgement for each specific situation, tempered by experience and common sense. This, in turn, should be guided by court, tribunal and planning decisions that have made informed judgements on these issues. For example, a tree shading a lawn and preventing grass growing may be acceptable where the garden is large and there are other lawn areas to use but unacceptable where it is the only area of lawn in a small garden. Similarly, regular and severe staining caused by fallen debris to a swimming pool surround may be unacceptable because the stark contrast in colours creates a dirty impression whereas the same staining on a path or drive surface may be more acceptable. Where more serious damage occurs to property from root action, then court judgements on liability help to focus on what level of damage is deemed tolerable by society.

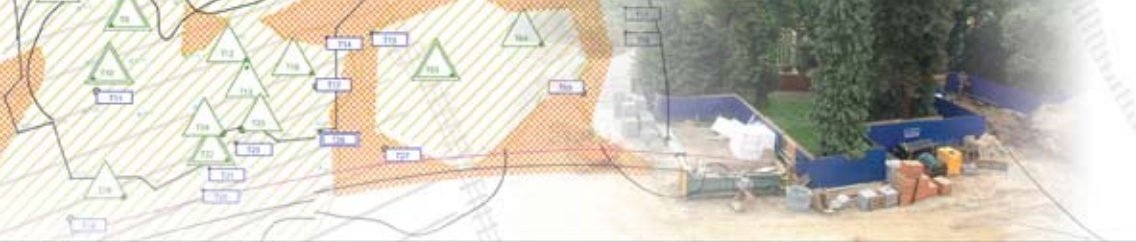
A sustainable management strategy must identify these thresholds and have a mechanism to adjust based on evolving experience. For example, in the UK, the Office of the Deputy Prime Minister (ODPM) oversees the administration of TPO appeals and has a database of decisions. These decisions specifically deal with issues of inconvenience/nuisance such as shading and falling debris etc, providing a benchmark to judge where the government sets the thresholds of acceptability on behalf of society. Of course, every case is different, so direct comparisons may not always be appropriate, but these decisions do represent an evolving body of opinion that will be useful in setting the broad boundaries in these matters. This is extremely valuable when assessing whether it is justifiable to remove a tree on the grounds of inconvenience/nuisance. The ODPM advise that this database will soon be available online.

- **Sustained amenity:** This is a principle 'borrowed' from the forestry concept of sustained yield. In the forestry scenario, a high priority is often placed on regulating the flow of timber products from a forest unit because of obvious benefits such as stability for wood based industries and employment. In the urban 'forest', the product arboriculturists manage is amenity rather

than timber and significant benefits arise from regulating its flow to the community. A major part of this amenity is through tree size and their impact on the landscape over time; the larger they are and the longer they can be retained, the greater tends to be their importance. It follows that good management should seek to maximise this contribution and minimise the impact of necessary maintenance. It is a common feature of amenity planting that all the trees are of a similar size or age. The implications of this are that many trees will reach maturity and need removing at about the same time, resulting in rapid changes to the local landscape. It is inevitable that as trees mature they will need removing and replacing; good management should seek to spread these operations over long periods, thus reducing the number and impact of removals at any one time. Sustained amenity is achieved by establishing a range of age classes within a local population; from new planting right through to mature trees. Generally, this can be achieved by removing and replacing trees that are not performing because they are not suited to the site or they are interfering with better trees. Whilst much more subtle than the issues of risk and inconvenience/nuisance, removing trees to achieve a desirable age class distribution, is nonetheless an essential element of long term tree population management.



Australia: This severely unbalanced Eucalypt in a Melbourne park has no potential to improve and compromises the principle of sustained amenity. It is limiting age class structure diversity by occupying space that a new tree with better potential could use.



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• **The principle of negative selection:** At first glance, as arboriculturists are managing amenity, it would seem an obvious approach to base management decisions on what a tree looks like and how big it is. But risk and inconvenience/nuisance override this and cause some difficulty using visual features as decision making criteria (see the futility of 'form'). This is further complicated by extremely variable and awkward factors such as how much of a tree can be seen and by how many people and from where. Fortunately, in the UK, some help can be extracted from primary legislation and government guidance, which sets out why trees are important. It is widely accepted that the 1990 Town & Country Planning Act gives a clear lead that all trees should be a material consideration when dealing with planning applications. Put simply, this means that the starting point in any assessment is that they are all important unless proved otherwise. This is reinforced by the government guidance on making tree preservation orders (TPOs) where it clearly states that any tree with amenity that can be viewed from a public place can be protected and that amenity can be present or future. I interpret these references as providing a solid foundation for a management presumption that all trees are good unless there are valid reasons to the contrary. Counterintuitive as it may be, I believe there is a compelling case to say we should abandon the traditional tree assessment theme of looking for what is good and do the complete reverse - look for what is bad!! Valid and defensible reasons for removing trees are far more relevant to the decision making process than reasons for keeping trees. Negative selection is removing the worst, which results in the best being selected by default.

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On the assumption that these general principles are relevant to the majority of urban tree management scenarios, how can they be applied at an individual tree level? Clearly, the presumption that all trees should be retained unless there are valid reasons to remove them seems an attractive, defensible and sustainable approach to tree management. Using this starting point, valid reasons to remove trees include the following:

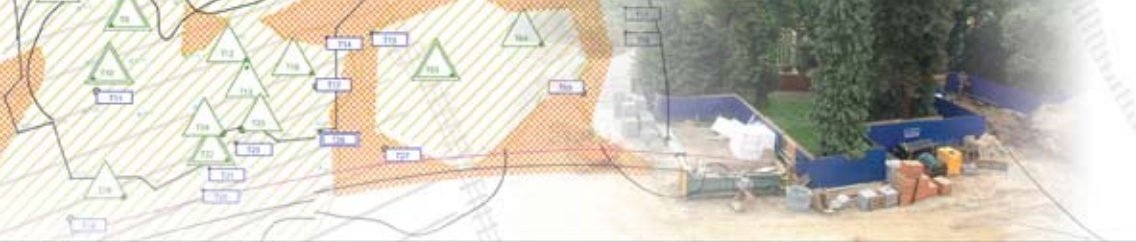
• **High risk:** Establishing whether trees need to be removed for risk reasons has been extensively researched and documented (see hazard assessment). Obvious reasons include dead, dying, diseased, severe damage/structural defects and instability. There is a wide range of credible methods to assess risk and it is

beyond the scope of this article go into any detail. However, it is important to avoid becoming over-focused on this at the expense of other management considerations. Risk is just one element, important as it obviously is, of a much larger system and it should not be used in isolation from the other essential considerations of sustained amenity and inconvenience/nuisance.

"Risk is just one element, important as it obviously is, of a much bigger system and it should not be used in isolation from other essential considerations of sustained amenity and inconvenience/nuisance."



France: Monstrosity or magical? The quality of form is simply an opinion that has no place in serious tree assessment.



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- **Good management:** In addition to establishing acceptable levels of risk, good management should seek to minimise inconvenience/nuisance, all within the context of sustaining amenity. Valid inconvenience/nuisance reasons to remove trees include excessive shading, dropping of debris, honeydew staining, branch encroachment, root encroachment, structural damage and excessive cost to retain. Valid sustaining amenity reasons to remove trees include occupying space that could be better used by new trees and poor trees destructively interfering with better trees. The precise point at which the level of disruption becomes sufficient to justify removal is a matter for professional judgement and a very good reason why only arboriculturists should carry out these types of assessments (see establishing thresholds).

- **Exceptions to the rule:** My experience has shown that there are always elements within any system that cannot be neatly 'pigeon-holed' and are exceptions to the rule. Annoying as they are to the tidy minded, they cannot be avoided and any sustainable system needs to be sufficiently flexible to deal with them. An important exception is trees that form ecological habitat that has statutory protection, most notably veteran trees under the European Protected Species legislation. At the other extreme, typical exemptions are hedges from TPOs, small

trees on development sites and poisonous trees within private gardens. Eccentric as some of these may seem, they do form valid reasons to retain or remove trees on a local level and there must be provision to incorporate them into the decision making process.

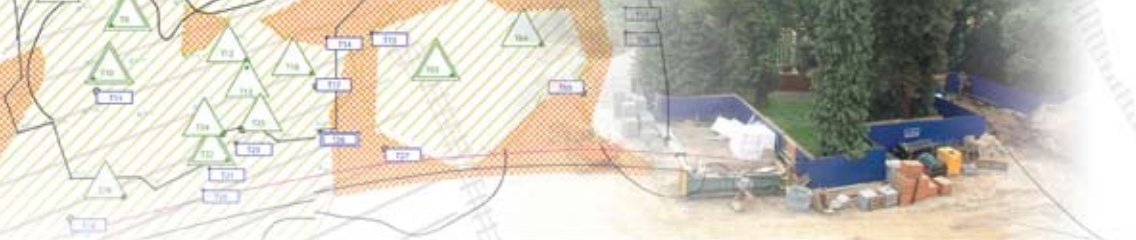
With all these complex and interacting issues, it is useful to have a structured method of considering each element individually in a systematic way to arrive at a final decision. There are several significant benefits to such an approach. The most practical advantage is that all the issues are listed so nothing is accidentally forgotten, an essential reminder with such a complex set of considerations. But perhaps most importantly, as these decisions can be subjected to public scrutiny or end up in legal proceedings, there is a defensible trail to the final decision. The cornerstone of avoiding claims of negligence is to demonstrate a proper and comprehensive method was applied to the decision making process and that process can be inspected.

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UK: This famous New Forest landmark is formed by four trees each individually unbalanced but as a group, form a stable and sustainable unit





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In the context of all these considerations, the 'yes/no' flow chart in Figure 1 summarises the fundamental decision making process for each individual tree. Of course, this is a summary and extensive arboricultural knowledge, experience and understanding must be applied to make a proper assessment at each stage in that process. At each stage, specific issues are considered and a 'yes/no' decision is made. If the decision is 'yes', then the next element is assessed and so on until the end. If, at any stage, the decision is 'no', then removal can be justified and the process for that tree stops at that point. If a tree can survive the analysis at all of these stages, then there are no valid reasons to remove it so it is worthy of retention by default. How it is managed from that point onwards depends on the purpose of the survey.

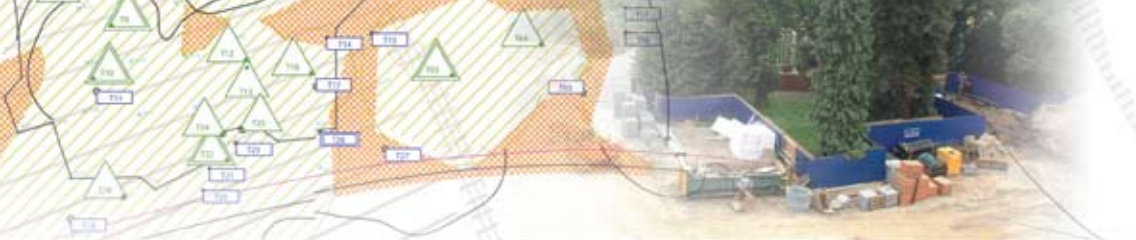
Managing groups of trees where individuals are closely spaced and contribute to amenity as a distinct unit is more demanding but it is still possible to make systematic and reasoned assessments. Each tree within the group must be considered individually and subjected to the same systematic process outlined in Figure 1. The same exclusion criteria apply so trees can be removed because they are a high risk, an excessive inconvenience/nuisance or compromise the objective of sustained amenity. Taking the issue of risk, a significant consideration with groups is that the assessments are made in the context of the other adjacent trees. Common features of trees within groups are that they are individually tall and thin or unbalanced although the group as a whole may be well proportioned. These characteristics are often so extreme that if the trees were isolated, there would be no option but to remove them. However, in a group situation, the shelter of the adjacent trees often reduces the level of risk to the extent that the poorly proportioned trees can be retained.

In terms of sustaining amenity, any tree destructively interfering with a better tree or a poor tree occupying space a new tree could use to better advantage are candidates for removal. However, in the context of groups, this long term benefit needs to be balanced against the disadvantages that might have on the group. For example, in a simple scenario of two trees in a group, if the removal of one compromises the retention of the other, then the implications are far reaching and need to be carefully weighed up. However, if the removal of one tree will not adversely impact on the other, then removal could be justified if it rectified destructive interference or made space available for new trees. A common characteristic of groups is that most of the individuals have developed with mutual shelter and rely on each other for stability. There is often little scope for the removal of trees from intact groups because of the adverse impact on those retained, especially if the group is mature. However, as

groups begin to lose individuals and become more fragmented, the opportunities for management to move towards establishing an uneven age class structure through phased removals and new planting are greatly increased.

Figure 1 outlines a basic methodology for making tree management decisions in any scenario where trees are close to people and property. This will be the same across international boundaries although the detail of how it is implemented will vary locally depending on the prevailing legislative, cultural and environmental framework. Within each country, differences in detail will also result from the specific management tasks that are required. In the UK, there are four main areas where these principles of tree assessment are applied with slight differences in emphasis as follows:

- **Development sites:** The priority on development sites is to identify the trees that have the potential to contribute to amenity to the extent that they are worthy of influencing any future layout. Development is about design for future use where the emphasis is on contribution of the site to amenity rather than individual trees so precise tree location is not critical. This means that existing small or young trees that can be replaced with similar sized trees within the site are not important in the wider planning context. On development sites, the future design dimension dictates small trees are an exception to the rule and can be justifiably removed (as long as they are replaced).
- **TPOs:** The general principles for deciding if a tree is suitable for retention on a development site are identical to those for deciding if a tree is suitable for inclusion in a TPO. The main exceptions to the rule arise from legal detail and generally relate to local administration and interpretation. Hedges are not included although the threshold where rows of large trees cease to be a hedge and become trees is difficult to define. As with development sites, small trees may be an issue because they are awkward to administer and Local Authorities may choose size as valid exclusion criteria.
- **Highway tree inspection:** Budgets are always a critical issue in highway tree management because of the numbers of trees involved and the extended nature of the location. The sheer logistics of managing millions of trees along thousands of miles of roads normally focuses resources on the immediate risk issues with little left for the longer term sustained amenity considerations. Interestingly, in direct contrast to the development site and TPO scenarios, this emphasis on risk results in small trees being retained until they become big enough to be a liability.



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• **General garden/parkland management:** The emphasis in these types of situations is very much directed by the personal taste and objectives of the owner. Of course, risk management is the priority but beyond that, if an owner has a preference against a certain species of tree or has specific landscape objectives that discriminate against a colour or shape, then, in the absence of any statutory control, these would be valid reasons for removal.

In the context of all these considerations, Barrell Treecare has developed a basic method for assessing trees that can be applied with minor modifications of detail to all these scenarios. It is called the Tree A/Z method of assessing trees or TreeAZ (pronounced 'Treeez') for short. It is an easy to remember name originating from the intuitive step of categorising all the good trees as 'A' and all the bad trees as 'Z'. More information on how this can be applied in practice can be found on our website at www.barrelltreecare.co.uk by clicking on the TreeAZ logo on the home page.

TreeAZ is unique because its central principle of negative selection neatly sidesteps the complexities of describing why trees are worth retaining, the Achilles heel of all existing tree assessment methods. For the first time arboricultural history, TreeAZ sets out a framework for tree assessment that steps beyond national boundaries, utilising principles and concepts that are relevant to tree management throughout the world. Sophisticated UK planning legislation is the envy of arboriculturists worldwide because of the high priority it places on trees. TreeAZ continues that tradition as a methodology setting Britain at the forefront of innovative arboriculture.

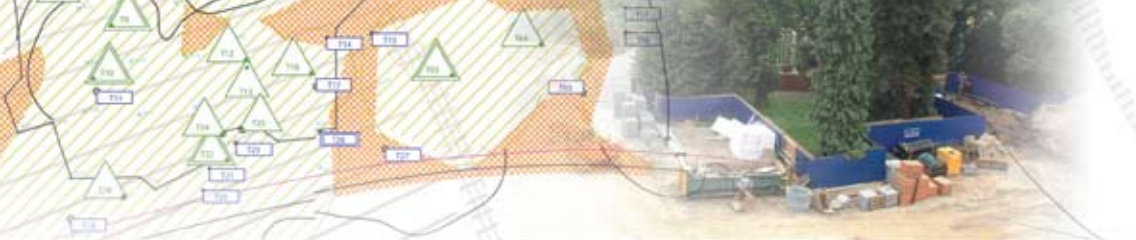
UK: It may be possible to remove problem trees from groups without compromising the retention of those that remain



Spain: 70–80% of the trees in this Madrid suburb would be classed as poorly formed, a situation found commonly around the world. Management based on this criterion would result in massive reductions in urban tree cover.

New Zealand: These three Monterey cypresses in an extremely exposed coastal location stand or fall together. Loss of any one of these trees will compromise those that remain.





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Figure 1: TreeAZ: an international framework for tree assessment based on the principle of negative selection

